TISLR13

theoretical issues in sign language research

Theoretical Issues in Sign Language Research Conference

26-28 September 2019

University of Hamburg

Conference Handbook

FINAL VERSION (19.09.19)

Universität Hamburg
DER FORSCHUNG | DER LEHRE | DER BILDUNG

HUMBOLDT-UNIVERSITÄT ZU BERLIN

GEORG-AUGUST-UNIVERSITÄT GÖTTINGEN

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Welcome

It is our pleasure to welcome you to the 13th International Conference on *Theoretical Issues in Sign Language Research* (TISLR) under the umbrella of the Sign Language Linguistics Society (SLLS). TISLR 13 will be held at the University of Hamburg, Germany, from September 26–28, 2019. We are proud to present an extensive three-day program with 25 stage presentations, 11 SIGNopsis presentations (a new format at TISLR), 187 poster presentations in 3 poster sessions, 3 social events, and the SLLS Business Meeting. This conference handbook contains all necessary information on the program, presentations, and events as well as logistic and practical details.

In line with the mission of the SLLS, the TISLR 13 conference aims to promote the latest advances in sign language research from a broad range of domains and adhering to the highest scientific and ethical standards. For this reason, we are happy to report that we received more than 450 abstracts of a high quality from all continents, from d/Deaf and hearing researchers and from early-career and senior researchers.

Moreover, the program impressively shows that the specialization of various fields in sign language research has been advanced. The research findings afford us an improved theoretical understanding of language structure, processing, acquisition, documentation, language use, and multilingualism. In addition to helping with the documentation, preservation, and revitalization of sign languages and sign language communities, the research presented at TISLR 13 further allows us to promote the awareness and practical implementation of sign language rights of d/Deaf sign language users in various societal domains including (but not limited to) education, the media, culture, employment, health, and justice. At this point, we feel fortunate to welcome as our special guests at TISLR 13 presidents and/or representatives of the WFD (World Federation of the Deaf), WASLI (World Association of Sign Language Interpreters), the DGB (German Deaf Association), the GLVHH (Deaf Association of Hamburg), and the DFG (German Science Foundation).

The four official conference languages are International Sign, German Sign Language, American Sign Language, and English, but several additional sign and spoken languages will also be used at this truly multilingual and multimodal event. We are confident that all conference attendees will have a chance to engage in direct conversations to exchange new ideas for future research, projects, and collaborations – irrespective of their background (e.g. hearing status, gender, professional status, or country of origin with(out) a long tradition of sign language research).

Finally, numerous people have been involved in various preparation stages of this conference: keynote signers and speakers, presenters, SLLS board members, members of the various TISLR 13 committees (including the topic committee, scientific committee and organizing committee as well as the NSF ASL committee), interpreters and translators (DGS/English, ASL/English, IS/English and CART), student assistants from the universities in Berlin, Göttingen, and Hamburg, technicians and colleagues from the Institute for German Sign Language (IDGS), as well as other colleagues and promoters of sign language research worldwide. Thank you very much for your important contributions and your support. It is always appreciated.

We are looking forward to seeing you soon in Hamburg,

Annika Herrmann (Universität Hamburg)
Barbara Hänel-Faulhaber (Universität Hamburg)
Christian Rathmann (Humboldt-Universität zu Berlin)
Markus Steinbach (Georg-August-Universität Göttingen)

TISLR 13 committees

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KURT UND KÄTHE KLINGER - STIFTUNG

RIT
National Technical Institute for the Deaf

SLS

General information

Arrival

By plane: Hamburg Airport is situated in the north of the city in “Fuhlsbüttel”. The city center can be reached by public transportation (S-Bahn, take S1 towards “Wedel/Blankenese”) or by cab. If you go by S-Bahn, please change at central station (“Hauptbahnhof”), as described below under “By train”. The ride from the airport to the station “Hamburg Dammtor”, which is next to the conference site (see maps below), takes about 30 minutes.
By car: Getting to the University of Hamburg by car is easiest if you take the highway and exit at “Hamburg Zentrum”. Then follow the signs to “Messe /CCH”, which will guide you to “Hamburg Dammtor”. This station is located next to the main building of the University of Hamburg (see maps below).
By train: The main building of the University of Hamburg is located right next to the train station “Hamburg Dammtor” (see maps below), where both loca trains and Deutsche Bahn high-speed trains and international trains stop. In case you arrive at Hamburg Central Station (“Hauptbahnhof”), please take the S-Bahn (line S 21 towards “Elbgaustraße” or line S 31 towards “Altona”). Either line will take you to the next stop, “Hamburg Dammtor”, in about two minutes. From the station “Hamburg Dammtor” it is only a 5 minute walk to the conference area (see map below).
Public transport: The University of Hamburg is well-connected to key locations in Hamburg via an extensive network of above-ground (S-Bahn) and underground (U-Bahn) metro lines, as well as several bus lines. Stations in walking distance to the TISLR conference site are: “Dammtor”, “Stephansplatz”, “Gänsemarkt”, “Hallerstraße”, “Grindelhof”, and “Universität Staatsbibliothek” (see maps below). Please note that the TISLR conference ticket allows you to use all public transportation for free throughout the three days of the conference.

Important websites

- Deutsche Bahn (German Railways): https://www.bahn.com/en/view/index.shtml
- Public transport association Hamburg: www.hvv.de/en (public transportation routes and schedules are also available at the corresponding app).

Registration & certificates

Registration will take place in the foyer of the main building (ESA, Edmund-Siemers-Allee 1) close to lecture hall A (see maps below). The main building is located opposite to the long-distance train station “Dammtor” (see “By train” and “Public transport” above). You will receive a conference bag with all of the relevant information and a certificate of attendance at the registration desk. The registration desk will be open during the conference hours. For those who attend the International Sign classes, registration will already be available on Wednesday from 1pm to 2pm.

Cloakroom

The cloakroom facilities are located by the registration desk in the foyer of the main building and are open during the conference hours.

Catering arrangements

Coffee breaks and a light lunch are included in the conference fee. The catering will be served in the conference tent behind the main building (Ernst-Cassirer-Park), please follow the signs from the main building. Coffee breaks include drinks and snacks.

Conference languages and interpretation

The official conference languages at TISLR 13 are International Sign (IS), German Sign Language (DGS), American Sign Language (ASL), and English. In additon, CART services in English will be provided. To contact the interpreter teams for any organizational requests or special needs, write to: interpreting@tislr.de. If you would like to request an interpreter (DGS, IS or ASL) for preparation, presentation and/or one-to-one meetings on the conference site, please be in touch with the interpreting coordinator over email at interpreting@tislr.de. Many thanks! If you have any feedback related to interpreting matters, please only provide this directly to the interpreting coordinator Anna Michaels in person or at the above email address.

Posters

Posters will be presented during the three poster sessions right in the center of the conference tent behind the main building (Ernst-Cassirer-Park, see maps below). Poster size is DIN A0 (84,1 x 118,9 cm) in portrait format. There will be a specific coding scheme linking each poster to its corresponding session. A map of the poster distribution can be found at the entrance to the tent.

Meeting of the African Sign Language Resource Center

September 28, 1:15 – 2:15, Lecture Hall B, led by Dr. Eyasu Tamene and Dr. Ruth Morgan, interpreters provided

Summer school

Right after TISLR 13, the DGS corpus project (Academy of Sciences and Humanities in Hamburg) will organize a summer school in cooperation with the project INEL (Academy of Sciences and Humanities in Hamburg) and the EU-Project “The Sign-Hub“ (Horizon 2020). The program and the registration dates will be announced soon. For more information, see:
https://www.sign-lang.uni-hamburg.de/dgs-korpus/index.php/summer-school-en.html

When?	September 30 to October 4, 2019
What?	Courses, tutorials, and workshops within the scope of language documentation and corpus linguistics
Where?	Institute of German Sign Language and Communication of the Deaf (IDGS), University of Hamburg, Gorch-Fock-Wall 7
Languages:	English and International Sign

Social events

General information about the social program can be found here:
https://www.idgs.uni-hamburg.de/en/tislr2019/rahmenprogramm.html

The **warming up** (pre-conference dinner) will take place on Wednesday September 25, 6 pm, at the "Hofbräu am Speersort" (Speersort 1, 20095 Hamburg, see here www.hofbraeu-wirtshaus.de).

The **conference dinner** will take place on Thursday September 26, 7.30 pm. The location of the conference dinner is the "Besenbinderhof" (Besenbinderhof 57A, 20097 Hamburg, see here https://www.besenbinderhof.com).

The **reception** will take place on Friday, September 27, 7.30 pm. The location of the reception is the "Rathaus", the Hamburg city hall (Rathausmarkt 1, 20095 Hamburg).

There will be guided city tours preceding the conference, international sign classes the day before the conference (September 25th), and a lively artistic program at the dinner event. You can **register** for the following events **during the TISLR 13 registration process**:

Guided city tours in International Sign:

- Tuesday 24th September, 6pm: Guided city tour: Reeperbahn (red light district), in International Sign
- Wednesday 25th September, 3pm: Guided city tour: Hamburg city and harbor, in International Sign

International Sign classes: Wednesday 25th September, 2-5pm, main university building ESA (Edmund-Siemers-Allee 1)

Cash point

- ATMs can be found at:
    - Main entrance of the campus cafeteria and post office (see below)
    - Kiosk "Unser Supermarkt", Schlüterstraße 22 (7am-8pm, Monday through Friday, 8am-4pm on Saturday)
    - Haspa, Grindelallee 53
- Money exchanges can be found at:
    - Train station "Dammtor" (9am-2pm and 2:45pm-6pm, Monday to Friday)
    - Postbank, Schlüterstraße 51-53 (9am-6pm, Monday through Friday, 9am-12pm on Saturday)

Pharmacy

Enten-Apotheke, Grindelallee 88-90 (8am-7pm Monday through Friday, 9am-2pm on Saturday)

Places to eat

- Campus cafeteria (8am-3pm Monday through Friday, breakfast 8am-10:30am, lunch 11:15am-2:30pm)
- Café-Shop Campus (11am-4pm Monday through Friday)
- Cafeteria “Studierendenhaus” (11am-7pm Monday through Friday, lunch 11am-5pm, afternoon special 3pm-5pm)
- Restaurants and cafés: There are plenty of places to eat along Grindelallee and Grindelhof, many of them offer vegan and vegetarian options. The closest international restaurants are: “Gran Sasso” (Italian, Schlüterstraße 12), “Thäng long” (Vietnamese, Grindelallee 91), and “Arkadasch” (Mediterranean, Grindelhof 17).

Post office (with ATM)

Schlüterstraße 51-53 (9am-6pm Monday through Friday, 9am-12pm on Saturday)

Supermarket

“Netto” (Grindelhof 23) and “Edeka” (Grindelallee 128)

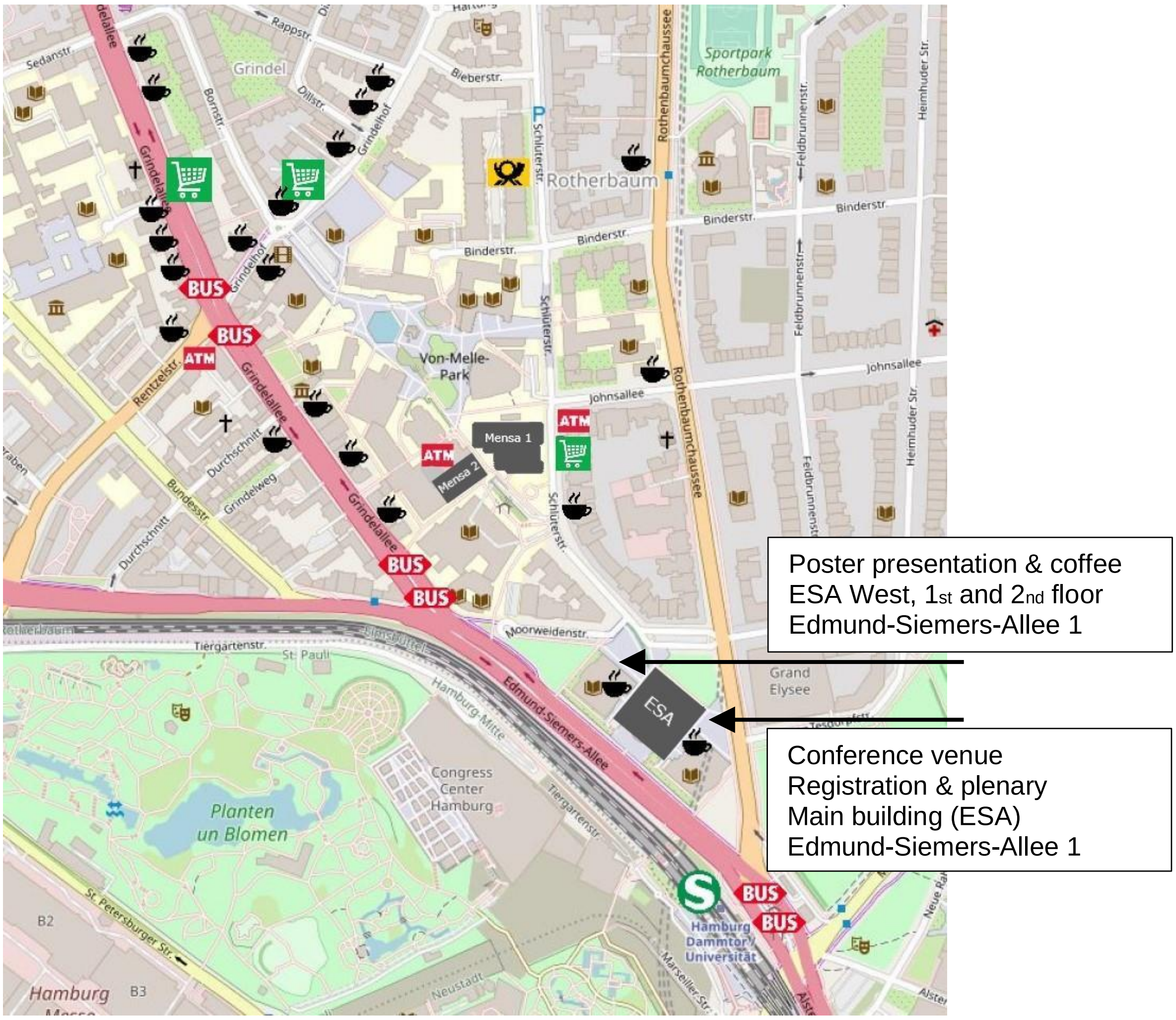
WiFi

The Eduroam network is available throughout Hamburg University. In addition, every participant of TISLR 13 will have free internet access via a personalized WiFi code. You will find the code on your name tag at the conference.

Further information

- Hamburg Tourist Information: https://www.hamburg.com/
- Association of the Deaf Hamburg: Bernadottestraße 126-128, 22605 Hamburg; www.glvhh.de
- Dialogue in silence (exhibition): Dialogue Social Enterprise GmbH, Alter Wandrahm 4, 20457 Hamburg, Dialoghaus https://dialog-in-hamburg.de/en/dialogue-in-silence/

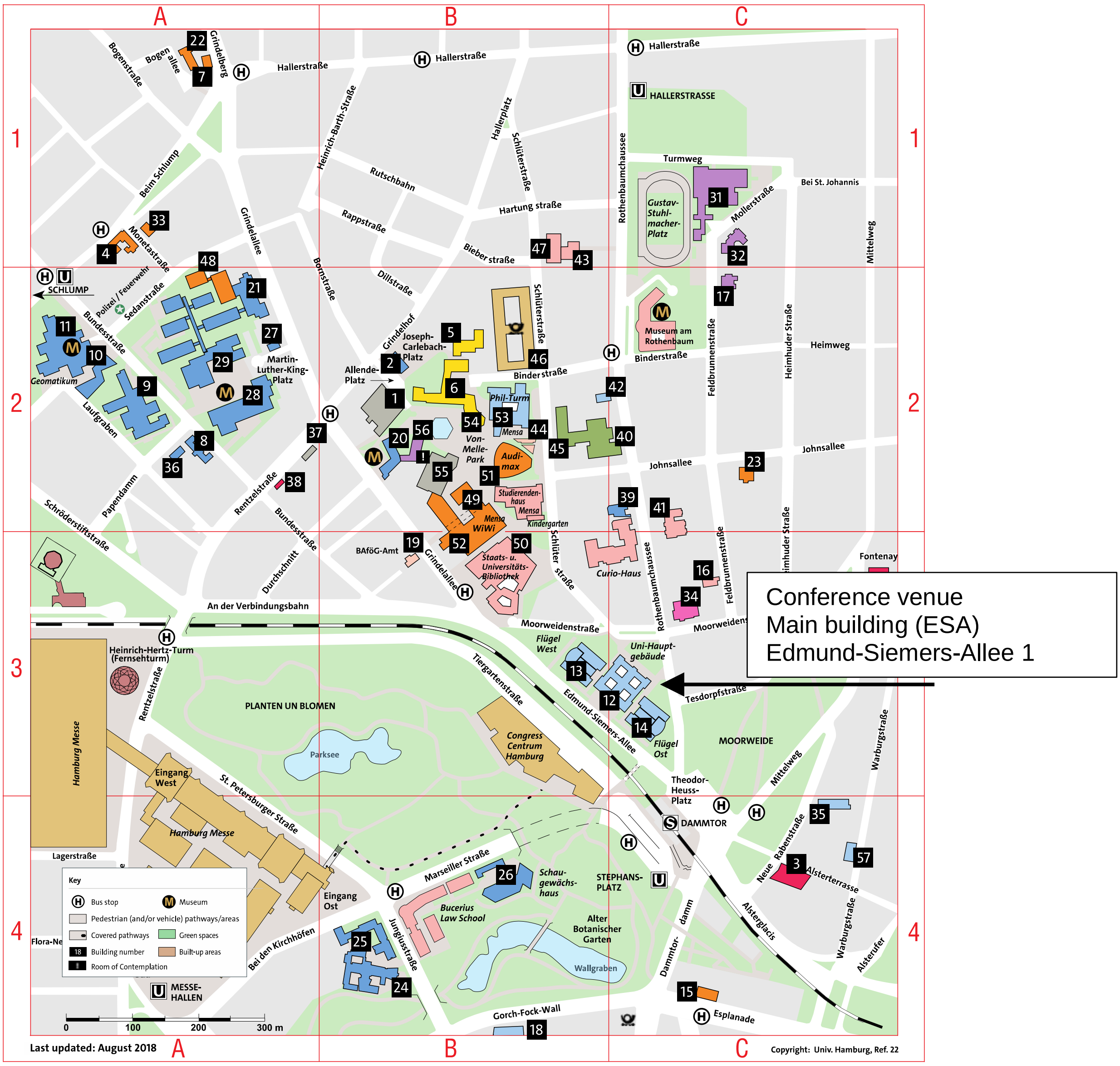
Local area map and places to eat



ATM - Cash machines Café / Restaurant Shops BUS - Bus Station

S-Bahn Post Office Mensa 1 - Studierendenhaus Cafeteria
Mensa 2 - Campus Cafeteria

Hamburg University campus map



UNIVERSITY MAP / BUILDING DIRECTORY

The numbers in front of the institutions listed above and found on the map are the building numbers. In the following building directory, you can use the building number to find the address and coordinates of the building you are looking for. **More Institutions of the University are located outside the scope of this map.** Information about the accessibility of the buildings for the disabled can be found at www.uni-hamburg.de/campus-zugaenglichkeit

- Faculty 1: Law
- Faculty 2: Business Economics and Social Sciences
- Faculty 3: Medicine*
- Faculty 4: Education
- Faculty 5: Humanities
- Faculty 6: Mathematics, Informatics and Natural Sciences
- Faculty 7: Psychology and Human Movement
- Faculty 8: Business Administration
- Buildings used primarily by the administration
- Buildings used by several faculties
- Other buildings

1	Allendeplatz 1 (AP1)	B2
2	Allendeplatz 2 (AP2)	B2
3	Alsterterrasse 1	C4
4	Beim Schlump 83	A1
5	Binderstraße 34	B2
6	Binderstraße 40	B2
7	Bogenallee 11	A1
8	Bundesstraße 43	A2
9	Bundesstraße 45	A2
10	Bundesstraße 53	A2
11	Bundesstraße 55	A2
12	Edmund-Siemers-Allee 1 (ESA1)	C3
13	ESA Flügel West (ESA West)	B3
14	ESA Flügel Ost (ESA Ost)	C3
15	Esplanade 36	C4
16	Feldbrunnenstraße 9	C3
17	Feldbrunnenstraße 70	C2
18	Gorch-Fock-Wall 5-7	B3
19	Grindelallee 9	B3
20	Grindelallee 46/48	B2
21	Grindelallee 117	A2
22	Grindelberg 5	A1
23	Johnsallee 35	C2
24	Jungiusstraße 9	B4
25	Jungiusstraße 11	B4
26	Marseiller Straße 5	B4
27	Martin-Luther-King-Platz 2	A2
28	Martin-Luther-King-Platz 3	A2
29	Martin-Luther-King-Platz 6	A2
30	Mittelweg 177	C3
31	Mollerstraße 2-4	C1
32	Mollerstraße 10	C1
33	Monetastraße 4	A1
34	Moorweidenstraße 18	C3
35	Neue Rabenstraße 13	C4
36	Papendamm 21	A2
37	Rentzelstraße 7	B2
38	Rentzelstraße 17	A2
39	Rothenbaumchaussee 19	C2
40	Rothenbaumchaussee 33	C2
41	Rothenbaumchaussee 34	C2
42	Rothenbaumchaussee 45	C2
43	Rothenbaumchaussee 81	B1
44	Schlüterstraße 11	B2
45	Schlüterstraße 28	B2
46	Schlüterstraße 51	B2
47	Schlüterstraße 70	B1
48	Sedanstraße 19	A2
49	Von-Melle-Park 2 (VMP2)	B2
50	Von-Melle-Park 3 (VMP3)	B3
51	Von-Melle-Park 4 (VMP4)	B2
52	Von-Melle-Park 5 (VMP5)	B3
53	Von-Melle-Park 6 (VMP6)	B2
54	Von-Melle-Park 8 (VMP8)	B2
55	Von-Melle-Park 9 (VMP9)	B2
56	Von-Melle-Park 11 (VMP11)	B2
57	Warburgstraße 26	C4

* University Medical Center Hamburg-Eppendorf (UKE): located outside this map

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Program

Invited presenters

Karen Emmorey

Karen Emmorey is a Distinguished Professor in the School of Speech, Language, and Hearing Sciences at San Diego State University and the Director of the Laboratory for Language and Cognitive Neuroscience. Karen Emmorey’s research focuses on what sign languages can reveal about the nature of human language, cognition, and the brain. She studies the processes involved in how deaf and hearing people produce and comprehend sign language and how these processes are represented in the brain. Her research interests also include bimodal bilingualism (i.e., sign-speech bilingualism) and the neurocognitive underpinnings of reading skill in profoundly deaf adults.

Jordan Fenlon

Jordan Fenlon is an Assistant Professor of British Sign Language in the Department of Languages and Intercultural Studies at Heriot-Watt University. From 2009-2014, he worked as a research associate in the British Sign Language Corpus Project at DCAL, London. During this time he obtained a Fulbright Scholarship to study Linguistics at Gallaudet University (2011-2012). After completing his PhD, he was awarded a prestigious Mellon Fellowship for postdoctoral research at the University of Chicago (2014-16). His research interests focus on the sociolinguistics of signed languages as well as its implications for applied linguistics contexts such as sign language teaching.

Ronice Müller de Quadros

Ronice Müller de Quadros has been a professor and researcher at the Federal University of Santa Catarina since 2002 and joined the CNPQ (Brazilian National Science Foundation) as a sign language researcher in 2006. She holds a Master's degree (1995) and a PhD (1999) in Linguistics from Pontifícia Universidade Católica do Rio Grande do Sul. As a PhD student, she spent 18 months at the University of Connecticut (1997-1998) researching the grammar of Libras and the acquisition of Libras and ASL. She was a visiting scholar at Gallaudet University and the University of Connecticut (2009-2010) investigating bimodal bilingual development in children (Libras/ Portuguese and ASL/ English), funded by the NIH and the CNPQ (2009-2014). During the academic year 2015/16, Ronice Müller de Quadros developed her research into bimodal bilingual language acquisition further as a visiting professor at Harvard University (funded by the CNPQ). One of her ongoing research projects is the foundation of the Nucleus of Acquisition of Sign Language (NALS) at the Federal University of Santa Catarina, where she has been gathering longitudinal and experimental data from deaf children and bimodal bilingual hearing people since 2002. Through the Ministry of Culture, Ronice Müller de Quadros has also been coordinating and consolidating the efforts dedicated to documenting Libras by creating a National Libras Corpus.

Gladys Tang

Gladys Tang is a Professor of Linguistics in the Department of Linguistics and Modern Languages at The Chinese University of Hong Kong as well as the director of The Centre for Sign Linguistics and Deaf Studies. Her research interests focus on the theoretical study of sign language structure and its acquisition by deaf children. Going a step further, she investigates how research findings in her area of interest can be implemented in an educational setting that benefits both deaf and hearing children.

Program main session

Thursday, 26.09.19
Hauptgebäude (main building, ESA), Edmund-Siemers-Allee 1

8:30-9:30	*Registration and coffee*
9:30-10:00	*Opening*
10:00-11:00	Jordan Fenlon (plenary presentation) *Sign language linguistics and sign language teaching: Realigning the two fields*
11:00-11:30	*Coffee break*
11:30-12:00	Matthew Dye, Matt Huenerfauth, and Kim Kurz *Sign language avatars activate phonological and semantic representations: Evidence from working memory and priming paradigms*
12:00-12:30	Freya Watkins and Robin L. Thompson *Comprehension in hearing non-signers from angle-diverse learning input*
12:30-13:00	Jordan Fenlon, Annelies Kusters, and Adam Stone *Linguistic convergence of International Sign*
13:00-14:30	*Lunch break*
14:30-15:00	Emily Carrigan and Marie Coppola *'Iconic' number signs do not hasten acquisition of number knowledge*
15:00-15:30	Qi Cheng and Rachel Mayberry *Word order or world knowledge? Effects of early language deprivation on simple sentence comprehension*
15:30-16:00	Evelyne Mercure, Samuel Evans, Laura Pirazzoli, Laura Goldberg, Harriet Bowden-Howl, Kimberley Coulson, Sarah Lloyd-Fox, Indie Beedie, Mark H. Johnson, and Mairéad MacSweeney *Plasticity in the neural substrate of language: Insights from unimodal and bimodal bilingual infants*
16:00-16:30	Felix Sze, Monica Wei Xiao, and David Lam *Evaluating the effectiveness of the Hong Kong Sign Language Sentence Recall Test (HKSL-SRT) in differentiating three groups of Deaf signers*
16:30-17:30	*Coffee break and poster session 1*
17:30-18:30	Karen Emmorey (plenary presentation) *Neural and behavioral consequences of lexical iconicity in American Sign Language*
19:30	*Conference dinner, Besenbinderhof*

Friday, 27.09.19
Hauptgebäude (main building, ESA), Edmund-Siemers-Allee 1

9:00-10:00	Gladys Tang (plenary presentation) *Functions of sign language classifiers*
10:00-10:30	Terra Edwards and Diane Brentari *Feeling phonology: Emergence of tactile phonological patterns in protactile communities in the United States*
10:30-11:00	Aurora Martinez del Rio *Finding systematicity in the margins: Polysyllabic forms in the ASL lexicon*
11:00-11:30	*Coffee break*
11:30-12:00	Jeremy Kuhn, Carlo Geraci, Philippe Schlenker, and Brent Strickland *Boundaries in space and time: Iconic biases across modalities*
12:00-12:30	Marloes Oomen, Roland Pfau, and Ulrika Klomp *On the nature of Neg-raising in Sign Language of the Netherlands*
12:30-13:00	Tory Sampson and Rachel Mayberry *The predicate SELF: Discovering the syntactic function of SELF*
13:00-14:30	*Lunch break*
14:30-15:00	Carl Börstell, Onno Crasborn, and Lori Whynot *True friends or false friends? Lexical similarity for predicting cross-signing success*
15:00-15:30	Mary Edward and Pamela Perniss *Encoding spatial information in two sign languages: A Comparison of Ghanaian (GSL) and Adamorobe (AdaSL) Sign Languages*
15:30-16:00	Francie Manhardt, Susanne Brouwer, and Asli Ozyurek *Sign influences spatial encoding in speech in bimodal bilinguals*
16:00-16:30	Adam Schembri *Making visual languages visible: Data and methods transparency in sign language linguistics*
16:30-17:30	*Coffee break and poster session 2*
17:30-18:30	5 Minute SIGNopsis (program see below)
19:30	*Reception at city hall*

Saturday, 28.09.19
Hauptgebäude (main building, ESA), Edmund-Siemers-Allee 1

9:00-10:00	Ronice Müller de Quadros (plenary presentation) *Language policies in Brazil: The place of Libras in science and in society*
10:00-10:30	Hope Morgan, Rama Novogrodsky, and Wendy Sandler *Phonological complexity and frequency in the lexicon: A quantitative cross-linguistic study*
10:30-11:00	Piotr Tomaszewski *The case of negative prefix in Polish Sign Language (PJM)*
11:00-11:30	*Coffee break*
11:30-12:00	Sabina Fontana and Claudio Ferrara *Metalinguistic awareness in sign language: A study on mouth actions*
12:00-12:30	Deanna Gagne, Ann Senghas, and Marie Coppola *The influence of same-age peers on language emergence*
12:30-13:00	Justin Power *The emergence of sign language in Tajik schools for the deaf: A scalar ecological investigation of a complex contact situation*
13:00-14:30	*Lunch break*
14:30-15:00	Tommi Jantunen, Danny De Weerdt, Brigitta Burger, and Anna Puupponen *The more you move the more action you construct – A motion capture study on head and upper-torso movements in constructed action in Finnish Sign Language narratives*
15:00-15:30	Lindsay Ferrara *Regulating turn-taking with pointing actions in Norwegian Sign Language conversation*
15:30-16:00	Kathryn Montemurro, Molly Flaherty, and Susan Goldin-Meadow *The development of person and agreement in Nicaraguan Sign Language*
16:00-16:30	Paul Dudis *Abstract spatial representations and embodiment*
16:30-17:30	*Coffee break and poster session 3*
17:30-19:00	*SLLS business meeting*
19:00-19:30	*Closing*

Alternates

(in alphabetical order)

Connie de Vos
Turn taking in signed conversations: The state of the art

Julia Gspandl
Mastering depicting constructions in L1 acquisition of Austrian Sign Language (ÖGS): Issues of Lexicalization

Laura Horton and Jason Riggle
Covering signs: Quantifying similarity and difference in emerging sign systems

Cornelia Loos, Marlijn Meijer, and Sophie Repp
Affirming and rejecting negative assertions in German Sign Language (DGS)

Hannah Lutzenberger, Onno Crasborn, Paula Fikkert, and Connie de Vos
B 1 FIST 5 – A preliminary investigation of the phonological feature inventory in Kata Kolok, a rural sign language of Bali

Yurika Aonuki
Phonology of adjective intensification in American Sign Language

Georgia Zorzi, Jordina Sánchez Amat, and Beatrice Giustolisi
Testing similarity to confirm the use of minimal pairs and phonologically related signs as phonological distractors in a comprehension task

Program 5 Minute SIGNopsis

Friday, 27.09.19, 17:30-18:30
Hauptgebäude (main building, ESA), Edmund-Siemers-Allee 1

Natasha Abner, Carlo Geraci, Justine Mertz, and Shi Yu
Articulatory evidence for sign language typology and history

Sara Cañas
Describing the non-manual marking of polar interrogative in Catalan Sign Language: Approaching its pragmatic function through a feature-based theory of biases

Ardavan Guity
Meaning of "bflap" in Iranian Sign Language

Jana Hosemann and Jens-Michael Cramer
The life stories of deaf elderly people: How did deaf people, born between 1930 and 1950 and raised in Germany, find their work profession?

Britta Illmer
The trial caught in the middle: An analysis of the trial in DGS as a phenomenon between dual and paucal

Jana Löffler
The tip-of-the-finger phenomenon in German Sign Language: A corpus-based analysis

Hannah Lutzenberger
The mystery of child signing

Mirella De Oliveira Pena Araújo
Mouth non-manual expressions in Libras: Usages and productivity

Poster sessions

Poster session 1

Thursday, 26.09.19, 16.30-17:30
West Wing of Main Building (ESA-W), Edmund-Siemers-Allee 1
Rooms 120, 121, and 221
Room 120: Posters 1.01-1.16
Room 121: Posters 1.17-1.32
Room 221: Posters 1.33-1.61

#	Presenters	Title
1.01	Natasha Abner, Laura Lakusta, Yasmin Hussein, Rebecca Lotwich, Emily Miiller, and Anah Salgat	Asymmetries in spatial communication: Evidence from sources and goals
1.02	Kristian Ali and Ben Braithwaite	Production and perception in a shared tactile sign language
1.03	Valentina Aristodemo, Chiara Annucci, Beatrice Giustolisi, Doriane Gras, Justine Mertz, and Caterina Donati	Measuring phonological complexity in sign languages
1.04	Juliane Farah Arnone, and Felipe Venâncio Barbosa	The “Tip of the Fingers” phenomenon in Brazilian Sign Language (Libras): A study about lexical retrieval in deaf people
1.05	Yuko Asada	Across-the-board dependencies in Japanese Sign Language
1.06	Emmanuel Asonye, Oluwasola Aderibigbe, Ohakwe Onyediziri, and Aniefon Daniel Akpan	Sociocultural analysis of lexical signs of an indigenous Nigerian Sign Language
1.07	Gemma Barberà and Patricia Cabredo Hofherr	**cancelled** [illegible]ite determiners in sign languages: A [illegible]gical look
1.08	Anastasia Bauer and Roman Poryadin	**cancelled** [illegible]nctions of PALM-UP in primary and [illegible]ate sign languages
1.09	Claudia Becker, Patricia Barbeito Rey-Geißler, and Martje Hansen	Narrative development of deaf children in German Sign Language
1.10	Gal Belsitzman, Atay Citron, and Wendy Sandler	Realizing the expressive potential of the body in a Sign Language Theatre Laboratory
1.11	Elena Benedicto	Simultaneity vs sequentiality: Serial verb constructions at the intersection. The case of agents in motion predicates
1.12	Kiva Bennett	First person singular pronouns as a marker of relative status in American Sign Language
1.13	Inez Beukeleers, Geert Brône, and Myriam Vermeerbergen	On the role of eye gaze in depicting and enacting in Flemish Sign Language: A comparative study of narratives and spontaneous conversations
1.14	Felicia Bisnath	Wh-questions in the Trinidad and Tobago signing community
1.15	Thomas Björkstrand, Eira Balkstam, and Josephine Willing	Sign language dictionary as a digital tool in L2 teaching: Score evaluation of sentences for CEFR levels A1–B2
1.16	Shane Blau	Perceptual narrowing in deaf infants
1.17	Carl Börstell, Onno Crasborn, and Adam Schembri	Signs of reduction: Frequency, duration, and signing rate in three sign language corpora
1.18	Rain Bosworth, Sarah Tyler, Eli	Automaticity of visual word & sign processing

#	Presenters	Title
	Binder, and Jill Morford	in deaf bilinguals: Evidence from the Stroop Task
1.19	Diane Brentari, Rabia Ergin, Ann Senghas, and Marie Coppola	How quickly does phonology emerge in a “village” vs. “community” sign language?
1.20	Fabian Bross	Coordination and subordination in German Sign Language (Deutsche Gebärdensprache) and the Bodily Mapping Hypothesis
1.21	Chris Brozdowski and Karen Emmorey	Using transitional information in sign and gesture prediction
1.22	Svetlana Burkova	Conditional and concessive constructions in Russian Sign Language
1.23	Raquel Veiga Busto	What can number tell us about person? Pronominal reference and person distinctions in Catalan Sign Language
1.24	Maria Del Carmen Cabeza, José M. García-Miguel, Ania Pérez, and Juan R. Valiño	Clause delimitation in Spanish Sign Language (LSE): Exploring projections
1.25	Chiara Calderone	Sentence topics and communicative strategies in Italian Sign Language (LIS)
1.26	Fanny Catteau and Coralie Vincent	Shared prosodic contours in LSF poetry and its spoken translation
1.27	Kenith Kai Lai Chan, and Felix Yim Binh Sze	More than a pointing: Pointing sign as an interjective hesitator in Hong Kong Sign Language
1.28	Richard Cokart and Trude Schermer	Changes in youth sign language variation in NGT
1.29	Franziska Conradts	**cancelled** N as a rescue mechanism for plural German Sign Language
1.30	Frances Cooley and David Quinto-Pozos	Investigating the role of phonological awareness on reading in deaf native signers
1.31	Raniere Alislan Almeida Cordeiro, and Aline Lemos Pizzio	Datilological sign in Libras – Brazilian Sign Language
1.32	Brendan Costello, Marcel Giezen, Miguel Ángel Sampedro, Saúl Villameriel, and Manuel Carreiras	Effects of familiarity, iconicity and phonological density in the LSE lexicon
1.33	Svetlana Dachkovsky, Rose Stamp, and Wendy Sandler	Time will tell: Grammaticalization of time expressions in Israeli Sign Language (ISL)
1.34	Connie de Vos	Turn taking in signed conversations: The state of the art
1.35	Danny De Weerdt	Before or after? Adposition signs in Finnish Sign Language: Form and position
1.36	Paul Dudis and Miako Villanueva	Application of Depiction Coding System
1.37	Matthew Dye, Andreas Savakis, Bruno Artacho, Aman Arora, Naomi Caselli, Erin Finton, and Corrine Occhino	Perceptual optimization of American Sign Language: Evidence from a lexical corpus

#	Presenters	Title
1.38	Evgeniia Khristoforova and Vadim Kimmelman	Relative clauses in Russian Sign Language: Where do they come from?
1.39	Ryan Fan	Fingers on the Face: Towards an interactional typology of fingerspelling
1.40	Casey Ferrara and Donna Jo Napoli	Handshape, movement, and geometry: Communicating shapes in sign languages
1.41	Michael Filhol	Regularities in a corpus of spontaneous Sign Language Writing, and a comparison to writing systems
1.42	Allison Fitch and Sudha Arunachalam	The role of early sign language exposure and deafness on visual orienting and disengagement
1.43	Manolis Fragkiadakis and Victoria Nyst	Towards a user-friendly tool for automated sign annotation: Identification and annotation of time slots and number of hands
1.44	Anne Therese Frederiksen and Rachel Mayberry	Implicit causality and thematic roles in ASL: A norming study of 239 implicit causality verbs
1.45	Orit Fuks	Multimodal motherese in Israeli Sign Language (ISL)
1.46	Sílvia Gabarró-López	The uses of PALM-UP in interpreted French and LSFB productions
1.47	Brigitte Garcia, Marie-Anne Sallandre, Marie-Thérèse L'Huillier, and Hatice Aksen	Impersonal human reference in French Sign Language (LSF)
1.48	Johnny George	Pragmatic constraints on extra-grammatical morphology in Japanese Sign Language (JSL) onomastics
1.49	Carlo Geraci and Justine Mertz	Theory-description-theory: A round trip in French Sign Language phonology
1.50	Austin German	Emerging functions of manual holds in Zinacantec Family Homesign
1.51	Aurelia Nana Gassa Gonga	NGT lexicon used in IS interpreting by a team of deaf interpreters: A case study
1.52	Julia Gspandl	Mastering depicting constructions in the L1 acquisition of Austrian Sign Language (ÖGS): Issues of lexicalization
1.53	Shengyun Gu	Phonological processes in Shanghai Sign Language
1.54	Kathleen Currie Hall, Oksana Tkachman, and Yurika Aonuki	Lexical competition correlates with articulatory enhancement in ASL
1.55	Matthew Hall and Stephanie De Anda	Language access profiles: A better way to characterize DHH children's early communicative input
1.56	Daisuke Hara and Makoto Miwa	The phonotactics of type-III syllables of Japanese Sign Language
1.57	Julie Hochgesang, Donovan Catt, Deborah Chen Pichler, Corina Goodwin, Carmelina Kennedy, Lee Prunier, Doreen Simons, and Diane Lillo-Martin	Sign language acquisition, annotation, archiving and sharing: The SLAAASh project status report

#	Presenters	Title
1.58	Andrea Lackner, Nikolaus Riemer Kankkonen, Christian Stalzer, Christian Hausch, Isabel Graf, Laura Theuermann, and Elisabeth Scharfetter	Deaf annotators' associations with 'head forward' in Austrian Sign Language
1.59	Lauren W. Reed, Alan Rumsey, and Francesca Merlan	Kailge Sign Language: A "network-based" sign language and its significance for sign language typology
1.60	Anne Wienholz, Simon Kirby, and Paula Rubio-Fernández	Effects of semantics and efficiency on adjective position in American Sign Language: A reference production study
1.61	Bencie Woll, Konstantin Grin, Tatiana Davidenko, and Anna Komarova	Mouthing in the acquisition of a second sign language by Deaf learners
new 1.62	Evie Malaia, Julia Krebs, Joshua Borneman, and Dietmar Roehm	Cortical entrainment to visual information as basis of sign language comprehension

Poster session 2

Friday, 27.09.19, 16.30-17:30
West Wing of Main Building (ESA-W), Edmund-Siemers-Allee 1
Rooms 120, 121, and 221
Room 120: Posters 2.01-2.16
Room 121: Posters 2.17-2.32
Room 221: Posters 2.33-2.63

#	Presenters	Title
2.01	Valentina Aristodemo and Charlotte Hauser	Temporal constructions: A comparison between LIS and LSF
2.02	Jia He and Gladys Tang	Argument realization and event delimitation in Hong Kong Sign Language and Tianjin Sign Language
2.03	Jon Henner and Emily Carrigan	The effects of form and meaning in responses chosen by test takers in a language based analogical reasoning assessment
2.04	Julie Hochgesang and Amelia Becker	Absence of reduplication in American Sign Language nominal plural morphology
2.05	Gabrielle Hodge, Jordan Fenlon, Adam Schembri, Trevor Johnston, and Kearsy Cormier	A corpus-based investigation of how deaf signers signal questions during conversation
2.06	Theresia Hofer and Keiko Sagara	Chinese language influences on Tibetan Sign Language users in Lhasa: Cardinal numbers and days of the week
2.07	Ingela Holmström, Magnus Ryttervik, and Krister Schönström	A note on phonological acquisition of novice/L2 signers through a sign repetition task
2.08	Laura Horton and Jason Riggle	Converging signs: Quantifying similarity and difference in emerging sign systems
2.09	Lynn Hou	Looking at LOOK-AT collocations in American Sign Language
2.10	Elena Jahn	Sentence segmentation in spontaneously produced DGS utterances with varying text formats
2.11	Marah Jaraisy and Rose Stamp	Language contact situation between Israeli Sign Language and Kfar Qassem Sign Language: A case of code-switching or borrowing?
2.12	Nikolaus Riemer Kankkonen, Joel Bäckström, and Magnus Ryttervik	Constructed sign sentences In Swedish Sign Language dictionary
2.13	Laura Kanto and Wolfgang Mann	A pilot investigation of mappings between phonological form and meaning in Finnish Sign Language signs among deaf and hearing native signers aged 4-15 years
2.14	Hadil Karawani and Josep Quer	Counterfactual imperatives across modalities
2.15	Geo Kartheiser	Author recognition is a significant predictor of reading fluency in deaf college-aged students
2.16	Demet Kayabaşı and Kadir Gökgöz	Causative-inchoative alternations in Turkish Sign Language
2.17	Ulrika Klomp	What has COME become? A corpusbased study into its grammatical functions in Sign

#	Presenters	Title
		Language of the Netherlands
2.18	Justyna Kotowicz, Asanowicz, Zofia Wodniecka, and Klaudia Tondos	Cognitive advantage in sign-spoken bilinguals
2.19	Elena Koulidobrova and Leyla Zidani-Eroglu	A few arguments for isomorphic sluicing in ASL
2.20	Julia Krebs, Ronnie Wilbur, Evie Malaia, Gerda Strutzenberger, Hermann Schwameder, and Dietmar Roehm	Event visibility in sign language motion: Evidence from ÖGS
2.21	Antti Kronqvist	Sociolinguistic factors affecting lexical variation in signs for months in Finnish Sign Language
2.22	Jeremy Kuhn and Lena Pasalskaya	Negative concord in Russian Sign Language (RSL)
2.23	Leyla Kürşat, Rabia Ergin, Ethan Hartzell, and Ray Jackendoff	Linear order: A minimal syntactic tool expressing the modifier and the modified
2.24	Kim Kurz	An analysis of constructed action in American Sign Language narratives: Comparing native signers and second language learners
2.25	Maria Kyuseva	On the semantic organisation of size and shape specifiers: The role of the non-manual component
2.26	Minttu Laine	Mutual gaze in sign language interpreting in mobile transitions
2.27	Gabriele Langer, Anke Müller, Sabrina Wähl, and Thomas Hanke	The DGS-Korpus approach to including frequent sign combinations in a corpus-based electronic sign language dictionary
2.28	Brittany Lee, Jonathan Mirault, Nathalie Bélanger, and Karen Emmorey	Pronounceability effects during sentence reading by deaf and hearing readers
2.29	Hyunhwa Lee and Sung-Eun **cancelled**	…pment of a corpus-based Korean Sign …age dictionary
2.30	Amy Lieberman and Arielle Borovsky	Novel sign learning in young deaf children: The role of referential cues and visual attention
2.31	Diane Lillo-Martin and Deborah Chen Pichler	ASL pronoun acquisition: Implications for pronominal theory
2.32	Cornelia Loos, Marlijn Meijer, and Sophie Repp	Affirming and rejecting negative assertions in German Sign Language (DGS)
2.33	Guilherme Lourenço	Ditransitive constructions in Brazilian Sign Language
2.34	Stéphanie Luna and Lisa Stockleben	Adaptation of the dementia diagnostics British Sign Language cognitive screening test: A crosslinguistic comparison of LSQ and DGS
2.35	Hannah Lutzenberger, Onno Crasborn, Paula Fikkert, and Connie de Vos	B 1 FIST 5 – A preliminary investigation of the phonological feature inventory in Kata Kolok, a rural sign language of Bali
2.36	Claudia Macht	Referent tracking and constructed action in jokes of German Sign Language – A corpus-based investigation
2.37	Bahtiyar Makaroğlu and Josep Quer	A corpus-based approach to clausal negation in Turkish Sign Language

#	Presenters	Title
2.38	Evie Malaia and Toshikazu Ik **cancelled**	…wise connectivity of righthemispher …STG in American Sign Language
2.39	Mariana Martins, Marta Morgado, and Victoria Nyst	The contribution of emblematic gestures to the emerging sign language of Guinea-Bissau
2.40	Natasja Massa, Brittany Lee, Katherine J. Midgley, Phillip J. Holcomb ,and Gabriela Meade	N400 phonological priming effects in ASL are modulated by task
2.41	Meghan McGarry, Natasja Massa, Megan Mott, Katherine J. Midgley, Phillip J. Holcomb, and Karen Emmorey	Matching pictures and signs: An ERP study of the effects of iconicity and structural alignment in American Sign Language
2.42	Rachel McKee and David McKee	Signs of globalisation: What is ASL doing in NZSL?
2.43	Johanna Mesch and Ronice Müller de Quadros	Segmentation in sign languages
2.44	Hope Morgan	Beyond 'double contact': Arguments for a new prosodic type in sign languages
2.45	Katie Mudd, Bart de Boer, and Connie de Vos	The role of marriage patterns on the persistence of shared sign languages
2.46	Alexandra Navarrete-González	A semantic-pragmatic analysis of contrast types in Catalan Sign Language
2.47	Grace Neveu and Sara Goico **cancelled**	…order variation in the Iquitos signing …unity
2.48	Lauren Nikolai and Ronnie Wilbur	The "flat chin" marker in ASL
2.49	Derya Nuhbalaoglu and Okan Kubus	IX signs in Turkish Sign Language relative clauses: A (re)analysis of variation
2.50	Marco Stanley Nyarko	Deaf parenting in rural and urban communities in Ghana: A case study of Adamorobe community and Koforidua
2.51	Victoria Nyst, Kidane Admasu, Timothy Mac Hadjah, Moustapha Magassouba, Mariana Martins, Marta Morgado, Evans Namasaka, Marco Nyarko, and Dieydi Sylla	A cross-linguistic comparison of representation techniques in the signing of deaf children and adults in Côte d'Ivoire, Ethiopia, Ghana, Guinea Bissau, Kenya, Mali, and the Netherlands
2.52	Rehana Omardeen	The contribution of lexical overlap to perceived iconicity in foreign signs
2.53	Marloes Oomen	LOOK-AT that! An attitude predicate in German Sign Language (DGS)
2.54	Aslı Özkul and Serpil Karabüklü	A morphological analysis of number signs in TİD
2.55	Nick Palfreyman	Variation and social meaning in BISINDO (Indonesian Sign Language): An investigation at the micro-level.
2.56	Lauren W. Reed, Alan Rumsey, and Francesca Merlan	Co-expression of past and future in Kailge Sign Language, Papua New Guinea
2.57	Beyza Sümer, Francie Manhardt, Kimberley Mulder, Dilay Kara… and Aslı Özyurek **cancelled**	Signers have better memory than speakers for … locations displayed on a lateral versus sagittal axis
new 2.57	Beyza Sümer, Veerle Schoon, and Aslı Özyurek	Child-directed spatial language input in sign language: Modality specific and general patterns

#	Presenters	Title
2.58	Zed Sevcikova Sehyr and Ryan Edinger	Quantifying differences in spatial and temporal patterns between nouns and verbs in American Sign Language using Microsoft Kinect
2.59	Anita Slonimska and Olga Capirci	The role of attentional focus in perspective encoding in Italian Sign Language
2.60	Patrick C. Trettenbrein, Nina-Kristin Pendzich, Jens-Michael Cramer, Simon Kollien, Angela D. Friederici, and Emiliano Zaccarella	Psycholinguistic norms for more than 300 lexical manual signs in German Sign Language (DGS)
2.61	Anne Wienholz	Similar or different? Tracking phonological priming effects in American Sign Language
2.62	Bencie Woll and Robert Adam	Code mixing in fingerspelling: A unique type of same-language switching in individuals bilingual in 2 sign languages
2.63	Giorgia Zorzi	The use of TOO in gapping in Catalan Sign Language

Poster session 3

Saturday, 28.09.19, 16.30-17:30
West Wing of Main Building (ESA-W), Edmund-Siemers-Allee 1
Rooms 120, 121, and 221
Room 120: Posters 3.01-3.16
Room 121: Posters 3.17-3.32
Room 221: Posters 3.33-3.63

#	Presenters	Title
3.01	Anastasia Bauer	Seeing stress: Temporal reduction in Russian sign language mouthing
3.02	Carl Börstell and Ryan Lepic	Spatial metaphors in antonym pairs across sign languages
3.03	Fabian Bross	Object shift and differential object marking in German Sign Language (Deutsche Gebärdensprache)
3.04	Brigitte Garcia and Carolina Plaza-Pust	Laying the groundwork for a comparative approach to the study of European sign languages: The international research network EURASIGN
3.05	Matthew Hall and Sheila Dills	Against communication mode
3.06	Ethan Hartzell, Rabia Ergin, Leyla Kürşat, and Ray Jackendoff	Lexical variation in Central Taurus Sign Language
3.07	Julie Hochgesang, Jennifer Willow, Rafael Treviño, and Emily Shaw	Gallaudet University Documentation of ASL (GUDA) – Whither a corpus for ASL?
3.08	Elena Koulidobrova and Tatiana Luchkina	Two models of sign phonology in SignL2 by Deaf learners: Sonority wins
3.09	Justyna Kotowicz, Bencie Woll, Rosalind Herman, Magda Schromova, Maria Kielar-Turska, and Joanna Łacheta	Executive function in deaf native signing children
3.10	Jeremy Kuhn	Iconic biases on quantification in sign language
3.11	Cornelia Loos, Jens-Michael Cramer, and Donna Jo Napoli	Taboo terms in German Sign Language (DGS): Exploring the influence of iconicity
3.12 **new: 1.62**	Evie Malaia, Julia Krebs, Joshua Borneman, and Dietmar Roehm	Cortical entrainment to visual information as basis of sign language comprehension
3.13	Nick Palfreyman	One sign language, two manual alphabets: Variation across fingerspelling-related tokens in the BISINDO Corpus
3.14	Aurore Paligot	Sociolinguistic variation of two-handed signs In French Belgian Sign Language: Weak Drop as a stable reduction phenomenon
3.15	Stephen Parkhurst	Laban's efforts and signing styles in narratives, poetry and song
3.16	Liona Paulus	Conditional clauses in German Sign Language (DGS) and Brazilian Sign Language (Libras) - A comparison

#	Presenters	Title
3.17	Deborah Chen Pichler	Effect of minimal sign language instruction on hearing learner's constituent order
3.18	Justin Power, David Quinto-Pozos, and Danny Law	Can the comparative method be used for signed language historical analyses?
3.19	Morgan Proietti and Chiara Bonsignori	Metaphors in (e)motion: The case of Italian Sign Language
3.20	Sina Proske	Does verb type matter? Investigating word order in German Sign Language
3.21	Anna Puupponen	Semiotic strategies in nonmanual signals: A study on the actions of the signer's head and body in Finnish Sign Language
3.22	Lauren W. Reed	A sociolinguistic sketch of the Port Moresby deaf community and Papua New Guinea Sign Language
3.23	Wanette Reynolds and Kari Spector	SPEAK SIGN SAME-TIME?!: Codeblending patterns of school-aged bimodal bilingual children
3.24	Pasquale Rinaldi, Maria Cristina Caselli, Luca Lamano, Tommaso Lucioli, and Virginia Volterra	Manual and non-manual components: Acquisition and mastery in deaf and hearing signers
3.25	Annie Risler	Pointing gestures and personal references in Seychelles Sign Language and Creole Seychellois
3.26	Angelica Rodrigues	The emergence of the adversative conjunction BUT in Brazilian Sign Language: Grammaticalization path from gesture to grammar unit
3.27	Patrick Rosenburg and Adam Stone	The relationships between lower-level and higher-level comprehension skills in ASL
3.28	Katherine Rowley, Jordan Fenlon, and Kearsy Cormier	Metalinguistic awareness of regional variation in BSL
3.29	Paweł Rutkowski, Joanna Filipczak, Piotr Mostowski, and Anna Kuder	Lexical frequency in the Polish Sign Language Corpus at different time points of its development
3.30	Keiko Sagara	Numeral systems and their diachronic changes in Japanese Sign Language, Taiwan Sign Language and Korean Sign Language
3.31	Mirko Santoro	Typological perspective on compounds in LIS and LSF
3.32	Emily Saunders and David Quinto-Pozos	Does iconicity benefit an L2 leaner's comprehension?
3.33	Krister Schönström and Johanna Mesch	Frequency and distribution of signs and sign proficiency in second language (L2) signers – A longitudinal and comparative study
3.34	Anique Schüller, Annika Schiefner, and Ellen Ormel	Native and non-native signers' performance on a sentence repetition task for Sign Language of the Netherlands
3.35	Zed Sevcikova Sehyr	Lexical and sublexical factors that influence sign production: Evidence from a large scale picture-naming study
3.36	Nina Semushina and Rachel Mayberry	Age of acquisition affects automatic magnitude estimation in ASL number signs and arabic digits

#	Presenters	Title
3.37	Anita Slonimska and Olga Capirci	Dismantling the notion of Constructed Action as a metalinguistic tool: Efficient information encoding through direct representation
3.38	Wink Smith Jr.	A cognitive grammar view on depictive expressions in ASL
3.39	Charley Soares	Theoretical study of phonethemes in Brazilian Sign Language: Some reflections about this approach
3.40	Adam Stone and Rain Bosworth	Do the hands have gravity? Time-series analysis of gaze behavior during sign language comprehension
3.41	Marianne Rossi Stumpf	Terminology and linguistics of corpus in Libras (Brazilian Sign Language): Recognition of specificities of terms
3.42 **new: 2.57**	Beyza Sümer, Veerle Schoon, and Aslı Özyurek	Child-directed spatial language input in sign language: Modality specific and general patterns
3.43	Rachel Sutton-Spence and Johanna Mesch	What are norms of sign language poetry? Studies from sign language poetry anthologies and collections
3.44	Felix Sze, Chin-lung Yang, Monica Wei Xiao, and David Lam	Lexical co-activation in bimodal bilinguals during spoken language comprehension: An eye-tracking study of Hong Kong Sign Language and Cantonese
3.45	Yufuko Takashima and Nami Arimitsu	The semantic network based on conceptual metaphor and negation: The case of UNDERSTAND in Japanese Sign Language
3.46	Angoua Jean-Jacques Tano **cancelled**	Deaf parents and their hearing children ...es and signs in expression of negation: ...of rural and urban deaf families of Côte d'Ivoire
3.47	Phoebe Tay	Revisiting the past to understand the present: The impact of linguistic colonialism on the Singapore deaf community and the evolution of Singapore Sign Language (SgSL)
3.48	Oksana Tkachman, Bryan Gick, and Kathleen Currie Hall	Body anchoring and iconic anchoring: Biomechanical and semantic motivation of signs' locations
3.49	Piotr Tomaszewski, Marta Majewska, and Piotr Krzysztofiak	Critical period hypothesis and sign language acquisition by Polish deaf people under different linguistic stimulation conditions
3.50	Patrick C. Trettenbrein, Giorgio Pappito, Emiliano Zaccarella, and Angela D. Friederici	The neural basis of sign language processing in deaf signers: An Activation Likelihood Estimation meta-analysis
3.51	Martha Tyrone and Claude Mauk	Signing space is reduced at faster signing rates in American Sign Language

#	Presenters	Title
3.52	Alicia Calderón Verde, Donny Wilson Limonta, Gilma Cervantes Soliño, Ariel Hernández Hernández, and Elena Benedicto	NMM for [eyegaze] and [mouth]: Grammatical functions in Motion Predicates in LSCu (Sign Language of Cuba)
3.53	Agnes Villwock, Erin Wilkinson, Brianne Amador, Pilar Piñar, and Jill Morford	Connected, but not confused: Deaf middle school students co-activate English print and American Sign Language in a monolingual semantic judgment task
3.54	Kayla Vodacek, Laurie Lawyer, Todd LaMarr, and David Corina	The role of movement in the memory for signs
3.55	Elisabeth Volk	**cancelled** [illegible]aticalization of gestures in German [illegible]anguage
3.56	Arnfinn Muruvik Vonen	Personal pronouns in Norwegian Sign Language – One system of two origins
3.57	Sabrina Wähl, Gabriele Langer, Anke Müller, Julian Bleicken, Thomas Hanke, and Reiner Konrad	Exploring lexical variation in a growing corpus of DGS
3.58	James Waller and Susan Gold[illegible] Meadow	**cancelled** [illegible]ponential analysis of constructed action [illegible]erican Sign Language
3.59	Debora Wanderley	Libras corpus in SignWriting: Analysis of verbs with person-number
3.60	Shuyan Wang	Adjectives or relative clauses? A new perspective on adjectives in American Sign Language
3.61	Anne Wienholz, Derya Nuhbalaoglu, and Nivedita Mani	The influence of overt localization on the processing of referential expressions in German Sign Language
3.62	Junhui Yang	A semantic analysis of calendric terms in Chinese Sign Language
3.63	Giorgia Zorzi, Jordina Sánchez Amat, and Beatrice Giustolisi	Testing similarity to confirm the use of minimal pairs and phonologically related signs as phonological distractors in a comprehension task

Abstracts

in alphabetical order of the last name of the first author

Articulatory evidence for sign language typology and history

Natasha Abner, Carlo Geraci, Justine Mertz & Shi Yu

Friday, 17:30-18:30 (SIGNopsis)

This project develops a theoretically-informed coding schema (and online tool) to annotate the articulatory/phonetic features of sign languages. We apply quantitative methods to these coded features to identify micro- and macro-language families in a data set of 24 sign languages. Thus, we provide proof of concept that quantitative methods can be used to probe typological and historical classifications of sign languages, along the lines of what has been done recently in spoken language phylogenetics (e.g., Dunn et al. 2005). These results can be combined with the (often impoverished) historical records of sign language genesis to evaluate relations across sign languages and concretely identify points of cross-linguistic variation in sign languages.

Asymmetries in spatial communication: Evidence from sources and goals

Natasha Abner, Laura Lakusta, Yasmin Hussein, Rebecca Lotwich, Emily Miiller & Anah Salgat

Thursday, 1.01

How we think and talk about the world may reflect biases in our conceptual or communicative representations. For example, though paths are central components in motion events (Talmy 1985), not all paths are 'equal'. Compared to goal paths, source paths are more structurally marked (Fillmore 1997), tend to be introduced as adjuncts (Nam 2004), and are less likely to be included in spoken descriptions (Lakusta and Landau 2005). Evidence from change detection tasks suggests that biases in conceptual representation (Papafragou 2010) do not fully explain this linguistic asymmetry (Lakusta and Landau 2012). In the present study, adults viewed and described simple motion events (e.g., *a woman runs from a garbage can to a pillow*) and responses were coded for the inclusion of source (*from a garbage can*) and goal (*to a pillow*) information. We use this task to investigate the encoding of source and goal information in two spatially rich communication systems: (i) the gesture produced by hearing people, without and without speech, and (ii) sign language.

Production and perception in a shared tactile sign language

Kristian Ali & Ben Braithwaite

Thursday, 1.02

Bay Islands Sign Language (BISL) is a shared sign language used by deafblind, deaf, and hearing people in certain communities in Roatan and Guanaja, two Caribbean islands belonging to Honduras. Usher Syndrome has been present in these communities for over 100 years, and the language has been used in both the visual-gestural and tactile-gestural modalities for several generations. All of the deaf signers are now over 50, and all but one have significant loss of sight. As a result, all conversations between deaf signers make use of tactile and proprioceptive perception.

Unlike previously described tactile sign languages, BISL emerged in a shared signing community (Kisch 2008). Interactions between deafblind people have never been mediated by interpreters (c.f. Edwards 2017), and tactile signing emerged without the prior existence of an established visual sign language. BISL therefore provides an opportunity to examine tactile phonology in a unique social setting.

This paper presents an initial analysis of the ways in which BISL is produced and perceived in conversations between deafblind signers. Data come from a documentation project which collected around 26 hours of video recordings of the language, primarily naturalistic conversations between pairs of deafblind signers.

Signing in the tactile modality allows articulatory possibilities which are not found in visual sign languages, including the co-formation of signs, whereby both the signer's and the addressee's hands and body may be involved in the articulation (Mesch, Raanes & Ferrara 2015). BISL interactions involve a number previously unattested configurations. One-handed body-anchored BISL signs may be formed by the hand of the signer, and perceived tactilely by the addressee. Alternatively, the sign may be formed using the addressee's hand. These signs can be articulated on either the signer's or the addressee's body. This allows for four distinct possibilities, all of which are observed. Figure 1 illustrates examples of each possibility from the data. Two-handed signs may be formed using the signer's hands, the addressee's hands, or one of the signer's and one of the addressee's. Signs with a non-manual component may be produced in such a way that the addressee is able to perceive the non-manual component directly, for example, by touching the signer's face.

These articulatory possibilities are pervasive in the language, and not limited to any subset of the lexicon. The choice between possibilities depends on a number of factors, including the degree of sightedness of the interlocutors. Sometimes, choices seem to be motivated by a reduction in the effort involved in conversation: for example, it may require less energy in certain circumstances if a sign is articulated on the addressee's body rather than the signer's. Choices may also affect ease of perception. For example, signs which are perceived proprioceptively may be more likely to be transmitted successfully than those which are perceived tactilely.

Figure 1
Possible articulations of one-handed body-anchored signs in BISL
(Note: black lines indicate the signer, grey lines indicate the addressee)

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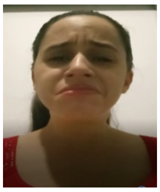
Mouth non-manual expressions in Libras: Usages and productivity

Mirella de Oliveira Pena Araújo

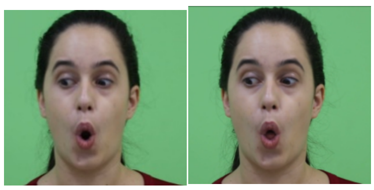
Friday, 17:30-18:30 (SIGNopsis)

Some studies have already shown that there are three well-defined types of non-manual mouth expressions in Libras, namely mouthings (mouth movements external to sign languages, Sutton-Spence and Boyes-Braem, 2001, about ASL); mouth morphemes (mouth movements internal to sign languages, Bickford and Fraychineaud, 2008, about ASL; and Pêgo, 2013, about Libras); and mouth signs (signs performed by lips, tongue and cheeks, Choi et al, 2010; Rodero-Takahira, 2015, about Libras).The grammatical value of the first two and the lexical value of the latter is also a matter of discussion. This paper is the result of a project supervised by Rodero-Takahira and called “Compounds in Libras”, which I took part from 2017 to 2018 during my graduation in Federal University of Juiz de Fora. It aims at discussing the status of these three types of mouth non-manual expression (NME) in Libras and, mainly, check the productivity of the latter type, mouth signs. On the one hand, mouthings and mouth morphemes are pretty common in Libras. On the other hand, mouth signs do not seem to be that frequent. Two examples of mouth signs (marked as “m”) presented in Rodero-Takahira (2015) are: SEXm, which appears in simultaneous compounds like SEXmIITRAVEL “honeymoon”, and STEALm, which appears in simultaneous compounds like STEALmIIDISGUISERlh “steal in a discreet way”. Some questions arise: a) what is the productivity of the mouth signs in Libras?; and, b) what is the morphosyntactic behavior of mouth signs performed with simple signs? We have started a detailed research for finding more examples of mouth NME in Libras in Capovilla et al (2013); in recordings made by the Deaf and shared in Youtube; and in the corpus presented in Rodero-Takahira (2015). We have noted that, besides the two signs already pointed out above, other mouth signs we have encountered are: DO-NOT-UNDERSTAND “I did not understand” (1) – performed by a joint expression of lips, eyes, eyebrows and head shake; as well as the sign LOOK-“x” "Look at that" (2) – performed by a joint expression of lips, tongue movement, eyebrows movement and eye gazing.

(1) DO-NOT-UNDERSTAND
“I did not understand”



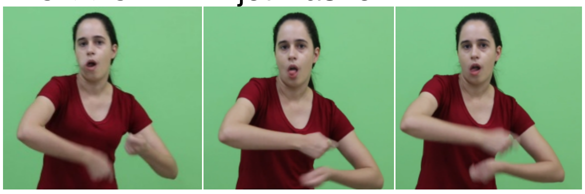
(2) LOOK-“x”
“Look at it there”



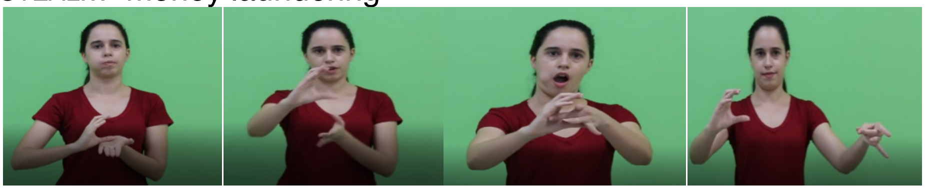
It is interesting to notice that some mouth signs in Libras have their origin in Brazilian gestures, as DO-NOT-UNDERSTAND “I did not understand”, in (1) above, but some of them are not related to gestures at all, as LOOK-“x” "Look at that", in (2) above, as well as SEXm and STEALm, which have their origin in Libras.

We have also found some mouth signs made simultaneously with simple signs, as in WASH>>STEALm "jet washer" (3); and, STRAIGHT-ENTITYCL>>CURVE-ENTITYCL-GIVEmov>>MUCHm>CURVE-ENTITYCL>>TAKE-STEALm "money laundering" (4):

(3) WASH>>STEALm "jet washer"



(4) STRAIGHT-ENTITYCL>>CURVE-ENTITYCL-GIVEmov>>MUCHm> CURVE-ENTITYCL>>TAKE-STEALm "money laundering"



These examples attest that mouth signs show certain productivity by themselves and that they are also productive when simultaneously produced with simple manual signs, in these cases, forming simultaneous compounds. With this research, we seek to show the different uses and productivity of the mouth non-manual articulator in Libras and emphasize its different grammatical and lexical statutes. Thus, we have registered the value of the mouth NME in Libras, highlighting the examples of mouth signs that also appear in simultaneous compound constructions and we have collaborated for the description of Libras and for future research on the morphosyntax of that language.

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Measuring phonological complexity in sign languages

Valentina Aristodemo, Chiara Annucci, Beatrice Giustolisi, Doriane Gras, Justine Mertz & Caterina Donati

Thursday, 1.03

Goals. We propose a new data-driven measure of sign language (SL) perceptual/articulatory complexity. If satisfactory, the measure will be used to assess in parallel with or in absence of other measures (e.g., frequency and acquisition). We compare the performance of our data-driven measure with a theory-driven measure of complexity based on the SL feature geometry (Brentari, 1998). Our empirical base is composed of four sign languages: French, Italian, Catalan and Spanish (LSF, LIS, LSC and LSE).

Background. There are two main types of approaches to phonological complexity in spoken languages, which we can refer to *theory-driven* and *data-driven*. The *theory-driven approach* is well illustrated by Clements (1985) and Sagey (1986) where counting distinctive features is the relevant measure. *Data-driven approaches* typically rely on pattern/order of acquisition, frequency, speech errors and similar measurable facts to assess phonological complexity. Ideally the two measures should converge.

As for SL *theory-driven approaches* to complexity, Brentari's Prosodic Model (1998) belongs to the former tradition: each phonemic class is assigned a set of features organized in a hierarchical/geometric structure. Each sign can be described in terms of a branching tree. The root corresponds to the prosodic word and branches correspond to the phonemic classes of handshape, location, and movement, each containing its own feature geometry. The richer is the structure (in terms of positively specified features), the higher is the complexity of a sign. While this model provides important crosslinguistic generalizations, its validity beyond ASL cannot be taken for granted. Similar considerations hold for other models (e.g., Sandler & Lillo-Martin 2006 and van Der Kooij 2002).

As for *data-driven approaches*, frequency and acquisition data are available only for a few sign languages (e.g., ASL, BSL, NGT), but they are entirely missing for others and would require long-term efforts to obtain. Diagnostics based on error rates can provide a quick and handy measure for early detection of a number language disorders.

Definitions of complexity. *Our data-driven measure* is based on error rates in naïve non-signers. The rationale is: signs that can be accurately and fluently repeated are treated as simple (see below). *Theory-driven measure*. Adapting Brentari's model, we measured complexity by counting the number of nodes and features necessary to describe it.

Methods. **Data-driven measure**. A repetition task is used to assess sign complexity in non-signers. The procedure is identical for all SLs in the study. We describe here the case of LSF.

Materials. 108 signs in LSF were selected based on criteria such as lack of major iconicity, frequency, lack of regional variation. A Deaf consultant was video-recorded producing the citation forms of the signs.

Participants. 20 hearing non-signers acquainted with the visual culture of France were recruited (divided in 5 age groups: 18-29: 30-40; 40-49; 50-59; 60-70).

Task: Each participant was asked to watch once the video of a sign and (try to) repeat it. Their performance was video-recorded (2160 tokens).

Coding complexity. Two students with a basic competence in LSF coded the data according to 5 measures: fluency, accuracy in handshape, orientation, location and movement. For each measure we assigned 1 if correct, 0 if incorrect. Overall accuracy for a sign is obtained by summing accuracies in each component. The degree of accuracy is directly mapped onto a complexity scale (5 = all correct = least complex, 0 = all incorrect = most complex).

Theory-driven measure: A portion of the entire dataset is used as a pilot study.

Materials. We annotated 15 items out of 108 used in the data-driven measure. These 15 items received a variable level of complexity in the data-driven measure (5 have a high level of complexity, 5 a low level of complexity and 5 have an intermediate level of complexity).

Coding complexity. The level of complexity depends on the number of nodes and positively specified features in its representation (lower values = less complex, higher values = more complex signs). The total set of nodes and features considered is 116 (handshape=67, location=22, movement =27).

Results. We report here preliminary results form LSF. By the time of the conference, the LSF and LIS data will be available for comparison.

Data-driven method. The overall mean of accuracy is 4.282 (SD=0.82). The most complex sign is HEDGEHOG with an average score of 3.15, while the easiest sign is HAM with a score of 5. Handshape is the class in which most of the errors are observed (45%) followed by movement (39%), orientation (8%) and location (7%). A mixed-model analysis with item and participant as random factors was conducted. A significant main effect of *age* was found (p=0.03). Younger participants are more accurate.

Theory-driven method: our 15 stimuli have an index of complexity that range from 15 to 39. The simplest sign is BAND-AID, while the most complex one is PEN.

Analysis. We observe a correlation between the overall complexity of the theory-driven measure and the overall accuracy/complexity of the data-driven method (r=-0.30). However, it is not significant (p=0.28). We observe a significant correlation between handshape complexity in theory-driven measure and overall accuracy (r=-0.58; p=0.02). The higher the complexity in the handshape is, the lower is the level of accuracy. Other correlations are not significant (movement/location vs. overall accuracy).

Discussion. Preliminary results show that: 1) The two measures converge; 2) Handshape is the class that better correlates with overall accuracy; 3) Still, for some signs we observed considerable divergence. The table illustrates that there are signs that receive a low score in complexity as measured by the theoretical model (i.e., that are predicted to be simple), but still have a poor performance in overall accuracy (e.g., SAUCE), and vice versa (e.g., BONE).

Data-driven scale		Theory-driven scale	
FLOWER	4,9	BAND_AID	16
RED	4,7	SAUCE	21
BAND_AID	4,55	TREE	25
PEAR	4,55	CASTLE	26
BONE	4,5	RED	26
TREE	4,4	PEAR	27
BREAD	4,35	GLASS	28
GLASS	4,2	FLOWER	29
CASTLE	4,1	COMPASS	32
LEAF	3,95	BREAD	32
PEN	3,9	THEATRE	34
FACTORY	3,9	LEAF	35
THEATRE	3,85	BONE	35
SAUCE	3,6	FACTORY	36
COMPASS	3,35	PEN	39

We shall speculate on the source of this divergence. In principle, this could be due to at least one of the following reasons: a) the data-driven measure, being non-linguistic, does not capture some important phonological categorizations; b) the theory-driven measured is not fully equipped to predict complexity in LSF. To address these issues, one could replicate this study in two ways: with signers as participants, and by using pseudo-signs as stimuli. We also expect comparison with the results of the study in LIS to shed light on these issues. Another interesting issue is whether handshape alone is enough to predict complexity. If this is the case, what is the role of place of articulation and movement in determining complexity? One possibility is that location and movement require a fully-fledged phonology in place. In this case, we expect major differences between signers and non-signers

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Temporal constructions: A comparison between LIS and LSF

Valentina Aristodemo & Charlotte Hauser

Friday, 2.01

Background. Temporal constructions typically involve subordination. This is the case of lan- guages like English and French[1]. However, this strategy is not the only one available as it can be observed in many other languages expressing these constructions by using juxtaposition[2] or coordination. These syntactic configurations are usually distinguished through several criteria such as dependency, asymmetric extraction, and so on. In this presentation, we use these crite- ria as a diagnostic to investigate temporal constructions in French Sign Language (LSF). After comparing LSF constructions to their LIS counterparts described in Aristodemo et al. (2016) [3], we will show that they are expressed by a different type of syntactic strategy (coordination vs. subordination).

Methodology. Data from LSF were collected using fieldwork methods. After elicitating the baseline with our two native informants, through a picture-based task, we started the syntactic and semantic investigation through interviews conducted in LSF.

Data. The baseline of temporal clauses in LIS and LSF is shown in (1) and (2).

(1) a. GIANNI BUY FLOWER NOT-YET, BEFORE MARIA STEAL BIKE. (br: GIANNI BUY FLOWER NOT-YET; nmm: BEFORE) *LIS*
'Maria stole a bike before the moment in which Gianni bought flowers.'

b. GIANNI BUY FLOWER, AFTER MARIA STEAL BIKE. (br: GIANNI BUY FLOWER; nmm: AFTER)
'Maria stole a bike after the moment in which Gianni bought flowers'

c. GIANNI BUY FLOWER, **MOMENT SAME/MOMENT PI** MARIA STEAL BIKE. (br: GIANNI BUY FLOWER; nmm: MOMENT SAME/MOMENT PI)
'Maria stole a bike at the moment in which Gianni bought flowers.'

(2) a. JEAN BUY FLOWER, BEFORE MARIA STEAL BIKE. (left: JEAN BUY FLOWER; br: BEFORE; right: MARIA STEAL BIKE) *LSF*
'Jean bought flowers and before that Maria stole a bike.'

b. JEAN BUY FLOWER, AFTER MARIA STEAL BIKE. (left: JEAN BUY FLOWER; br: AFTER; right: MARIA STEAL BIKE)
'Jean bought flowers and after that Maria stole a bike.'

c. JEAN BUY FLOWER, **MOMENT SAME/*MOMENT PI** MARIA STEAL BIKE. (left: JEAN BUY FLOWER; br: MOMENT SAME/*MOMENT PI; right: MARIA STEAL BIKE)
'Jean bought flowers and at the same moment Maria stole a bike.'

From a prosodic point of view, we observe differences between LIS and LSF. In LIS, Aristodemo et al.[3] found two different types of eyebrow raising; one marking the first clause (glossed as 'br'), the other being co-articulated with the temporal marker (i.e 'nmm') and the whole sentence is signed in the neutral space in front of the signer. By contrast, in LSF we found that the first clause is marked by body/head lean towards the left side of the signer and the second clause is signed while leaning on the opposite side. As for the temporal adverb, it is marked by eyebrow raising and articulated in the middle of the signing space. From a lexical point of view, although after-clauses (1b and 2b) contain the same lexical items in both languages, before clauses in LIS (1a) requires the presence of the negation NOT-YET while LSF clauses do not (2a). Similarly, LIS allows the use of the relative marker pi which is not acceptable in LSF (see (1c) and (2c)). From a syntactic point of view, we tested if the two clauses can stand in isolation (3) and be inverted (4) but also what kind of extraction (accross the board (6) vs asymmetric (5)) was available.

(3) Isolation
   a. *GIANNY BUY FLOWER NOT YET./*BEFORE MARIA STEAL BIKE. *(LIS)*
   b. JEAN BUY FLOWER. / BEFORE MARIE STEAL BIKE. *(LSF)*
   'Jean bought flowers.' 'Before, Marie stole a bike.'

(4) Inversion
   a. *BEFORE SECRETARY STAMP BUY BOSS STOCK SELL NOT-YET *(LIS)*
   b. BEFORE MARIE BUY VASE JEAN BUY FLOWER *(LSF)*
   'Before, Marie bought a vase and John bought flowers.'

(5) Asymmetric extraction
   a. i. [BOSS STOCK SELL NOT-YET] BEFORE _ STAMP BUY **WHO**? *(LIS)*
      'Who bought the stamps before the boss sold the stocks?'
      ii. *[stock sell not-yet] before secretary stamp buy **who**?
   b. i. ***WHAT** [JEAN BUY _] BEFORE MARIE STEAL BIKE? *(LSF)*
      Intended : 'What did Jean buy and before that Marie stole a bike?'
      ii. ***WHAT** [JEAN BUY FLOWER] BEFORE MARIE STEAL ?
      Intended : 'What did Jean buy flowers and before that Marie stole ?'

(6) Across the board extraction
   a. _ STOCK SELL NOT-YET BEFORE _ STAMP BUY **WHO**? *(LIS)*
   'Who bought the stamps before selling the stocks ?'
   b. **WHAT** JEAN BUY _ AFTER MARIE STEAL _? *(LSF)*
   'What did Jean buy and after that Marie stole ?'

From these data, we observe that the two clauses can stand in isolation only in LSF ((3b)). As for inversion, while it is agrammatical in LIS, it is allowed in LSF but it triggers a change in meaning (see the translation in (4b)). Finally, in LIS both types of extraction are allowed ((5a) and (6a)), in LSF accross the board strategy is possible while asymmetric extraction is not ((6b) and (5b)).

Analysis: All these differences call for two separate syntactic analyses. Aristodemo et al. [1] argue that LIS temporal constructions are subordinated clauses on the base of 1) presence of eyebrow raising that marks the syntactic movement of the subordinate clause, 2) presence of the relative marker pi and 3) availability of asymmetric extraction which is typical of subordination [4]. Since LSF data shows the opposite pattern of LIS, they call for a different syntactic analysis, either juxtaposition or asymmetric coordination. The isolation is the only property that prima facie could be used in favor of an analysis in term of juxtaposition. However, it cannot hold when we take into account the other properties (non-manual marking and across the board extraction) and it can be explained by the absence of an overt coordinator. Therefore we argue that LSF temporal constructions are instances of asymmetric coordination. This analysis is supported by several pieces of evidence: 1) the non-manual marking is the one usually associated with coordinated structures [5], 2) the relative marker is not allowed and 3) asymmetric extraction is agrammatical while ATB extraction is allowed as is expected from coordinated clauses [4].

Conclusion: In this study, we conducted a deep investigation on LSF temporal clauses by taking into account different linguistic aspects which range from prosodic to morpho-syntactic properties. By systematically comparing our data with the LIS data presented in Aristodemo et al. (2016), we show that LSF is the mirror image of LIS. Therefore we claim that LSF uses a different syntactic configuration which is an instance of asymmetric coordination.

Selected references. [1] Cristofaro (2005). Subordination. Oxford University Press. **[2] Haspelmath, (1993).** A Grammar of Lezgian. Mouton de Gruyter. **[3] Aristodemo et al.(2016)** Temporal construction in LIS. Talk presented at FEAST 2016. **[4] Ross, 1967.** Constraints on variables in syntax. Doctoral dissertation. MIT **[5] Pfau et al. (2012)** Sign Language, An international Handbook. Mouton de Gruyter.

The "Tip of the Fingers" phenomenon in Brazilian Sign Language (Libras): A study about lexical retrieval in deaf people

Juliane Farah Arnone & Felipe Venâncio Barbosa

Thursday, 1.04

The aim of this research is to analyze and discuss how the search for target signs occurs in the lexical retrieval in deaf people using Brazilian Sign Language (Libras); to verify if the "tip of the fingers" (TOF) phenomenon occurs; and describe the phonological aspects in the occurrence of the phenomenon.

The TOF phenomenon mirrors the "tip of the tongue" phenomenon in oral languages (*cf* BROWN; MCNEILL, 1966). This phenomenon occurs when there is momentary forgetfulness of known words and the feeling that this word is about to be recovered. This phenomenon offers clues about language processing and lexical retrieval. Few studies have been carried out on this phenomenon in sign languages (THOMPSON; EMMOREY; GOLLAN, 2005) and this research is important because sign language has a different modality and therefore it has particular phonological processes.

In this sense, a test was prepared to elicit the phenomenon in 34 deaf adults, who reported using Libras as the main means of communication. The test consisted of the signing regarding proper names of famous personalities and cities in the world. Images were displayed and the participant should say whether or not he knew the sign for the person or city, or whether he was experiencing TOF. In the latter case, the participant should sign what he remembered of the target sign.

A total of 69 stimuli were performed per participant, totaling 2346 stimuli and, as a result, we obtained the occurrence of 20 TOFs (0.9% of the stimuli). In all TOF cases, at least one of the phonological parameters (ie, hand configuration, location / space, orientation, movement, number of hands) was retrieved. Of those, the hand configuration was recovered in 65% of the cases (13 times); the location in 70% (14 times); space 85% (17 times); movement in 35% (7 times); orientation by 50% (10 times); and the number of hands in 90% of the cases (18 times).

We corroborate the conclusion of Thompson, Emmorey and Gollan (2005) that movement is the least recovered parameter at the time of TOF. This fact may indicate that the parameters localization, hand configuration and orientation (more retrieved while in TOF state) constitute the onset of the syllabic structure of the sign. In addition, the occurrence of the "tip of the fingers" phenomenon in Libras helps to confirm separation, in the processing of lexical retrieval in semantic encoding and phonological encoding established in lexical retrieval models of oral language (GARRETT, 1988; LEVELT, 1989).

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Across-the-board dependencies in Japanese Sign Language

Yuko Asada

Thursday, 1.05

This paper examines the status of across-the-board (**ATB**) dependencies in coordination in Japanese Sign Language (**JSL**) and proposes an analysis that accounts for the observed data.

ATB in JSL. Extraction from a conjunct in a coordinate structure leads to a violation of the Coordinate Structure Constraint (**CSC**) (Ross 1967), while this effect disappears when a *wh*-phrase is extracted in an ATB manner, as illustrated by (1). JSL exhibits a similar pattern, as shown in (2) (see also Tang & Lau 2012). Just as in (1a), the extraction out of one conjunct is not permitted (2a), violating the CSC, but no violation occurs with an ATB extraction (2b), as in (1b). On closer inspection, however, complex facts emerge. In JSL, a *wh*-expression may occur not only clause-final, but optionally also in-situ in a phonologically weaker form, as illustrated in (3) (cf. [5]). Thus, we may expect that a similar ATB dependency holds with this "*wh*-double" construction (cf. [4]), but this is not what we see. The ATB configuration with in-situ *wh*-phrases in (4b), for example, cannot repair the violation of the CSC in (4a). The contrast between (2b) and (4b) with respect to the availability of ATB-extraction is thus puzzling. Note that the "*wh*-in-situ only" strategy is not possible in JSL: While some languages like Japanese permit in-situ *wh*-phrase(s) without a *wh*-phrase at the clausal edge (see (5)), JSL does not allow *wh*-phrase(s) to solely stay in-situ without a clause-final *wh*-phrase, as shown in (6)-(7). Rather, the observed pattern of coordination in JSL is reminiscent of coordination in English as in (8)-(9) (see [1]). Overt ATB movement from embedded clauses is permitted in (8b), just as in JSL (2b), and an ATB dependency of in-situ *wh*-phrases fails to be established in (9), as in JSL (4b). The parallelism between English and JSL is also observed in (10) that mirrors English (8b).

Analysis. A number of researchers pursue an LF/semantic representational approach to the CSC (cf. Fox 2000, [3]). This approach assumes that what may induce a CSC effect is not the movement out of a conjunct *per se* but rather the LF representation resulting from the movement. More precisely, under this approach, it is assumed that each conjunct in a coordinate structure forms an independent structure at LF by sharing all the material above the conjunct, and that a sentence with coordination is well-formed only if each of these LF structures (**LFS**) independently satisfies grammatical constraints (see also Davidson 2013). To illustrate, the examples in English (1a) and (1b) have the LFS in (11) and (12), respectively. The one in (11b) produces a problem: it violates the ban on vacuous quantification (**BVQ**). (1a) therefore results in ungrammaticality. In contrast, neither of the two LFS in (12) violates the BVQ (or any other grammatical constraints). The contrast between (1a) and (1b) thus follows from this account.

Proposal. I claim that this semantic view of coordination can capture the above data concerning ATB dependencies in JSL/Japanese/English, assuming the Q-based theory of *wh*-constructions proposed by [2]. First, let us consider the two types of *wh*-

constructions in English, (8b) and (9). The two examples have the LFS in (13) and (14) (see [3] for details). Neither (13a) nor (13b) leads to the violations of any grammatical constraints. In contrast, (14a) and (14b) violate the BVQ because there are two Q/*wh*-words covertly moved above the conjunct and one of the two fails to bind a variable, i.e., **what**$_k$ in (14a) and **what**$_j$ in (14b). Thus, only (8b) is grammatical. This example crucially differs from ungrammatical (9) in that the *wh*-phrases which originate in the two conjuncts share the same copy – **what**$_i$ – already in overt syntax. In contrast, the *wh*-phrases in (9), raised covertly at LF, remain as two distinct items in each LFS. Let us next turn to (5a) in Japanese, where an ATB dependency is established with *wh*-in-situ. According to [2], Japanese is a “Q-adjunction” type language that lacks Q/*wh*-agreement, unlike English. Importantly, the *wh*-words of such languages do not to bear the Q-feature and the Q-particle in a *wh*-question – *ka* in Japanese – appears in clause-final adjoined position. Thus, the two LFS of this example, shown in (12), do not involve (covert) Q/*wh*-movement and satisfy grammatical constraints. This is why (5a) is grammatical. Finally, consider JSL (2b) and (4b). Recall that JSL allows ATB-extraction with a clause-final *wh*-phrase but in a *wh*-double question with *wh*-in-situ, an ATB-dependency is not available. This fact naturally follows if we assume with [4] that JSL is a Q/*wh*-agreement language like English, differing minimally in that Q/*wh*-words in JSL are morphologically split between a *wh*-non-manual marker (i.e., a Q-particle) and a *wh*-sign, the former undergoing overt Q-movement and pied-piping the latter. On this proposal, the LFS of (2b)/(4b) look like (16)/(17). Although neither of (16a) and (16b) produces a problem with any grammatical constraints, we find a problem in (17a-b): they violate the BVQ because the covert **WHAT**$_j$ in (17a) and the overt **WHAT**$_i$ in (17b) fail to bind a variable. This contrasts with the grammatical example in (3) without coordination. It has the LFS in (18), where the only one *wh*-phrase successfully binds its phonologically weak copy.

(1) a. ***What** did John [buy ***t***] and [sell a house]?
b. **What** did John [buy ***t***] and [sell ***t***]?

(2) a. *[FATHER / ***t*** / LIKE] (head nod (hn)) [MOTHER / TOMATO / DISLIKE] / **WHAT**? (wh)
(Lit.) ‘What does father like and mother dislike tomatoes?’
b. [FATHER / ***t*** / LIKE] (hn) [MOTHER / ***t*** / DISLIKE] / **WHAT**? (wh)
‘What does father like and mother dislike?’
c. [FATHER / ***t*** / LIKE] **WHAT**? (wh)
‘What does father like?’

(3) [FATHER / **WHAT** (wh) / LIKE] **WHAT** (wh)?
‘What does father like?’

(4) a. *[FATHER / **WHAT** (wh) / LIKE] (hn) [MOTHER / TOMATO / DISLIKE] / **WHAT**? (wh)
b. *[FATHER / **WHAT** (wh) / LIKE] (hn) [MOTHER / **WHAT** (wh) / DISLIKE] / **WHAT**? (wh)
(Lit.) ‘What does father like and mother dislike?

(5) a. [John-ga **nani**-o kai] [Mary-ga **nani-o** uri] -masita **ka**?
John-NOM what-ACC buy Mary-NOM what-ACC sell -polite.past Q
b. **Nani**-o [John-ga ***t*** kai] [Mary-ga ***t*** uri] -masita **ka**?
what-ACC John-NOM buy Mary-NOM sell -polite.past Q
'What did John buy and Mary sell?'

wh
(6) *FATHER / **WHAT** / LIKE?
(Lit.) 'What does father like?'

wh hn wh
(7) *[FATHER / **WHAT** / LIKE] [MOTHER / **WHAT** / DISLIKE]?

(8) a. *I wonder **what** [John bought ***t***] and [Peter sold a house]. ([1]:108)
b. I wonder **what** [John bought ***t***] and [Peter sold ***t***]. ([1]:108)

(9) *Who said [that John bought **what**] and [that Peter sold **what**]? ([1]:110)
cf. Who said [that John bought **what**]? (Hornstein 1984: 64)

wh
(10) [TAROO / ***t*** / SELL] and [HANAKO / ***t*** / BUY] **WHAT** IX_1 DON'T-KNOW.
'I don't know what Taroo sold and Hanako bought.'

(11) *LFS of (1a)* a. **what**$_i$ did John buy ***t***$_i$
b. **what**$_i$ did John sell a house

(12) *LFS of (1b)* a. **what**$_i$ did John buy ***t***$_i$
b. **what**$_i$ did John sell ***t***$_i$

(13) *LFS of (8b)* a. I wonder **what**$_i$ [John bought ***t***$_i$]
b. I wonder **what**$_i$ [Peter sold ***t***$_i$]

(14) *LFS of (9)* a. [who$_i$ [**what**$_j$ [**what**$_k$ [C [*t*$_i$ said that John bought **what**$_j$]]]]]
b. [who$_i$ [**what**$_j$ [**what**$_k$ [C [*t*$_i$ said that Peter sold **what**$_k$]]]]]
([3]:155)

(15) *LFS of (5a)* a. [$_{CP}$[$_{CP}$[$_{IP}$[John-ga **nani**-o nom-]-masita] C] **ka**$_{[Q]}$]
b. [$_{CP}$[$_{CP}$[$_{IP}$[Mary-ga **nani**-o tabe-]-masita] C] **ka**$_{[Q]}$]

(16) *LFS of (2b)*
wh$_{[Q]}$
a. [[FATHER / ***t***$_i$ / LIKE] C] **WHAT**$_i$
wh$_{[Q]}$
b. [[MOTHER / ***t***$_i$ / DISLIKE] C] **WHAT**$_i$

(17) *LFS of (4b)*

a. ___wh$_{[Q]}$ ___wh$_{[Q]}$ ___wh$_{[Q]}$

[[[FATHER / **WHAT$_{I}$** / LIKE] C] **WHAT$_{J}$**] **WHAT$_{I}$**

b. ___wh$_{[Q]}$ ___wh$_{[Q]}$ ___wh$_{[Q]}$

[[[MOTHER / **WHAT$_{J}$** / DISLIKE] C] **WHAT$_{J}$**] **WHAT$_{I}$**

(18) *LFS of (3)*

___wh$_{[Q]}$ ___wh$_{[Q]}$

[[FATHER / **WHAT$_{I}$** / LIKE] C] **WHAT$_{I}$**

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Sociocultural analysis of lexical signs of an indigenous Nigerian sign language

Emmanuel Asonye, Oluwasola Aderibigbe, Ohakwe Onyediziri & Aniefon Daniel Akpan

Thursday, 1.06

This paper discusses the sociocultural nuances that accompany a corpus of lexical signs of Magajingari Deaf community in Kaduna North, Nigeria. Magajingari Deaf community has approximately 300 deaf signers among whom about 80 use the indigenous Sign Language as a primary means of communication, some are bilingual (using the indigenous Sign Language and Signed English), while some others sign only English. Deaf in Nigeria form a major minority group (Asonye, 2017), with rich varieties of indigenous Sign Language largely neglected and undocumented, while a variety of English based signed language is used for the education of deaf children in Deaf schools across the country (Asonye, Emma-Asonye & Edward, 2018).

Magajingari Sign Language is a variety of Hausa Sign Language, one of the prominent and oldest indigenous Nigerian Sign Languages. Its users are mostly deaf adults with no education a few of whom acquired the language in their childhood, while many others, out of necessity, learnt from fellow Deaf through an informal Deaf mentoring setting. The language appears to be largely iconic and rich in sociocultural nuances. This paper gives account of the first documentation of Magajingari Sign Language and analyzes a body of lexical signs collected during the documentation exercise by the documentation team of Save the Deaf and Endangered Languages Initiative. The analysis is on the sociocultural interpretation of some of the lexical signs collected.

The purpose of this study is to lay the foundation for the theoretical and empirical description of Magajingari Sign Language, while English based signed language (often referred to as ASL by Deaf signers) provides the bases for comparison where necessary. Data discussed in this study include a large number of lexical signs for food and household items found in the community, animals, place signs, name signs, and some items from the modified Swadesh Wordlist (Woodward, 2000). Signed language materials were collected using video recorders and still cameras; a descriptive analysis of the still and motion pictures is employed in this study, while signs with remarkable iconic structure and sociocultural interpretations are elicited.

Studies show that Magajingari Sign Language is an indigenous Nigerian Sign Language distinct from the widely used Signed English (perhaps not distinct from other variant of signed languages in Northern Nigeria), rich in sociocultural meanings and largely iconic. Although the language is hardly passed down to the younger generation due to the increased impacts of Western education in the community and in the country at large, study shows that if documented and developed, Magajingari Sign Language could serve a very strong literacy and language acquisition platform for younger deaf generation. The need for further documentations and studies of this language is emphasized on this study.

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Indefinite determiners in sign languages: A typological look

Gemma Barberà & Patricia Cabredo Hofherr

Thursday, 1.07 **– CANCELLED**

1. INTRODUCTION AND PROPOSAL The present work is a pilot study for a comparative research of indefinite pronouns and indefinite determiners in 6 sign languages: three historically related sign languages, namely Italian Sign Language (LIS), French Sign Language (LSF), and Catalan Sign Language (LSC), and three typologically unrelated sign languages, such as Russian Sign Language (RSL), Hong Kong Sign Language (HKSL), and Turkish Sign Language (TID). The study has two parts. Firstly, taking the typological study of indefinites in Haspelmath (1997) as a backdrop, we first examine the lexicalisation of human indefinites, i.e. the equivalents of English *someone, anyone,* or Catalan *algú, qualsevol* in all 6 sign languages. We propose that the 6 sign languages examined follow the derivational bases established in typological studies. Moreover, they make use of morphological marking based on the use of signing space and non-manual marking to express epistemicity.

In a second step, we examine the expression of indefinites in LSC in more detail: (i) examining the expressions for three ontological categories: "person" (*someone*, Fr. *quelqu'un*), "thing" (*something*, Fr. *quelque chose*) and "place" (*somewhere*, *Fr. quelque part*) and (ii) applying Haspelmath's semantic maps for indefinites to LSC. We propose that LSC indefinite series are categorised according to formational phonological parameters, rather than semantic ontological categories as found for spoken languages.

2. HUMAN INDEFINITES IN SIX SIGN LANGUAGES Diachronically, in the world's languages indefinites derive from three major sources: interrogative-based indefinites, indefinites based on the numeral *one,* and generic-noun-based indefinites (Haspelmath 1997:26-29). All three strategies are attested in the 6 sign languages under consideration, with each sign language using one, two or the three derivational bases (Table 1). As for the morphological marking, epistemicity is marked both in the use of signing space, by means of a high locus (for 4 sign languages) and with particular non-manual marking (for the 6 sign languages) (Garcia et al. 2018 LSF, Kelepir et al. 2018 TID, Mantovan & Geraci 2018 LIS, Sze & Tang 2018 HKSL, Kimmelman 2018 RSL). The particular epistemicity non-manual marking concurs for the 6 sign languages and it is marked with: raised or furrowed eyebrows, lowered corners of the mouth, averted eyegaze and slightly raised shoulders. It has to be stressed that the indefinite pronoun or determiner often co-occurs with the just mentioned distinctive non-manual marking: in these cases the homomorphy with the interrogative/numeral *one*/generic noun is limited to the manual component with the distinctive non-manuals marking sender's ignorance.

	Derivational bases			Morphological marking	
	Interrogative-based	**One-based**	**Generic-noun-based**	**Use of signing space**	**NMM**
LIS		ONE	PERSON		yes
LSF		ONE	PERSON	high locus	yes
LSC	WHO^SOME (derived from WHO)	ONE	PERSON	high locus	yes
RSL	SOMEONE (derived from WHO)				yes
TID		ONE	ONE^PERSON^C-PERSON	high locus	yes
HKSL		ONE	HUMAN/PERSON	high locus	yes

Table 1. Derivational bases and morphological marking of human indefinites in 6 sign languages

3. INDEFINITE SERIES AND SEMANTIC MAP OF INDEFINITE READINGS IN LSC As Haspelmath (1997: 21ff) points out, cross-linguistically certain indefinites come in series covering the ontological categories of "person", "thing", "place", "time", "manner", and "amount" (*someone/something/somewhere/sometime/somehow;* amount Greek *posós*). Haspelmath proposes a semantic map for the readings found with indefinite pronouns cross-linguistically, with 9 different functions. Semantic variability should only appear for adjacent areas of the map (Haspelmath 1997:58ff).

For LSC we examined to what extent the different strategies are used for ontological domains other than "person". In this first study we restricted ourselves to "thing" and "place". We found three series of indefinites in LSC based on the formational phonological parameters of the sign: place of articulation, handshape and movement.

(i) ALGUN/ALGÚ ('something/someone'): signs articulated on the chin.
(ii) NINGÚ/CAP ('no one/none'): signs articulated with 0-handshape.
(iii) QUALSEVOL ('anyone'): signs articulated on the chest with a movement forward.

Each series may be used for the three ontological domains tested, sometimes by composition with the signs THING and PLACE articulated in a high locus. The examples below show the series QUALSEVOL for person domain (1), thing (2) and place (3).

(1) **QUALSEVOL** CAN GO UNITED-STATES. 'Anyone can visit the United States.'
(2) IX1 **THING QUALSEVOL** BUY. IX3 HAPPY SURE. 'You can buy him anything. He'll be happy for sure.'
(3) **PLACE QUALSEVOL** WATER THERE-IS VILLAGE CL.ZONE SURE. 'They built villages anywhere there was water.'

With respect to the different readings, as shown in Table 2 the series ALGUN/ALGÚ are found in contexts like specific, non-specific, irrealis, questions, conditionals and comparative. The series CAP/NINGÚ are found in contexts of indirect negation and direct negation. Finally, the series QUALSEVOL are found in free choice contexts.

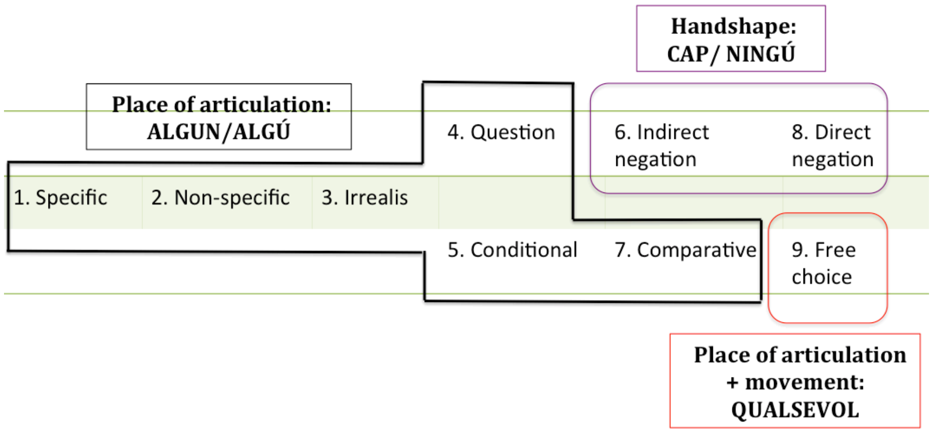

Table 2. Semantic map of indefinite readings with indefinite series in LSC

4. OUTCOME The present study contributes to the young field of sign language typology and focuses on derivational bases of indefinite determiners and pronouns in 6 sign languages. Moreover, it identifies three indefinite series in LSC, which are applied to all ontological domains tested.

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The functions of PALM-UP in primary and alternate sign languages

Anastasia Bauer & Roman Poryadin

Thursday, 1.08 **– CANCELLED**

PALM-UP (PU) is a multifunctional form, which is produced by rotating one or both open hands towards an upward palm orientation. PU is ubiquitous in communication. The prominence of PU forms in gesture and sign language is striking (Cooperrider et al., 2018). PU was shown to have polysemous meaning (McKee & Wallingford 2011). PU has been previously described to always appear with non-manuals signals, such as body shift, head nod, shoulder shrug, headshake, affective facial expressions, mouth gestures and mouthings (Engberg-Pedersen 2002; Conlin et al 2003, Chu et al., 2013). It was shown that PU is widely used to express large set of distinct meanings in sign languages: absence of knowledge, uncertainty, interrogatives, hypotheticals, obviousness and exclamatives (Cooperrider et al., 2018).

This study adds novel data by comparing the occurrences and functions of PU in two typologically unrelated sign languages in a quantitative corpus analysis study. Russian sign language (RSL) is an established sign language used by deaf people on the territory of Russia. Yolngu sign language (YSL) is an alternate sign language, used by hearing and deaf Aboriginal people in the communities of North East Arnhem Land, Australia (Bauer 2014). PU signs have never been studied before in these two languages. The study aims to find out whether the functions and the occurrences of PU differ in these two languages.

We use corpus data to give a more objective impression of the frequency and amount of variation in the use of PU. For RSL we use the on-line corpus (Burkova 2012-2015). The corpus currently includes over 180 texts filmed from 59 RSL signers – men and women aged from 18 to 63 years, with varying degrees of deafness: deaf, hard-of-hearing and CODA. A large part of the signers currently resides in Novosibirsk; another part in Moscow. The corpus contains spontaneous speech (narratives and dialogues) and texts filmed on the basis of stimulus materials (cartoons retelling, picture based storytelling). The corpus reflects the true everyday language use of different groups of RSL signers in a variety of situations. For YSL, we use the data, which has been collected during two periods of fieldwork between August 2009 and July 2010 by the author (Bauer, 2014).

We annotated each of the identified instance of PU including co-occurring non-manual components in ELAN software on the following tiers: eyebrows, eye gaze, eyes, mouth action (mouthing, mouth gesture), head, nose, cheeks, shoulders and body. The RSL annotations were done by a native RSL signer.

Analysis revealed that PU signs belong to the most frequently occurring forms in both sign languages following index signs. The two languages differ with regard to the use and the function of PU signs. In YSL, the interrogative uses of the PU signs prevail, in RSL PU signs are mostly used to express uncertainty and obviousness. While YSL PU signs are usually accompanied by co-sign speech, PU signs in RSL are usually accompanied by a series of various non-manual components: head and/or body movement, change in eye gaze direction, expressive non-manuals (shoulder shrug, rolled eyes, nose wrinkle). Different mouthings such as *вот* (russ. 'here', 'so') or *все* (russ. 'all', 'that's it') often accompanied PU in our data.

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Seeing stress: Temporal reduction in Russian Sign Language mouthing

Anastasia Bauer

Saturday, 3.01

Mouth movements that resemble the articulation of a spoken word are known as mouthing in sign language research (Boyes-Braem & Sutton-Spence 2001). Mouthing may be fully pronounced, temporally reduced, repeated or spread across adjacent manual signs (Crasborn et al. 2008). A mouthing is considered reduced when its parts are invisible, as in the German sign language (DGS) example *wi*(chtig) ‘important’, Norwegian sign language example *fe*(rtig) ‘ready’, in the Sign Language of the Netherlands (NGT) example *aksp* for accepteren ‘to accept’ or iin the Russian sign language (RSL) example *Novosib*(irsk) (Boyes Braem 2001: 104; Bank 2014: 24; Bauer 2018: 22). Mouthings may even be reduced to a single syllable or to very short mouth movements as in the NGT example *zien* ‘see’, which is reduced to only *z* (Bank 2014: 38).

Two views exist in the literature as to why only parts of the spoken word are mouthed in sign language. The first hypothesis states that (reduced) mouthing conforms to the rhythm of the (mono)syllabic form of the sign (Sandler & Lillo-Martin 2006: 105). The second hypothesis states that the stressed part of the spoken language word is usually mouthed, which indicates that signers have access to the rhythmic structure of spoken words (Bank 2014: 40-42). In the NGT data, Bank (2014:40) clearly identifies the reduction of mouthing to the stressed syllable in the Dutch word. The findings from Auslan and DGS data show that temporal reduction in mouthing typically happens in the form of deleting word-final consonants and syllables with a schwa, which are not stressed in Germanic languages (Ebbinghaus & Heßmann 1995; Johnston et al. 2016).

These two views are not mutually exclusive: a mouthing can be reduced to a stressed syllable of a surrounding spoken language and conform to the rhythm of the often monosyllabic form of the sign.

Our corpus analysis, however, reveals interesting results. For example, a RSL sign INTERESTING is usually disyllabic and is accompanied by the first, unstressed syllable of the Russian word *in*(terésnyj) in almost 50% of all of its corpus occurrences.

Figure 1: RSL sign INTERESTING with the mouthing *in*(terésnyj)

This study adds novel data by looking at reduced mouthing in RSL and contributes to the question whether the signers do have access to the prosodic information of spoken words. This can best tested in a sign language surrounded by a spoken language with a different word stress pattern as hitherto analyzed.

RSL lends itself well to researching reduced mouthing, since in contrast to Germanic word stress patterns, where the first syllable is usually stressed, spoken Russian is a free-stress language, i.e. the stress can fall on any syllable in a word: cf. *prínter* 'printer', *proféssor* 'professor', *inženér* 'engineer'. The stress is movable in the sense that different morphological forms of a lexeme may have different syllable structures: *stol* 'table-NOM', *stolá* 'table-GEN'; it can also differentiate morphological forms: *proféssora* 'professor-GEN-SG', but *professorá* 'professor-PL.NOM'.

In this study, we analyze reduced mouthings in the on-line corpus of RSL (Burkova 2012-2015). The corpus currently includes over 180 texts filmed from 59 RSL signers – men and women aged from 18 to 63 years, with varying degrees of deafness: deaf, hard-of-hearing and CODA. A large part of the signers currently resides in Novosibirsk; another part in Moscow. The corpus contains spontaneous speech (narratives and dialogues) and texts filmed on the basis of stimulus materials (cartoons retelling, picture based storytelling). The corpus reflects the true everyday language use of different groups of RSL signers in a variety of situations.

We focus on 30 RSL frequently occurring signs in the RSL corpus, which are accompanied by mouthings with two and more syllables in citation forms in spoken Russian. A native RSL signer annotated the mouth activity and the precise mouthings co-occurring with these 30 RSL signs.

We found out that

(1) the first hypothesis appears to be true for RSL: monosyllabic signs do show a preference to appear with a one syllable mouthing in the RSL corpus data.
(2) the second hypothesis does not hold for the RSL data. The reduced mouthings accompanying the RSL signs are not necessarily stressed syllables of the Russian spoken word.

RSL corpus data suggest that the most common type of temporal reduction is pronouncing the first or the most visually salient syllable of the spoken/written word. The concept of the visually more salient syllables will be discussed and the occurring tokens of reduced mouthings, their frequencies and percentages presented. The study affirms previous idea about mouthing conforming to the rhythm of the syllabic form of the sign and concludes that the prosodic structure of spoken words is not visible for the signers.

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Narrative development of deaf children in German Sign Language

Claudia Becker, Patricia Barbeito Rey & Martje Hansen

Thursday, 1.09

Children develop narrative discourse competences through the interaction of cognitive factors and social conditions. From a cognitive view, development is mainly determined by cognitive processes and becomes manifest in the semantic structure of children's stories which reflects the state of their mental representation of the story scheme (exposition – complication – resolution). Results on hearing children show that they acquire these competences in discrete steps whereas they first learn to elaborate a story. Since the dramatization of a story seems to be the most challenging task, hearing children acquire the ability to mark their story affectively only at a later stage between 9 and 14 years (e.g. Boueke et al 1995). Social-interactive approaches regard story telling as an interactive task that is carried out jointly by both conversational partners. They assume that children achieve narrative proficiency primarily on the basis of their experiences in dyadic interactions with adults who support children in reaching the next stage of development (e.g. McCabe & Peterson 1991; Hausendorf & Quasthoff 1996).

To date, only little is known about deaf children's development of narrative discourse competences in sign languages. First, it is not yet clear whether these children follow the same developmental patterns as their hearing peers: Some studies found similar developmental steps (Reilly 2001, ASL; Rathmann et al 2007, BSL), others different ones (Vercaingne-Ménard et al 2001, QSL). Second, it is still under discussion whether the different interactional experiences of deaf children influence their narrative development or not: A study of Marschark et al (1994) indicate that there are no differences between native signers (deaf children of deaf adults, DoD) and non-native signers (deaf children of hearing adults, DoH) whereas Knoors (1994) and Becker (2009) assume the opposite.

Method: We designed a cross-sectional study with five age cohorts (in total 60 subjects: 28 DoD, 32 DoH aged from 5 to 17 years). All children use DGS as their dominant language and have no other impairments. These age groups were chosen as we expected from research on hearing children that in the age of 5, 7 and 10 years children reach milestones in narrative development. At the age of 14 years the development should be more or less completed (e.g. Boueke et al 1995, Hausendorff & Quasthoff 1996). As the access to sign language can be delayed for DoH we investigated these children beginning at the age of 7 up to 17 to check whether they can catch a possible developmental delay.

Data collection: We elicited personal experience narratives of a real life event that is standardized but even so the storytelling is embedded in natural, authentic interactions (adaption of Quasthoff et al 2013): Two investigators went into classrooms and pretended that they wanted to interview pupils about their experiences with DGS. The deaf investigator left the classroom pretending that she has to prepare the video technique in another room. In the meantime together with the teacher the second investigator initiated two mishaps that break the normal course of events in the classroom (1. a lot of peas fell on the floor, 2. the teacher sat down on a plate with biscuits). After the occurrence of both mishaps, the deaf investigator waiting outside the classroom picked up a child for the interview. At the beginning of the interview, she asked the child what happened in the classroom.

Data analysis: All narrative interactions were transcribed with ELAN and were analysed with regard to the following aspects of narrative discourse:

- Global structural dimension (interactive independency, complexity of turns and its pragmatic correctness)
- Global semantic dimension (information structure, narrative structure, perspective of event in the climax)
- Global formal dimension (marking of narrative structure (exposition, climax, resolution)
- Local formal dimension (Cohesion (reference, interclausal connections))

Generalized linear regression models were used to estimate the relationship between age, group membership (DoD and DoH) and the competence in each dimension. In addition, correlations between the areas of competence were calculated using a Pearson correlation.

Results: With increasing age, both DoD and DoH show significantly higher competences in the global structural, global semantic and global formal dimension of narrative discourse. However, concerning the local formal abilities the children show development only with regard to the first introduction of the characters. All four areas correlate very positively with each other whereas the largest developmental leap in all dimensions takes place between the ages of 7 and 10. Global semantic and global formal competences develop mainly up to the age of 10, whereas global structural competences develop further up to the age of 14. This is consistent with studies on hearing children learning a spoken language.

However, children of all age groups already dramatize their stories by marking the climaxes with combinations of different linguistic and gestural devices. Only their preferences for the means change slightly with increasing age. This is in contrast to Reilly et al (2001).

Also contrary to our expectations, the interactional experiences do not have an influence: DoH and DoD show comparable competences and developmental patterns in all four dimensions of narrative discourse. This is an interesting result as DoH of the same sampling differ significantly from DoD in other data on syntactic competences (Becker et al. 2018). This can be taken as an indication that – concerning the acquisition of narrative discourse competences - cognitive developmental steps are more important than the quantity of interactive experiences.

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Realizing the expressive potential of the body in a Sign Language Theatre Laboratory

Gal Belsitzman, Atay Citron & Wendy Sandler

Thursday, 1.10

Artistic and metalinguistic uses of language, as in poetry and language games, manipulate aspects of linguistic structure for aesthetic effect and entertainment. By extending language beyond its boundaries, such manipulations are known to reveal much about underlying linguistic form and communicative functions (Bagemihl 1995). Similarly, creative use of sign language and physical theatre by deaf actors is expected to provide novel and enlightening data and to shed light on the communicative functions of body articulators. We learn that linguistic and artistic use of the body reveal the full range of compositional capacity in communicative expression (Sandler 2018).

This study focuses on the work of Ebisu Sign Language Theatre Laboratory, which consists of eight actors, all of whom use Israeli Sign Language (ISL) for daily communication. Although actors have been asked to generate data for numerous scientific studies of emotional expression (e.g., Bänziger et al., 2009), deaf actors have never been the object of linguistic study before.

The actors in Ebisu incorporate different devices from two mediums of body communication in their creation: (1) **sign language**, the actors' natural language, which includes grammatical devices of ISL, and (2) **physical theatre**, which includes methods of movement and creation that are acquired in the studio during rehearsals. We suggest that the combination of these different visual mediums results in a compositional and sophisticated form of expression, in which the actors realize the expressive potential of their body.

Our videotaped data include two improvised exercises of different types: (1) Restaurant scene, in which the waitress describes the daily specials, and (2) Studio research, in which the actor transitions between nine signs through physical theatre techniques. We find two devices that affect every expression of the actors. First, *simultaneity*, a device that is at the core of sign language grammar (Vermeerbergen et al., 2007). Two types of simultaneity can be detected, simultaneous action of articulators, and simultaneous use of different mediums of expression (physical theatre and language). The second device is the physical theatre feature by which the *whole body* is recruited for action. This feature enables the signers that usually move their body only from the waist up (both in daily communication and in sign language poetry), to move their lower body as well (waist down). It creates new possibilities of movement and interaction of more body articulators.

Figure (1a,b) exemplifies two lexical signs – PITY, CAN'T-HEAR – that are signed simultaneously, although the two hands cannot sign two different signs in everyday signing (Battison 1978). The simultaneous signing forms a semantic link between the meanings of the lexical signs (i.e., "They pity me because I can't hear"). While the actor repeats the simultaneous signing, his face is also active. It is partitioned off from the hands (Dudis 2014), mimicking an expression aligned with PITY (1a), and CAN'T-HEAR (1b) alternately, creating a dialogue between the two perspectives.

Figure (2) exemplifies a simultaneous, compositional bodily expression. (a) The actress' right hand is configured to represent a linguistic classifier for a flat object (a steak). (b) Her left hand pantomimes flipping the meat in a pan. (c) On her face is an iconic mouth gesture for a visual 'sound' (Sandler 2009). (d) At the same time, her lower body swings to echo the motion conveyed by the hands.

This lower body movement represents a new non-manual gesture that arises from our data – **Echo Body Beats (EBBs)** – in which the hips echo and magnify the movement of the Echo body beat EBB)

The theatre field liberates the language from the rules and constraints it is bound to in everyday communication. Thus, it enables the actors to stretch the linguistic boundaries and use them creatively to form new meanings. These and other examples in our analysis show different ways in which the actors can realize the expressive potential of their (whole) body using their linguistic knowledge together with physical theatre methods.

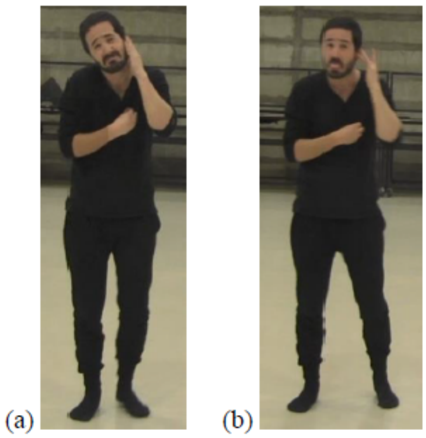

Figure 1 (a,b): Simultaneous use of two lexical sign and facial expression (1a-expression aligned with PITY, 1b-expression aligned with CAN'T-HEAR)

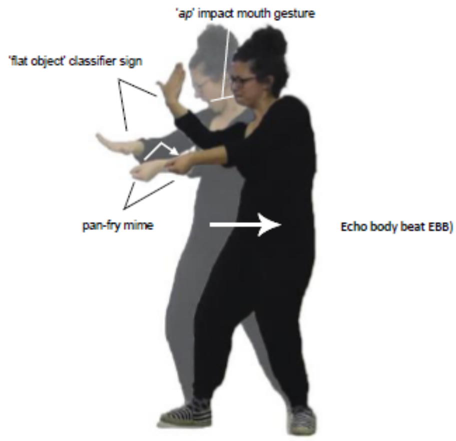

Figure 2: Simultaneous bodily expression of linguistic and theatrical devices

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Simultaneity vs sequentiality: Serial verb constructions at the intersection. The case of agents in motion predicates

Elena Benedicto

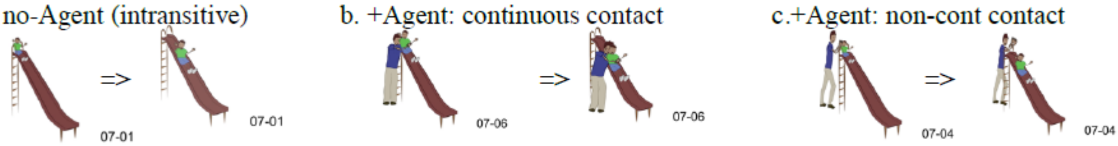
Thursday, 1.11

Introduction. It has been long claimed that Sign Languages can simultaneously encode a good amount of morphological information that would be impossible in most Spoken Languages. At the same time, it has also been shown that Sign Languages use the morpho-syntactic device of Seriality (Supalla 1990, Benedicto-Cvejanov-Quer 2008, Lau 2012)), which linearizes morpho-syntactic components sequentially. These two trends seem at odds with each other. Here we examine this tension within an area that seems to offer *optionality* in the realization of syntactic patterns: the transitivization of (intransitive) motion predicates. We will claim that such *optionality* is the byproduct of the specific morphemes selected in the Numeration and the particular subeventive structure underlying the predicate.

Goals. (i) To characterize the syntactic strategies used by ASL to add an agent argument onto (i.e., to transitivize) an intransitive motion predicate. (ii) To provide a principle-based account of the factors that underlie the tension between simultaneity and sequentiality, observed in the range of syntactic patterns obtained in the data collected.

Data and Data Collection. Given previous structural differences observed cross-linguistically (Hale-Keyser 2001), we consider two types of Agent: those in continuous contact with the Theme (*John took the child to the doctor*) and those with only initial non-continuous contact (*John kicked the ball into the goal*). Data from 3 native ASL signers were collected. Stimuli belong to a larger project on Motion Predicates containing 175 animated video-clips, with 87 related to transitivization: 50 for initial non-continuous contact (*kick*-type), 37 items for continuous contact (*take*-type) (1b,c) each with a corresponding minimally contrastive intransitive pair (1a). Telic and atelic versions of the motion event are included.

(1) a. no-Agent (intransitive) b. +Agent: continuous contact c.+Agent: non-cont contact



Results. Results initially show the use of (i) HDL-classifiers for continuous contact agents vs BP-classifiers for non-continuous contact agents (4a-b'-c/-4b), as well as a variety of strategies for continuous contact, including Serial Verb Constructions:

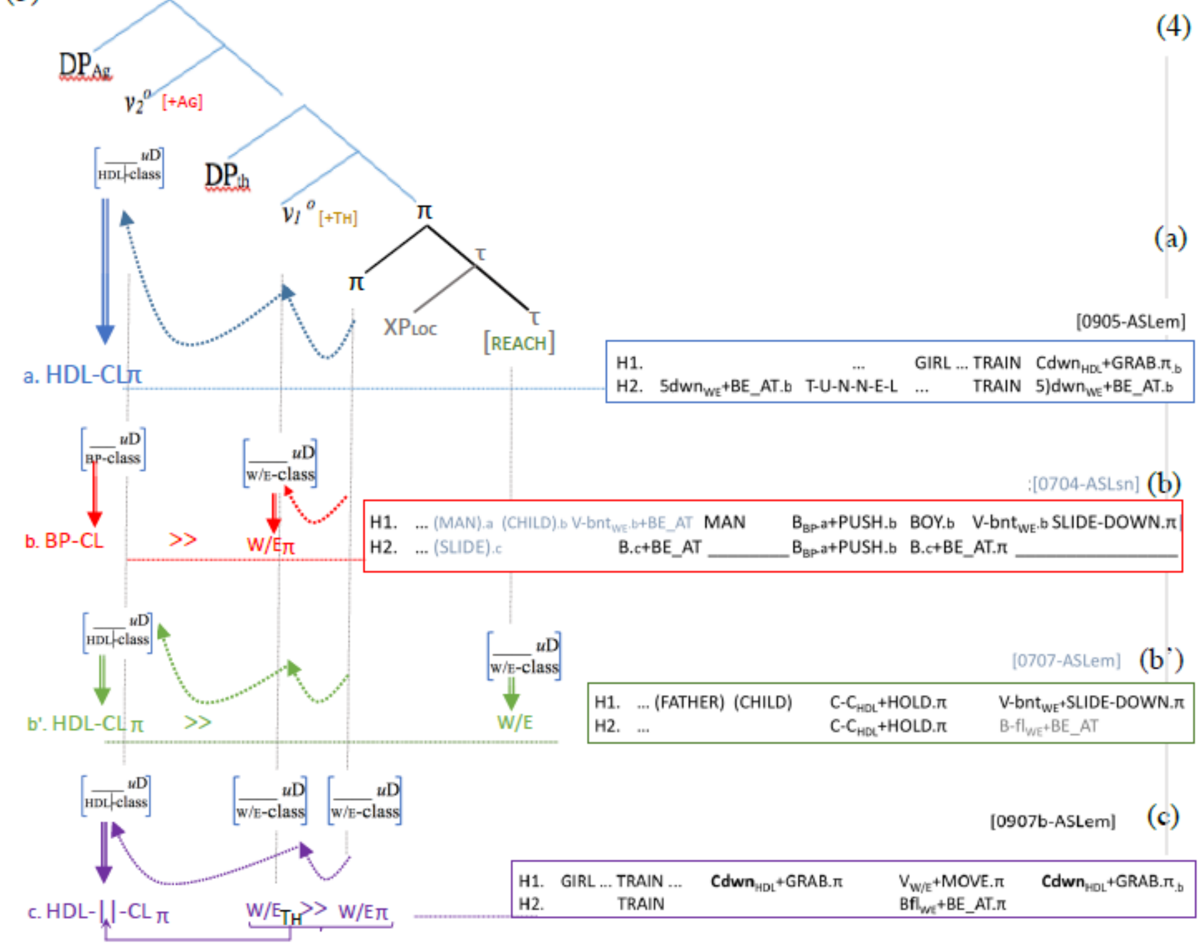
(2) a. Mono-CL: HDL.AG+MOTION.PATH
b. SVC HDL+W/E: HDL.AG >> W/E.TH+MOTION.PATH
c. SVC Sandwich: **HDL.AG >>** W/E.TH-W/E.π +MOTION.PATH **>> HDL.ag**-W/E.π+MOTION.PATH
d. SVC Co-articulation: HDL.ag-a>> HDL**.ag**-**CL.**-a +MOTION.path:π

Assumptions.

We assume Agents are introduced by a dedicated functional head, *little v* (Kratzer 1996, Chomsky 1995). We further assume, based on work both on SL and in SpL (Borer 1994, 2005; Benedicto-Brentari 2004; Ramchand 2008; Harvey 2013) that there is a *v*-split, with an agentive v_2 structurally separate and above a thematic v (v_1). Finally, we also assume the syntactic decomposition of subeventive structure, as outlined in Benedicto-Branchini-Mantovan 2015, represented in (3), in particular, the separation of a PATH substructure distinct from a telic REACH substructure in Motion Predicates; as well as the analysis of Classifiers in Benedicto 2018 that considers them as CLASS features that freely bundle up with contentful functional heads.

Hypohesis. Based on the assumptions above, the structure we claim underlies the patterns in (2) is the following, with the different patterns arising from syntactic movement and available CLASS:

(3)



The PATH morpheme π is a bound morpheme (the kinetic movement of the predicate) and as such, it needs to head-move and attach to another head; in case the Numeration only provides one classifer morpheme, HDL-class to bundle with the higher v_2, and no REACH head, π successively moves to v_1 and then to v_2, yielding the (a.) case, with only one HDL-CL that is articulated on the motion's PATH (carried by π).

If, on the other hand, the Numeration provides 2 classifiers, one for v_2 and one for v_q, then a 'classical' SVC ensues, with a BP-cl followed by W/E-cl, where only W/E is articulated on the PATH, as the result of π only raising to v_1; that is the b-case, exemplified in (4b). Alternatively, if a a head REACH is provided by the Numeration, together with a HDL-cl and a W/E-cl, then an alternative SVC arises (the 3b'-case, exemplified in (4b')), where the PATH is articulated on the HDL-cl (as the result of successive head movement of π) and W/E follows with the head τ-REACH. Finally, we will argue that the SVC-Sandwich case is the result of linearization of 3 CLASS morphemes provided by the Numeration: one HDL, one W/E_{THEME} and one W/E_{PATH} (in c.). Since there is no physical possibility of simultaneously articulating 3 CLASS morphemes (there are only two hands to support the handshapes), when the second head movement takes the 2 W/E-cl's to the head with the HDL-cl, splitting that head (thus, yielding the sandwich effect) is the only strategy that can save the derivation.

First person singular pronouns as a marker of relative social status in American Sign Language

Kiva Bennett

Thursday, 1.12

This study provides preliminary results indicating that relative social status is correlated with interlocutors' use of first person singular (FPS) pronouns in American Sign Language (ASL), specifically that people of relatively lower social status use higher rates of these words.

Background: First person singular (FPS) pronoun use has been shown to signal the relative social status of conversation partners in American English (e.g., Kacewicz et al. 2013). This negative correlation, lower social status signaled by higher FPS usage rates, has been explained as the possible result of greater self-focus by lower-status people (Tausczik & Pennebaker 2010; Davis & Brock 1975). The present study is the first to extend this work to a signed language, hypothesizing the same inverse relationship would be found in American Sign Language (ASL).

The idea that attentional focus is reflected in language use can be found in psychology as well as linguistics. The former has postulated that greater attentional focus leads to higher use of first person singular pronouns as the possible result of greater self-focus by lower-status people (Tausczik & Pennebaker 2010; Davis & Brock 1975). The latter includes the notion of construal (including profiling, prominence, foregrounding (e.g., Langacker 2008), and attentional windowing (Talmy 2000)), supporting the claim that attentional focus is reflected in language use. Relative social status is one factor that influences how individuals construe a situation, making a higher rate of self-referencing words (such as FPS pronouns) a cue that the individual is focused on themselves.

Methods: The five studies described by Kacewicz et al. (2013) were used in designing this ASL study. One of their studies was replicated rather closely, and elements of others were included as appropriate (e.g., the inclusion of objective social status markers in addition to subjective indications). For each element described here, a parenthetical number indicates how many of the Kacewicz et al. (2013) studies shared this feature. For the present study, data was collected from 18 dyads (3) of native ASL users, mismatched for social status (3), participating in face-to-face (2) 20-minute get-to-know-you chat sessions (1). Social status was initially determined by objective factors (2) such as age and level of education. Participants then self-reported their subjective perceptions (3) of their status relative to one another. Both assigned and self-reported status are taken into account in this analysis (0). By participating in multiple sessions, some participants were of relatively higher social status in one chat session and relatively lower social status in another (0). Participants' rates of FPS pronoun use were then calculated and compared (5).

Discussion: Results showed the overarching pattern followed that of the work done in American English (e.g., Kacewicz et al. 2013); social status was inversely related to rates of FPS pronoun use. Those dyads whose relative status was more disparate, objectively and/or subjectively, produced clear differences in their rates of FPS pronoun use. Differences between these interlocutors' use of FPS pronoun use ranged from 20% to 69%. Those whose rates of FPS pronoun use were similar (0.001% - 5% differences between interlocutors) were objectively and/or subjectively of more similar status. A closer look at individual cases reveals the need for more nuanced work to tease apart the factors that may help clarify the impact of objective versus subjective status.

Next Steps: The results from this study are being used to design a follow-up study. This subsequent study will re-examine how relative social status is determined within the American Deaf community, fine-tune how objective status is assessed and how subjective status is elicited, and will include experimental as well as correlational methods. The need to better understand the social elements involved calls for the inclusion of sociolinguistic methods, such as those used by Hill (2012). Further consideration should also be given to other linguistic constructions that evoke a first person construal, such as indicating verbs (also called agreement verbs) and other pro-drop environments. The use of such structures may provide a clearer picture of how FPS construal (as opposed to overt FPS pronouns only) is related to relative social status.

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On the role of eye gaze in depicting in Flemish Sign Language: A comparative study of narratives and spontaneous conversations

Inez Beukeleers, Geert Brône & Myriam Vermeerbergen

Thursday, 1.13

Signers, as speakers, can communicate an event in different ways. On the level of discourse, they can either *tell* about a certain event (describe it) or they can *show* (demonstrate) the event space (Clark 1996; Johnston 1996; Cuxac 1996, 2000; Vermeerbergen 2006). Telling in signed languages is often associated with the use of fully lexical signs, i.e. signs that are conventionalized and entrenched within a community (Schembri and Johnston 2010). Showing, on the other hand, is rather related to the use of linguistic units that are less entrenched and less conventionalized in form and meaning, i.e. to depicting signs and enacting gestures.

Distinguishing between the different types of linguistic units is, however, not straightforward. Most interesting for the current study is that differences in formal characteristics such as eye gaze and mouthing have been proposed. Whereas signers tend to gaze at their interlocutor during the productions of fully-lexical signs, they rather gaze at their own hands, i.e. at the projected referent when using depicting signs (e.g. Engberg-Pedersen 1993 for DTS, Cuxac 2000 for LSF). Important to note, however, is that these studies do not report on a systematic analysis of gaze behavior. Moreover, it is known that eye gaze also plays an important role in discourse regulation. Interlocutors can, for example, use eye gaze to mobilize response (e.g. Bavelas et al. 2002; Stivers and Rossano 2010; Baker 1977; Lackner 2009) and as such to seek for positive evidence of understanding and keep track of common ground (Clark and Brennan 1991). As both depicting signs are less conventionalized in form and meaning and are less entrenched, this coordination of understanding might be more important and as such discourse regulating functions might overrule linguistic functions of eye gaze.

The current study aims to present the first fine-grained analysis of gaze behavior during depicting signs with a specific focus on the possible interaction between linguistic and discourse regulating functions of signers' gaze behavior. We provide a comparative study, working with both narratives (monologues) and spontaneous conversations. The dataset of this study consists of 12 narratives of "Frog, where are you?" (Mayer 1969) taken from the corpus of Flemish Sign Language (Van Herreweghe et al. 2015) and 6 20-minute triadic conversations. The later are not only recorded with external cameras, but participants were also equipped with mobile eye-tracking devices (Tobii Pro Glasses 2).

The analysis of the narratives shows that signers indeed tend to gaze at their own hands when using depicting signs. In most cases, however, this gazing at the depiction is alternated with a gaze shift in the direction of the addressee. Moreover, a similar gaze pattern was found during indicating nouns, i.e. fully-lexical signs that are modified to include topographical information on the referent. Further qualitative analysis revealed that gaze patterns differed across the information status of the depicted referent (e.g. introduced or re-introduced) and to the surrounding linguistic environment, i.e. the number of depictive elements that contributed to the larger depiction. We therefore argue that signers' gaze behavior does not relate to the type linguistic forms they use, but rather to the function of these different forms in the discourse. Further analysis will gain more insights into similarities and differences with the interactions.

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Wh-questions in the Trinidad and Tobago signing community

Felicia Bisnath[1]

Thursday, 1.14

Wh-questions are typologically valuable because they can be assumed to exist in all languages. They can also provide evidence of how modality impacts linguistic structure (Cecchetto et al. 2009). To investigate this, data from as many sign languages as possible is needed. Zeshan's (2006) cross-linguistic comparison of *wh*-questions in 37 sign languages is a beginning; however, no Caribbean languages are represented in this sample (p.33). This is the motivation behind this study, which describes *wh*-questions in the previously unstudied context of Trinidad and Tobago (T&T).

In T&T there are two signing varieties that emerged out of the move from oralism to Total Communication in deaf education (Braithwaite et al. 2011; Braithwaite 2018): Trinidad and Tobago Sign Language (TTSL), that developed at a deaf school while oralism was used, and a local dialect of American Sign Language (ASL), Trinidad and Tobago American Sign Language (TTASL), that developed when ASL was introduced in education in 1975. Data was collected from 5 signers using a combination of picture elicitation, grammaticality judgements, and interviews (in that order).

The TTASL *wh*-paradigm resembles that of ASL, with idiosyncratic signs for *who, what, when, where, why, how, how many/much, which*, and WHAT-TIME. The TTSL paradigm is minimal, like that found in Indian Sign Language (Aboh et al. 2005), with just 3 idiosyncratic signs: WHO, WHAT-TIME (identical to that in TTASL) and a general interrogative (GI), resembling the palm up co-speech gesture, for all other *wh*-words. The *wh*-words covered by the GI are disambiguated by mouthings, and in some cases by iconically-motivated NMM. The form of the TTSL *wh*-paradigm appears to be influenced by spoken language and co-speech gesture, which is likely since it developed under oralism. It appears that oralism could have resulted in *wh*-mouthings becoming grammatical items in TTSL as evidenced by (1) and (2) which mean "which boy?"

(1)	______*what* BOY-TTSL	(2)	*______*what* BOY-ASL	[Signer 01]

These examples show that mouthing "what" over a manual sign is a grammatical way of forming a *wh*-question in TTSL, but not in TTASL. A similar strategy is found in the shared sign language, Providence Island Sign Language, in which the sign TELL-LIE-UPON is a compound of the manual sign for TELL and the spoken word LIE. (Washabaugh et al. 1978 p.98).

As for prosody, two main patterns of NMM are found in TTASL and TTSL: wh1 (furrowed eyebrows + squint) and wh2 (eyebrow raise + wide eyes). *wh*-NMM may be

[1] This study is a continuation of my MA thesis which was supervised by Roland Pfau (University of Amsterdam). The data was collected with the help of Ben Braithwaite (University of the West Indies, Trinidad and Tobago).

used without a manual *wh*-sign in questions like (3); however, when compared with the ungrammaticality of (4), it seems that this strategy is not productive and that (3) may be a fossilisation. According to signer 01, a *wh*-mouthing would be needed to make (4) acceptable, again suggesting that mouthings are part of TTSL grammar.

(3) ___*wh1*
OLD
"How old (are you?)" [Signer 03]

(4) *______*wh1*
BOY-TTSL
"Which boy?" [Signer 01]

No clear pattern of *wh*-NMM spread was found in either TTSL or TTASL which is likely due to the small sample; however, it may be that *wh*-NMM is not used syntactically or that its use has not stabilised yet.

Syntactically, TTASL and TTSL behave the same, and like ASL, Croatian SL and Brazilian SL in that *wh*-words are found in clause-initial and/or clause-final positions (Cecchetto et al. 2012); however, all signers indicated that they prefer the *wh*-word in clause-final position. This suggests that the natural position of the *wh*-word is clause-final in TTSL, which would align it with Italian Sign Language (LIS), Indo-Pakistani Sign Language (IPSL) and Hong Kong Sign Language (HKSL) (Cecchetto 2012: p. 307); however, more data is needed to be certain of this.

Overall, the data shows that *wh*-questions in TTSL and TTASL behave like those in other sign languages. It indicates that mouthings may have grammatical status in TTSL, which is likely because it developed under oralism. Similar patterns are also found in sign languages used by hearing people, which suggests that spoken languages can impact the grammar of signed languages. Finally, the preference for the placement of *wh*-words in clause-final position suggests that this position may be the natural location for *wh*-words, since it developed in spite of oralism. This suggests that some aspects of sign language grammar may be more susceptible to spoken language influence than others.

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Sign language dictionary as a digital tool in L2 teaching: Score evaluation of sentences for CEFR levels A1–B2

Thomas Björkstrand, Eira Balkstam & Josephine Willing

Thursday, 1.15

In this paper, we describe the development of the Swedish Sign Language online dictionary for including CEFR level evaluations of the example sentences. This is done in order to support L2 learners at different stages of proficiency and facilitate sign language teaching.

For the students in the BA program for sign language and interpreting, the dictionary is used as a digital tool for searching and finding signs and sentences. In connection to this, we found that there was a need to adapt the sentences to different levels of proficiency, following the CEFR-based scale from A1 to B2. The focus on levels A1 to B2 is motivated by the levels reached within the 2-year program. As far as we are aware, no other sign language lexical database has applied this method – nor is there much international research pertaining to this – and as such this is a novel model.

During the fall semester of 2013, the first 3-year BA program for sign language and interpreting in Sweden started at Stockholm University. The program consists in part of theoretical and practical courses on Swedish Sign Language, in part of courses in interpreting between Swedish and Swedish Sign Language. The program is to a large extent practically oriented and the main goal is for the students to obtain proficiency in Swedish Sign Language as an L2. The practical segments is adapted to CEFR, which is a joint reference framework for language learning, teaching, and evaluation, established by the European Council for the purpose of describing second language proficiency.[1] The scale has three levels, each with two sublevels: A1–2 (basic user); B1–2 (independent user); and C1–2 (proficient user). PRO-Sign[2] has developed and adaptation of CEFR on the basis of sign language. PRO-Sign's CEFR profile includes a summary of the requirements for students, including production, comprehension, and conversation.

The Swedish Sign Language Dictionary was initiated in the end of the 1990s. The lexical database currently contains 21,000 sign entries and 4,100 example sentences and was launched in its present online form in October 2008.[3] The database contains video files (demonstrating signs and example sentences), phonological transcriptions, and sign glosses (for corpus annotation work). The purpose of the database is to document all signs found in Swedish Sign Language. Besides sign video demonstrations, each sign entry is associated with up to four video example sentences with up to 16 signs each. Each sentence example sign is indexed such that it can be found across different sign entries. The maximum number of 16 signs is motivated by a need to avoid too long sentences.

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[1] https://www.coe.int/en/web/common-european-framework-reference-languages
[2] https://www.ecml.at/ECML-Programme/Programme2012-2015/ProSign/tabid/1752/Default.aspx
[3] https://teckenspraakslexikon.su.se

We are developing an idea evaluation method in which we are able to categorize each example sentence according to the CEFR scale (A1–B2). Based on this scale, we are able to select which grammatical functions (e.g., non-manual negation), parts of speech (e.g., verbs), clause types (e.g., declarative), and the number of signs to be included in a sentence. The sentences are either constructed or collected from the annotated Swedish Sign Language Corpus.[1] The SSL Corpus is an important resource for the development of the dictionary, but due to its limited size it is not possible to rely solely on authentic corpus example sentences.

In our database, different linguistic properties have been annotated – e.g., clause types, fingerspelling, auxiliary verbs, depicting signs, metaphors, negation, etc. – and each property has been assigned a certain score. By adding up the total score of the sentence and comparing this score to a predetermined evaluation scale, we are able to categorize the sentence according to the CEFR levels. In our preliminary evaluation scale, we have chosen to categorize the scores in the following intervals: A1 = 1–7 points; A2 = 8–17 points; B1 = 18–24 points; B2 = >25 points. This is illustrated in the following glossed example sentence:

POSS-1(J) BARN(J:) ALLTID(L) BRÅKA(BB:) VILL-INTE(5) MÖSSA(J) GÅ-UT(N).
POSS-1(J) CHILDREN(J:) ALWAYS(L) FIGHT(BB:) WANT-NOT(5) HAT(J) GO-OUT(N).
'My children are always fighting about not wanting a hat when going outside.'

The total score of this sentence is thus calculated as 12: 4 points for the clause type, and 8 points for the grammatical properties. As such, this sentence is categorized as an A2 level sentence.

With the help of this evaluation model, we are able to evaluate example sentences according to the different proficiency levels. The automatic conversion from point score to levels A1 and A2 are already considered relevant and we are now aiming to develop and adjust the conversion table for the other levels. According to the teaching staff, this method is useful and will be put to practice during the spring semester of 2019, with the hopes of receiving positive reactions from the students. The development of

[1] https://www.ling.su.se/teckenspråksresurser/teckenspråkskorpusar/svensk-teckenspråkskorpus

evaluation tools is of great importance, not only for the hearing L2 learners in or BA program, but also for similar sign language courses.

Perceptual narrowing in deaf infants

Shane Blau

Thursday, 1.16

Research Questions:

1) Are deaf infants able to distinguish between unknown sign languages? What linguistic features are salient when they are watching unknown sign languages?

2) Do behavioral paradigms used to evaluate perceptual development in hearing infants translate successfully to deaf infants? Sign languages?

Very young infants have perceptual biases that allow them to preferentially attend to potentially meaningful linguistic information. Perceptual narrowing, a loss of sensitivity to non-native linguistic contrasts, occurs within the first year of life in typically developing hearing infants(8). These changes allow babies to focus on information that is contrastive and meaningful in their native languages. In the earliest stages of development, infants use their inherent sensitivities and early experience to establish a foundational understanding of the prosodic features of their native languages. As they gain linguistic experience, they develop more finely tuned perceptual skills, which they then use to help them acquire more information about their language system.

Deaf infants in non-signing environments are at risk of missing the rich language exposure needed to trigger subsequent linguistic development(1). Without the requisite input, the perceptual foundation that is required for native language acquisition may not fully develop. While it is clear that early language deprivation is harmful to deaf children(1,4), few studies have directly examined the effect of delayed language exposure on deaf infants' perceptual skills. Paradigms used to test hearing infants have not been fully explored with deaf babies, leaving numerous methodological concerns when adapting experimental techniques.

In this study, I present an adaptation of two well-established infant behavioral paradigms, habituation and preferential looking. Both paradigms evaluate the onset of perceptual narrowing by looking at whether infants are able to discriminate between two sets of novel linguistic stimuli. Infants who are able to successfully distinguish between unknown linguistic input have not yet undergone perceptual narrowing, whereas those who do not recognize the difference have completed this developmental process.

The timeline for perceptual narrowing can be influenced by environmental factors and correlates with language outcomes(3). Infants who have atypical early language experience have been shown to have delayed onset of perceptual narrowing, and subsequently, have shown delays in other language acquisition milestones(2). Therefore testing the age at which deaf children lose sensitivity to non-native contrasts may offer important insights on how language exposure affects development even before the child is able to produce language.

Approach:

In order to address the impact of early language experience, the first step is to determine whether deaf infants do in fact discriminate between unknown sign languages. To address this foundational question requires consideration of some challenges unique to the study of sign languages and deaf infants. Currently, we do not know what features of sign languages make them distinguishable from each other, nor do we know exactly what features deaf infants attend to when perceiving sign languages. I have designed habituation and preferential looking paradigms to investigate whether deaf children (5-24 months) discriminate between unknown sign languages before and after the typical age of perceptual narrowing. The stimuli for the habituation paradigm consist of a bilingual Deaf signer producing two different sign languages, Russian Sign Language (RSL) and German Sign Language (DGS). Another set of stimuli, Japanese Sign Language (JSL) and British Sign Language (BSL) were used in another infant study, and so were included as part of the preliminary analyses. The preferential looking paradigm uses a natural sign language (American Sign Language) and an invented sign system (Signed Exact English). The experiment was carefully designed to provide a consistent controlled testing environment for deaf infants, who may be even more visually vigilant than hearing infants. It is also designed to be portable to address the prevalent problem of low numbers of participants in studies of deaf infants.

In this study, I analyze the language samples used for the experiment, discuss considerations and potential confounds in using habituation and preferential looking paradigms with deaf infants, present my experimental approach, evaluate the effectiveness of these adapted paradigms, and share preliminary results of infant testing.

Preliminary Results:

The BSL and JSL stimuli have been tested with hearing infants and were successfully discriminated by 6-month-olds but not by 12-month-old babies [(5)]. These findings indicate that sign language stimuli is recognizable as linguistic input to sign-naive infants, and that there are sufficient differences between the two languages to allow discrimination. Analysis of the two languages produced by the sign model indicates statistically significant prosodic differences. Table 1 below shows results of analysis from the 62 stimuli sentences.

The analysis indicates that in language samples of the same length, there are statistically significant differences in the length of intonational phrases (IPs) and in the length of the nonstatic segment of signs (movements). There are not significant differences in the overall duration of the signs, although the BSL stimuli showed more variation in sign length. This finding indicates that there may indeed be regular prosodic differences that distinguish different sign languages. In this case, it is possible that infants are able to recognize the more regular and shorter movements of JSL as compared to the longer and more variable movements in BSL, similar to the ability of young infants to recognize the difference between languages with vowel reduction in unstressed syllables and those with more consistent vowel length across syllables[(6)].

Table 1: Analysis of Japanese Sign Language and British Sign Language sentences

	# of signs	# of IPs	Sign duration *(ns)*	Movement duration **	IP duration **
JSL	161	80	M = 533.0	M = 113.5	M = 1272.8
BSL	131	50	M = 566.6	M = 195.5	M = 1815.6

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Signs of reduction: Frequency, duration, and signing rate in three sign language corpora

Carl Börstell, Onno Crasborn & Adam Schembri

Thursday, 1.17

Frequency effects in language are omnipresent (Bybee 2007). One such effect involves lexical frequency being inversely correlated with the length of a word (Zipf 1949). Similarly, sign frequency and duration have been shown to correlate in Swedish Sign Language (SSL) corpus data (Börstell et al. 2016). Only a handful of previous studies have looked at duration ("length of individual signs") and signing rate ("signs per time unit"), showing that signing rate differs slightly from speech rate (e.g., by being lower), but also that changes to signing/speech rate are controlled differently, possibly due to signers' pausing not entailing breathing as it does in speech (Grosjean 1979; Wilbur 2010). Here, we expand on this research by looking at both duration and signing rate as measures for reduction in sign production using corpus data from three sign languages – British Sign Language (BSL), Sign Language of the Netherlands (NGT), and SSL (Crasborn et al. 2015; Schembri et al. 2017; Mesch 2018) – and explore whether sociolinguistic factors such as region, age, and gender have an effect on duration and signing rate.

The ELAN (Crasborn & Sloetjes 2008) files are used to extract the annotation cells for sign glosses as an estimate of sign duration, with sign glosses segmented into "utterances", arbitrarily defined as any sequence of signs separated by pauses >1000 msec. With this methodology, we end up with ≈270,000 sign glosses distributed across ≈12,000 utterances.

First, we return to the question of mean sign type duration as a function of token frequency (inverse correlation), with more data than in Börstell et al. (2016), as well as two additional languages added. Using a linear mixed effects model in R (Kuznetsova et al. 2016; R Core Team 2015), we confirm the inverse correlation between logarithmic lexical frequency and mean sign type duration across languages ($\beta = -41.254$, $t(19892) = -24.98$, $p < .0001$, Figure 1). Unsurprisingly, we also see an inverse correlation between signing rate per utterance (signs/minute) and the mean duration of signs in the utterance ($\beta = -2.584$, $t(10790) = -76.74$, $p < .0001$, Figure 2) – i.e. higher signing rate comes with reduced (shorter) signs.

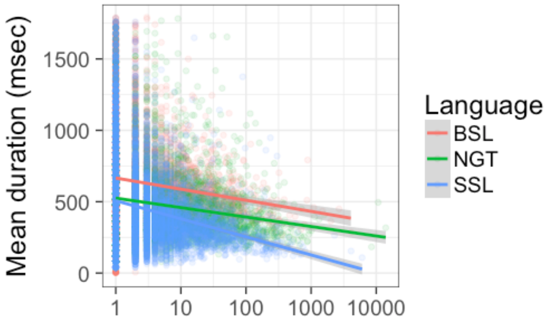

Figure 1

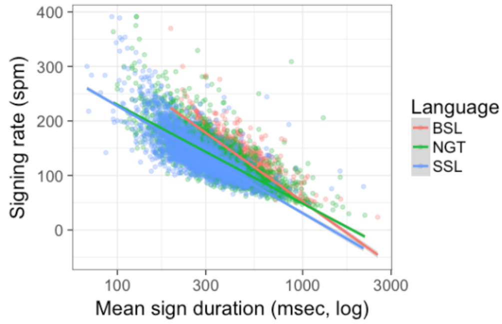

Figure 2

Following Börstell et al. (2016), we look at duration as a function of signer age, but also signing rate as a function of age. We see the expected pattern, mirroring findings from spoken languages, that the older the signer, the lower the signing rate ($\beta = -0.50546$, $t(493.8) = -8.052$, $p < .0001$, Figure 3) and the higher the duration of signs ($\beta = 1.1134$, $t(8859) = 13.351$, $p < .0001$, Figure 4).

With this study, we first corroborate previous work in that lexical frequency is inversely correlated with duration – as predicted by Zipf's second law. Second, we find correlations between signing rate and sign duration, confirming that phonetic reduction of individual signs is a strategy for increasing signing rate. Lastly, we show that at least one sociolinguistic factor (signer age) affects signing rate and sign durations. With the currently available data, we aim to expand the sociolinguistic perspective to include other factors, such as the regional and social background of the signers.

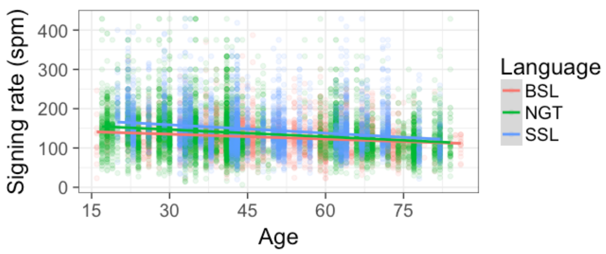

Figure 3

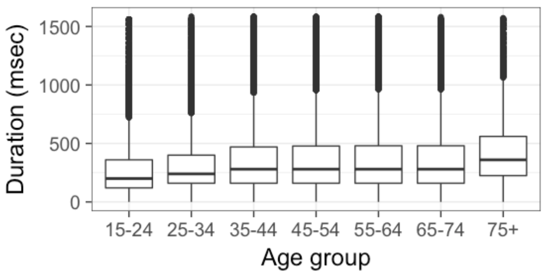

Figure 4

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True friends or false friends? Lexical similarity for predicting cross-signing success

Carl Börstell, Onno Crasborn & Lori Whynot

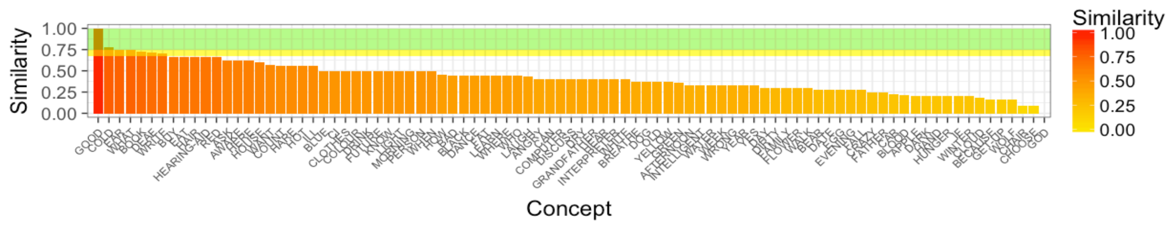
Friday, 14:30-15:00

When signers engage in cross-linguistic interactions, they bring their own set of linguistic resources, which entails using (conventional) material from their own primary language, but also adapting to the communicative situation. By doing so, deaf signers are able to achieve successful communication with increased complexity in a short amount of time, without sharing any signed or spoken language (Zeshan 2015; Byun et al. 2018). However, little is known about the degree of mutual intelligibility or "communicative compatibility" between individual sign languages, though the assumption is that cross-signing success is partly dependent on how similar the languages involved are. In fact, little is known about linguistic distances between sign languages and there are few measures for calculating this. Previous work in this domain has mainly used lexicostatistics, comparing the form overlap across languages based on concept lists. Such studies have for sign languages mostly been undertaken on an areal basis, with the intention of using lexical overlap as a metric for the likelihood of two languages being related (e.g., Woodward 1993; Guerra Currie et al. 2002; Johnston 2003; McKee & Kennedy 2000, Al-Fityani & Padden 2010), though the methodology for comparing any two sign forms across languages has varied between studies.

In this paper, we present a novel approach for measuring lexical distance across any two sign languages with the goal of creating a comparative metric for predicting cross-signing success. This is achieved by using the Global Signbank platform, in which languages are added as uniformly coded lexical datasets. This includes videos, ID glossing, and a standardized format for coding phonology for each sign entry. Here, we compare languages in two ways by using Global Signbank. First, we automatically compare the lexical distance between two languages for the list of concepts that has been mapped onto sign entries in both datasets. This requires a feature-by-feature comparison for all phonological features per concept and returning the number of matching features (scaled between 0 and 1). In cases of multiple sign variants for a concept within a dataset, the algorithm automatically selects the closest matching sign forms for that concept, as this estimates the maximal overlap possible from the languages' respective resources. Second, we compare all entries between the two datasets to find perfect form matches, in order to estimate true and false friends. That is, we want to see how many shared sign forms are found across languages and to what extent these encode the same meanings. The hypothesis is that languages with similar phonologies may show overlap in sign forms, which may or may not encode the same meaning. If the meaning mapping overlaps (true friends), the prediction is that mutual intelligibility is higher; if not (false friends), this could be an impeding factor for cross-signing. That is, the fact that the NGT sign WHERE is identical to the ASL sign WHAT (and vice versa) may disrupt cross-signing, since the addressee recognizes the form but maps it to a different meaning.

In our current data, we have datasets from NGT (4,026 signs; 88% of which have phonological coding) and Chinese Sign Language (2,248 signs; 17% coded), two unrelated languages. Using our comparative method, we first match the 301 concepts used in the ECHO project (Woll et al. 2010) to as many sign entries as possible across the two datasets. Of the 89 concepts represented in both datasets, only 4 pairs (≈4.5% of the concepts) have a similarity of 0.75 or higher, which is an approximation of the number of features that had to match for signs to be identified as "similar" in previous work (see Figure). This strongly suggests that the languages are unrelated (cf. Al-Fityani & Padden 2010). For the second part of our method, we identify 12 identical sign forms across the two full datasets. Of these, 3 forms have identical/related meanings across languages, such as 'good', in both languages, and 'Jesus' or 'God', respectively in NGT and CSL. The other 9 forms are false friends, for example '(to) lift' in NGT and '(to) begin' in CSL, or numbers such as NGT 'seven' or CSL 'eight'. Thus, it seems most NGT and CSL form overlaps are false friends, an indication of the lexical similarity that would be brought to a cross-signing situation between the languages. We are currently extending our study by adding more signs and more languages.

With this methodology, we aim to establish a metric for linguistic distance not only for formal linguistic classification, but also the potential for communicative success in a cross-signing context. Historical relationships offer some explanation for potential cross-signing comprehension, but this may be possible without relatedness, as long as the different languages involved in the interaction happen to share form–meaning mappings, by recruiting similar iconic patterns in word formation. This has been shown for International Sign, in that signers whose languages make use of signs similar to those recruited in IS performed better on IS lexical comprehension testing (Whynot 2015). We hypothesize that the same should be true in conversational cross-signing, which we will test next for NGT signers interacting with signers of CSL as well as the two sign languages of Belgium.



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Spatial metaphors in antonym pairs across sign languages

Carl Börstell & Ryan Lepic

Saturday, 3.02

Metaphors are found in both spoken and signed languages (Kimmelman et al. 2017; Lakoff & Johnson 1980; Meir & Cohen 2018; Wilcox 2000). Some metaphors are based on spatial mappings, such that space, time, and emotional valence are associated with spatial locations. This includes representing timelines ('then' vs. 'now') or valence scales ('good' vs. 'bad') along front/back, left/right, or up/down spatial axes (Cooperrider & Núñez 2009; Meier & Robinson 2004; Yap et al. 2014; Woodin & Winter 2018). This paper concerns metaphorical mappings in which emotional valence is described with space – e.g., good=up; bad=down – across sign languages.

We investigate the use of physical space in 45 different property words across 32 sign languages found in the Spread the Sign online dictionary (European Sign Language Center 2012). The word items are sampled from a list of common antonym pairs (Koptjevskaja-Tamm et al. 2017) based on their categorization into positive vs. negative valence (e.g., positive: 'good', 'happy'; negative: 'bad', 'sad').

We conduct both a manual and an automatic analysis of sign location and movement direction, to determine whether there is a general cross-linguistic pattern for positive vs. negative valence to be associated different spatial regions/directions in signing space (hypothesis: positive valence is generally articulated higher up or with upward movement than negative). 786 sign videos were collected (453 from positive property words; 333 negative) from Spread the Sign and were all manually annotated for approximate sign height and movement direction (upward/downward and inward/outward). Videos were also automatically analyzed with the Openpose software (Cao et al. 2017), capturing hand coordinates for each frame, with the average of *y* coordinates recorded as the sign height.

A linear mixed effects model (R Core Team 2017; Kuznetsova et al. 2017) – with valence (positive/negative) as fixed effect, and word and language as random effects – shows no significant difference in sign height between positive and negative valence words, for neither manually nor automatically annotated data ($p > 0.5$). However, we do see a significant difference in the distribution of movement *direction*, such that upward movements are more often associated with positive valence ($\chi^2(1) = 35.681$; $p < 0.0001$; Figure 1), which supports previous findings by Yap et al. (2014) on a smaller sample of sign languages. Thus, it is the *change* in sign height (i.e. the movement in vertical space) rather than static height that correlates with valence. Interestingly, we also find a significant difference in the distribution of sagittal movement direction, in that outward movements are more often associated with positive valence ($\chi^2(1) = 16.294$; $p < 0.0001$; Figure 2). This result is perhaps more unexpected as it does not immediately correspond to well-established conceptual metaphors of space and valence.

We interpret these statistical results as initial evidence for a systematic pattern to represent positive/negative valence along a vertical scale – a known metaphor across languages – which is then iconically mapped directly onto vertical dynamic articulation in signs. Interestingly, we also find a difference in the distribution of movements along the sagittal axis, such that outward movement is more often associated with positive than negative valence, a finding that motivates further cross-linguistic research in the use of spatial metaphors in language along various axes.

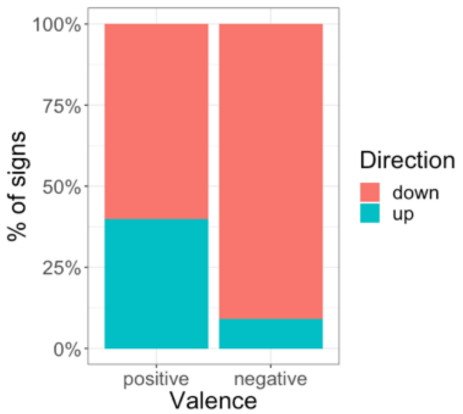

Figure 1

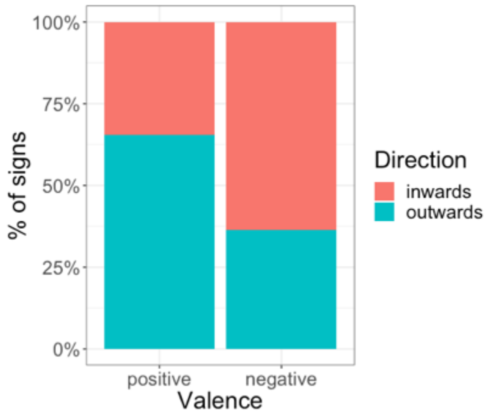

Figure 2

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Automaticity of visual word & sign processing in deaf bilinguals: Evidence from the Stroop Task

Rain Bosworth, Sarah Tyler, Eli Binder & Jill P. Morford

Thursday, 1.18

Introduction: The well-documented Stroop effect (1935) demonstrates that visual word recognition is highly automated. In the Stroop task, participants view a printed color word and are asked to name the ink color of the word. Participants must inhibit visual word processing in order to name the ink color of the word. Responses are slower when the ink color is incongruent with the word (responding "blue" when reading the word "RED" presented in blue ink) than when the color is congruent (responding "red" when reading the word "RED" presented in red ink). This is the classic Stroop interference effect.

The Stroop Task has been used to investigate automatic processing by comparing performance on an automated task (visual word recognition) to a novel task (color naming). More recently, investigators have used the Stroop Task to probe cognitive control in bilinguals. Bilinguals are argued to have greater cognitive control abilities due to the need to select the target language and inhibit the non-target language during typical interactions with speakers of both languages. Studies of bilinguals completing the Stroop Task, however, indicate that language proficiency and cross-language similarity together impact performance on this task (Coderre & Van Heuven, 2014). To date, no studies have attempted to assess Stroop effects in both languages of Deaf bilinguals, while controlling for language proficiency and including bilingual control groups varying in cross-language similarity. In the current study, we select bilinguals whose languages differed in cross-script similarity: ASL-English bilinguals (single script), English-Chinese bilinguals (low script similarity), English-Korean bilinguals (moderate script similarity), English-Spanish bilinguals (high script similarity).

Aims: This study investigates the following questions: *1) Is proficiency in ASL related to the magnitude of the Stroop interference effect in ASL signers?* If so, then we predict that signers with better proficiency in ASL will exhibit stronger ASL Stroop interference, indicative of more automatic lexical access. *2) Do ASL-English bilinguals show Stroop interference in both languages?* If so, this result is indicative that visual recognition of both English words and ASL signs is highly automated in ASL-English bilinguals. *3) Does cross-language script similarity impact the Stroop interference effect?* If so, we predict that ASL-English bilinguals will show the smallest interference effects since they do not have competing orthographic systems. We address these three questions by comparing Stroop task performance in four groups of deaf and hearing bilinguals.

Methods: 16 deaf ASL-English bilinguals, 22 hearing English-Chinese bilinguals, 15 hearing English-Korean bilinguals, and 34 hearing English-Spanish bilinguals completed a reading proficiency questionnaire. They then completed a total of 4 blocks of the Color Stroop Task using a button press response: One block of color naming and one block of word/sign reading in each language. Order of blocks was randomized and counterbalanced. ASL Stroop involved presenting a video of an ASL sign against a black background in which the hand was colored blue, green, yellow or purple. Chinese, Korean or Spanish Stroop involved presenting words in each language on a black background in which the graphemes were colored blue, green, yellow or purple (see Figure 1). Only participants who performed better than 80% correct on the congruent word/sign reading blocks in both languages were included in the analysis to ensure that all participants had a high level of proficiency in both languages.

Results: Stroop effects for ASL were found using a novel Stroop paradigm (cf. Dupuis & Berent, 2015; Marschark & Stroyer, 1993). Proficiency in ASL as measured by the ASL-CT predicted the size of the Stroop interference effect ($r=.53$, $p<.05$). A comparison of performance on the English and ASL Stroop Color Naming Tasks revealed a main effect of congruency on Response Time for the ASL-English bilinguals, and no effect of Language, indicating that processing of both English words and ASL signs is highly automated in ASL-English bilinguals, $F(1, 14) = 59.84$, $p<.0001$. A comparison of the four groups of bilinguals revealed stronger Stroop interference effects for color naming of English words than for color naming of words in the other language for all groups except the ASL-English bilinguals. ASL-English bilinguals showed comparable interference effects for both languages. Finally, the ASL-English bilinguals achieved the highest accuracy on the Stroop task in both languages.

Discussion: The results support three conclusions. First, Stroop interference effects are independent of language modality but are dependent on language proficiency. Second, contrary to some claims in the literature, deaf signers' visual word processing of both signs and written words is highly automated. Third, cross-language similarity is a critical factor in shaping bilinguals' experience of Stroop interference in their two languages. Deaf ASL-English bilinguals show the greatest cognitive control at no cost to accuracy among the four bilingual groups.

Figure 1. Word reading and color naming stimuli. ASL signs are presented as videos.

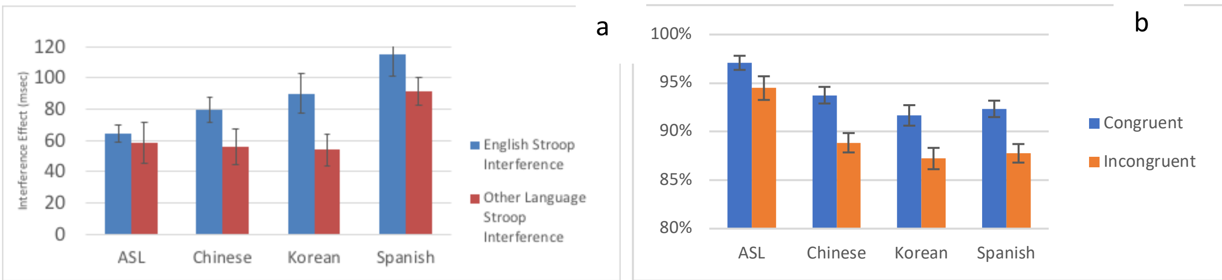

Figure 2. a) Deaf Bilinguals show comparable interference effect sizes in English and ASL.
b) Deaf Bilinguals show highest accuracy on Stroop color naming task in English

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How quickly does phonology emerge in a "village" vs. "community" sign language?

Diane Brentari, Rabia Ergin, Ann Senghas, Pyeong-Whan Cho & Marie Coppola

Thursday, 1.19

In this work, we offer several new findings concerning how phonology emerges in a "village" sign language (Central Taurus Sign Language, CTSL) vs. a "community" sign language (Nicaraguan Sign Language, NSL). The demographics of the two types of sign languages (SLs) are different: A village SL has a mix of hearing and deaf members, and the number of deaf members of CTSL community is comparatively small (maximum 25-30). In contrast, a community SL is composed largely of deaf members; there are few, if any, hearing members. The NSL community is comparatively large (approximately 3500). This analysis reveals that several social factors are at work in the development of a phonological system, including the community size, whether users interact with one another in a community, and whether users have access to a language model from a previous generation or cohort.

Methods: Data were collected and analyzed using the same task, stimuli, and levels of handshape complexity used in previous work [1,2]. This method assigns a value of 1 (low) to 3 (high) to each handshape for joint complexity and selected finger complexity, based on frequency, time course of acquisition, and phonological structure. Handshape Type was also annotated—(H)andling-HS, (O)bject-HS. We analyzed data from 8 stimulus objects participating in equal numbers of agent and no-agent contexts designed to elicit descriptions from 6 participant groups (80 items per participant; 4-5 adults per group; 6472 handshapes total). These groups were classified with respect to their access to a community of users, called "(Hor)izontal contact", and to a language model, called "(Ver)tical contact" (Table 1).

	-horizontal	+horizontal
-vertical	homesigners(1) (NSL)	NSL1(50); CTSL1(5)
+vertical		NSL2(200);CTSL2(10), CTSL3(20)

Table 1. Characteristics of participant groups regarding community access and language model; the number in parentheses is the approximate community size of each group.

Results: A Bayesian mixed-effects linear model was employed to estimate the effects of community size, vertical contact, and handshape type (H-HS, O-HS) on three measures of handshape complexity (joint, selected fingers, total). Consistent with the previous report, H-HSs have higher joint complexity (Fig1). The 95% credible intervals of the effects of community size, horizontal contact, and vertical contact on selected finger complexity (Fig2) and total complexity (Fig3) did not include 0, suggesting that handshapes become more complex with a larger community size, but simpler with horizontal and vertical contact.

Discussion: These results suggest that:

(A) Community size plays a role in developing a phonological system.
(B) A high level of joint complexity is associated with H-HSs in all groups. Previous work has shown this pattern in gesture groups as well. [1,2].
(C) The development of selected finger complexity is indicative of system wide changes in a primary communication system, and is at the vanguard of phonological emergence. (1) homesigners, who are –Hor,–Ver contact, generate the highest range of selected finger complexity. (2) A system showing economical use of features emerges within a community (+Hor), and subsequently shows a stronger alignment of form with meaning (H-HS vs. O-HS) with a learning model (+Ver).

Figure 1. Analysis of Joint complexity across the targeted factors of this study.

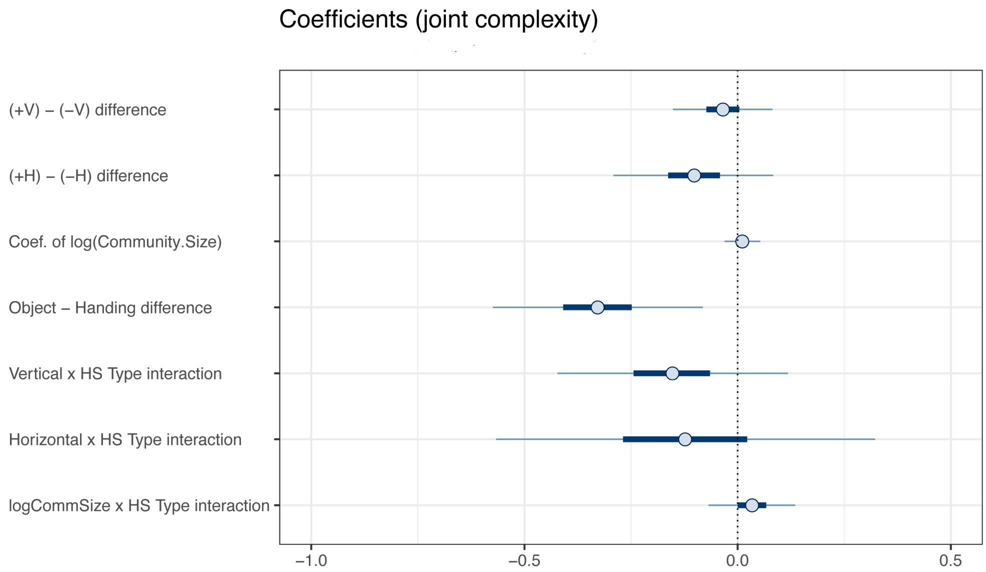


Figure 2. Analysis of selected finger complexity across the targeted factors of this study.

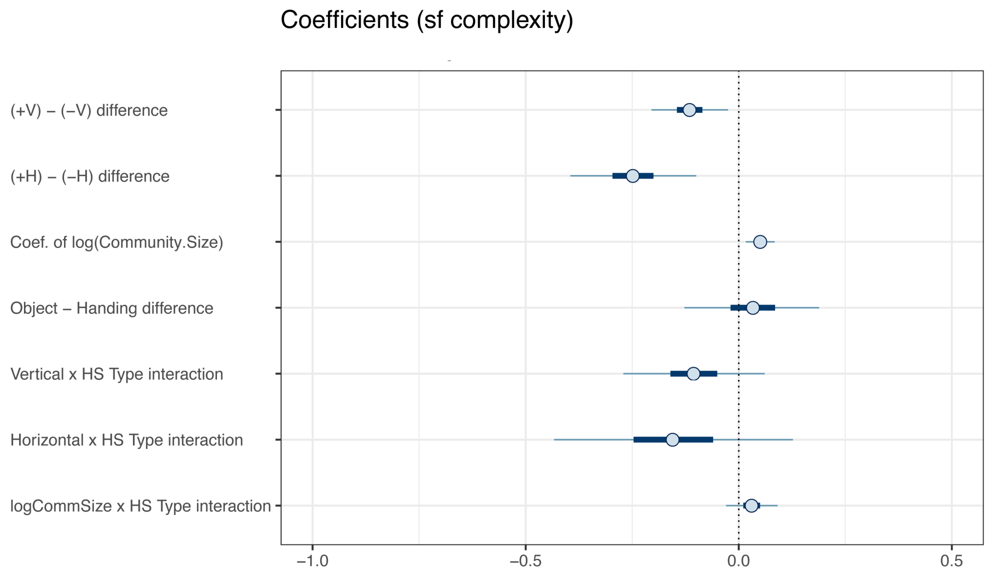
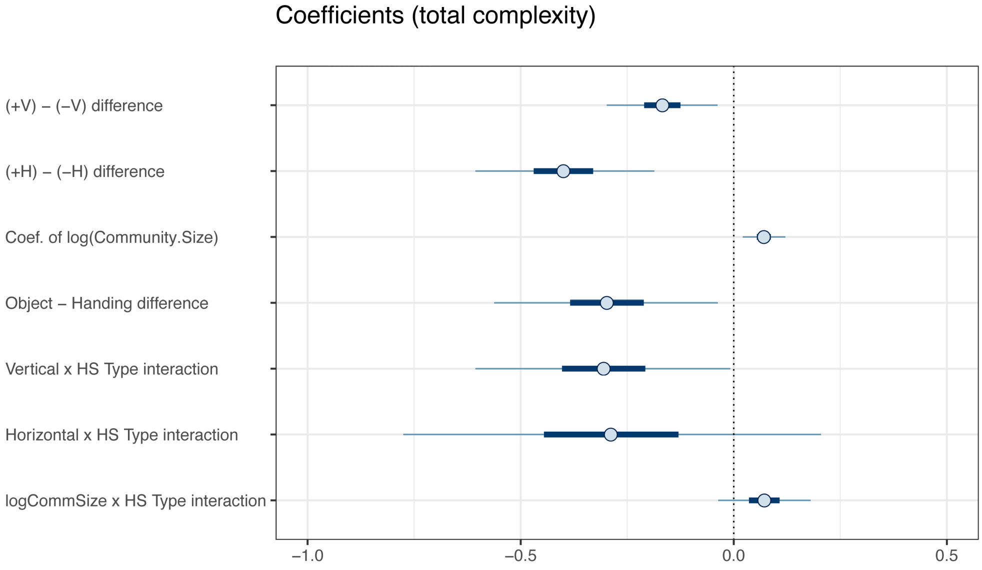


Figure 3. Analysis of Total complexity across the targeted factors of this study.



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Coordination and subordination in German Sign Language (*Deutsche Gebärdensprache*) and the Bodily Mapping Hypothesis

Fabian Bross

Thursday, 1.20

The goal of this talk is to put the Bodily Mapping Hypothesis by Bross & Hole (2017) and Bross (2018) to test by looking at coordination and subordination data from German Sign Language (*Deutsche Gebärdensprache*, DGS). The data presented here is based on elicitations from eleven native speakers of DGS from Southern Germany (Munich, Stuttgart, and Heidelberg).

The Bodily Mapping Hypothesis: Bross & Hole (2017) and Bross (2018) claim that higher syntactic categories, i.e., those above T, are expressed non-manually with the face in sign languages; the highest ones (e.g., speech-act or topic marking with the upper face) find realization with the upper face and the lower portion of the CP with the lower face (e.g., scalarity). TP internal material is furthermore expressed manually. Descending the clausal spine with its richly articulated structure thus means descending the signer's body (i.e., they claim that scope is iconically mapped onto articulators in DGS).

Coordination and subordination: For coordination and subordination, the Bodily Mapping Hypothesis predicts that subordination will be expressed non-manually with the upper face as a reflection of active syntactic heads in the higher CP domain, while coordination should not lead to upper-face markings. This predictions indeed turn out to be on the right track. A prime example are *but* coordination and *although* subordination. While antithetic *but* leads to a coordinate structure, antithetic *although* leads to a structure with a main and an embedded clause. While concessive and antithetic structures are superficially very similar in English, the contrast between coordination and subordination gets visible in languages like German. While coordinating two main clauses in German leads to two V2 clauses, embedded clauses are generally verb final in this language, as illustrated in (1).

(1) a. Paul kocht Spinat, aber Maria **mag** das nicht. **Coordination, verb second**
Paul cooks spinach but Maria like that not
'Paul cooks spinach, but Maria does not like that.'
b. Paul kocht Spinat, obwohl Maria das nicht **mag**. **Subordination, verb final**
Paul cooks spinach but Maria that not like
'Paul cooks spinach although Maria does not like that.'

As predicted, concessive *although* subordination, but not antithetic *but* coordination leads to upper-face markings in DGS (namely, eyebrow raise abbreviated 'br'), although the manual signs for *although* and *but* are the same. In both cases, the two sides of the body are used as indicated by the indices in the following examples.

(2) a. PAUL3a LAUGH3a BUT MARIA3b CRY3b
'Paul laughs, but Maria cries.'

br

b. PAUL3a LAUGH3a BUT MARIA3b CRY3b
'Paul laughs, although Maria cries.'

In the case of concessive *although* subordination instead of the manual sign BUT it is also possible to use a palm-up gesture (PU-G) which similarly receives eyebrow raise. The three signs are depicted in Figure 1. That upper-face non-manuals are absent in coordination and present in subordination, in fact, is a general pattern: While there is no sign for *and*, there is a manual sign for *or* which does not receive non-manual markings. Subordination, on the other hand, is either expressed non-manually only with the upper face, as for example in conditionals, or by a combination of a manual sign and upper-face markings, as it is, for example, the case in *because* clauses:

br

(3) MARIA EARLY SLEEP REASON TOMORROW WORK
'Maria goes to bed early because she works tomorrow.'

Other cases of subordination I will discuss include embedded polar as well as constituent questions, embedded imperatives, relative clauses, and conditionals, which all receive upper-face markings. Embedded questions are marked by raised brows, embedded imperatives receive furrowed brows in reported speech:

br

(4) a. PAUL ASK MARIA BEER BUY **embedded polar question**
'Paul asked if Maria bougth beer.'

br

b. PAUL ASK MARIA BUY WHAT **embedded wh-question**
'Paul asked what Maria bought.'

brow furrow

c. MARIA PAM PAUL ORDER CIGARETTE BUY **embedded imperative**
'Maria ordered Paul to buy cigarettes.'

Concerning conditionals, signers fall into two classes. Some signer mark conditionals non-manually (by brow raise), others mark them by a combination of the manual sign GIVEN and brow raise:

hs

br hs

(5) (GIVEN) EXAM PASS CAN-NEG APPRENTICESHIP
'If you don't pass the exam you won't be able to do an apprenticeship.'

Concerning the expression of relative clauses, there is also two varieties of DGS. There are two patterns. In the first pattern, the relative pronoun is accompanied by an eye-brow raise as previously described by Pfau & Steinbach (2005), cf (6a). In the second pattern, lowered eye-brows and tensed eyes (lb/te) accompany the relative clause including the relative pronoun, cf (6b). (The two patterns are not related to the relative clause being restrictive or not.)

br

(6) a. YESTERDAY INDEX$_1$ MAN MEET RPRO-H FROM ITALY
‘The man who I met yesterday is from Italy.’

lb/te

b. POSS$_1$ BROTHER RPRO-H ENGINEER TOMORROW COME
‘My brother who is an engineer will come tomorrow.’

Taken together, in line with the Bodily Mapping Hypothesis, upper-face non-manuals are absent in coordinate, but required in subordinate structures in DGS.

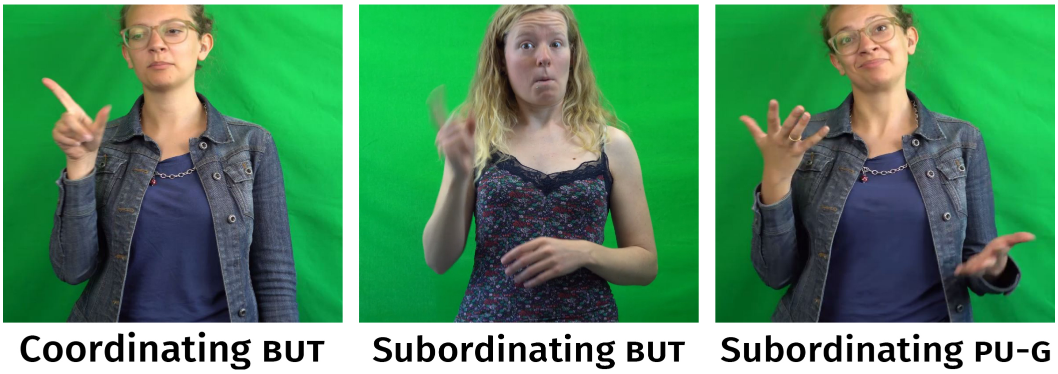

Figure 1: Coordinating BUT receives no upper-face markings while subordinating BUT does.

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Object shift and differential object marking in German Sign Language (*Deutsche Gebärdensprache*)

Fabian Bross

Saturday, 3.03

In this talk, I defend the view that German Sign Language (*Deutsche Gebärdensprache*, DGS) exhibits (i) object shift depending on the definiteness/givenness of the direct object and (ii) differential object marking. The data presented here is based on elicitation data from eleven native signers from Southern Germany.

Object shift: It is a well-documented fact that definite direct objects in many language have to leave their VP-internal base position and move to a higher syntactic slot (Diesing 1992). This is also true in DGS. When a direct object in DGS is indefinite it follows an adverb as illustrated in (1).

(1) (Context: Paul walks through the village and knocks at every door.)
NOW PAUL AGAIN DOOR KNOCK
'Now, Paul again knocks at a door.'

When the direct object, in contrast, was mentioned in the previous discourse and is definite it moves into a higher position and precedes an adverb:

(2) (Context: Paul knocked at a specific door on different occasions.)
NOW PAUL DOOR AGAIN KNOCK
'Now, Paul again knocks at the door.'

Differential object marking: With some verbs, DGS requires an additional sign which is referred to as 'person agreement marker' (PAM) in the literature (Rathmann 2003). An example is given in (3). The sign looks similar to the sign PERSON, but in contrast to PERSON, the sign agrees with the object's location. The subject referent PAUL is located at a point 3a in the signing space in the example and MARIA, the object,
at a point 3b. As the glosses indicate, PAM agrees with the object's location 3b.

(3) PAUL$_{3a}$ PAM$_{3b}$ MARIA$_{3b}$ LIKE
'Paul likes Maria.'

There is a rich literature on PAM analyzing it as an auxiliary verb which has to be used when the object is animate and the verb is non-agreeing (as it is the case for LIKE). The use of PAM is traditionally explained by a phonological requirement: if a verb is, due to its agreement behavior, not able to express (object) agreement, PAM has to be inserted (e. g., Rathmann 2003; Pfau & Steinbach 2006, 2008; Steinbach 2011). In this talk, I will challenge these claims. I argue that PAM is not an auxiliary, but a preposition-like element that represents a rather clear instance of differential object marking (DOM)—and is not inserted due to phonological reasons.

That PAM is used due to phonological restrictions is probably based on an illusion: The vast majority of verbs in DGS is non-agreeing. This is also true for verbs taking an animate direct object. There are, however, some verbs with restricted agreement properties, like HATE, and clear agreeing verbs, like ADVISE, which obligatorily need PAM when the direct object is animate. Additionally, it is possible to use PAM with some inflected backward verbs, like INVITE. Examples are given in (4).

The sentences in (4) illustrates that the verbs agree with the object's location and, if possible, also with the subject's location (as indicated by the subscripts). At the same time, PAM obligatorily agrees with the object.

(4) a. PAUL_{3a} PAM_{3b} MARIA_{3b} HATE_{3b}
'Paul hates Maria.' **verb with restricted agreement**
b. PAUL_{3a} PAM_{3b} MARIA_{3b} ${}_{3a}\text{ADVISE}_{3b}$
'Paul advises Maria.' **agreement verb**
c. PAUL_{3a} PAM_{3b} MARIA_{3b} ${}_{3b}\text{INVITE}_{3a}$
'Paul invites Maria.' **backward verb**

That PAM is not an auxiliary can be shown by the fact that it can, and in fact has to be used in nominalizations—a behavior which would be expected under a prepositional analysis, but not under the assumption that PAM is an auxiliary (cf. *Paul is searching for a book* will nominalize to *Paul's search for a book* and not to **Paul's is search for a book* or **Paul's is search a book*):

(5) a. INDEX_{1} [DP $\text{POSS}_{1}\text{LOVE}$ PAM_{3b} MARIA_{3b}] NEVER FORGET
'I will never forget my love for Paul.'
b. *INDEX_{1} [DP $\text{POSS}_{1}\text{LOVE}$ MARIA_{3b}] NEVER FORGET
'I will never forget my love for Paul.'

As in other DOM languages, for example in Spanish (Heusinger & Kaiser 2005), not only the animacy of the object referent triggers DOM (Aissen 2003), but affectedness also plays a crucial role (the more affected the object, the more likely the use of PAM is) in DGS. While the use of PAM is obligatory with some verbs, it's use is facultative with others. The meaning differences between sentences with and without PAM are related to definiteness and telicity—two phenomena which are well-known to be connected to DOM (e. g., García García 2005; Rodríguez-Mondoñedo 2007). Additionally, whether a verb optionally allows for PAM marking or whether PAM marking is required can be predicted by Tsunoda's (1985) affectedness hierarchy. Finally, object shift and DOM are related in DGS: As PAM marked objects are interpreted as definite their natural position is before an adverb (e.g., PAUL_{3a} PAM_{3b} MARIA_{3b} OFTEN INSULT 'Paul often insults Maria.').

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Using transitional information in sign and gesture prediction

Chris Brozdowski & Karen Emmorey

Thursday, 1.21

The fluid sign stream can be broken down into purposeful lexical productions and transitional periods, moving from sign offset positions to subsequent onset positions (Jantunen, 2013). While there is some debate as to how to measure the length of signs or how to divide up fluid signing (see Jantunen, 2015), Jantunen (2013) makes the case that there is a qualitative phonological difference between signs and transitions. Viewed through this lens, sign perception studies have provided evidence that signers are able to incorporate transitional information into comprehension processes. For example, participants can detect semantically anomalous signs prior to sign onset (Hosemann, Herrmann, Steinbach, Bornkessel-Schlesewsky, & Schlesewsky, 2013), and they show reduced reaction times to detect signs preceded by longer transitional periods (Arendsen, van Doorn, & de Ridder, 2007). There is limited evidence that signers use long-distance co-articulatory location information to predict items later in a sentence (Grosvald & Corina, 2012). The present study focused specifically on the role transitional periods may play in the perception and prediction of manual information for signers and nonsigners when monitoring for linguistic pseudosigns and nonlinguistic grooming gestures. We hypothesized that sign language experience would enhance the ability to incorporate transitional information in predictions, and that this effect would be most pronounced in linguistic contexts. Gestures served as a baseline to which groups had equal exposure.

In the present study, 21 deaf signers (13 female) and 21 nonsigners (12 female) participated in a target detection task. Before each trial, the participant saw a still image representing one of 24 possible pseudosign or grooming gesture targets and then a fluid stream of either grooming gestures or pseudosigns. Stimulus videos were either shown as filmed (Normal), with blurs obscuring handshape transition information (Blur), or with the final frame of each item held during the transitional period (Hold) which provided no transition information whatsoever. See Figure 1. Video condition was randomized within blocks of stimulus type (grooming gesture or pseudosign). Participants also completed the TAMI-h (Donoff, Madan, & Singhal, 2013), a measure of motor imagery specifically targeting imagined hand movements.

A linear mixed effects model examined response time (RT) relative to target item onset. Video condition, stimulus type, and group were fixed effects. Random effects included item, subject, and interactions between subject and effects of interest. Parameter estimates (mean RTs from the model) are shown in Figure 2. Planned contrasts revealed that, for both signers and nonsigners, target-detection RTs were slower when no transitional information was available, compared to blurred handshapes indicating that both groups made use of movement transitional information. Only signers, however, showed significant differences between Blur and Normal conditions, indicating that signers were able to use the transitional handshape information present in the Normal condition to predict targets. In addition, signers had significantly faster target-detection times for Normal pseudosign videos compared to nonsigners. Thus, sign language experience may support the use the complex phonological handshape transition information in generating predictions about manual information. Finally, average target-detection RTs were significantly correlated with motor imagery scores for the nonsigners ($p < .05$), but not for the signers. This result suggests that nonsigners may rely on motor imagery in a way that is supplanted by linguistic experience among signers. Future work could examine whether explicit training to recognize handshape transitions aids sign comprehension in nonsigners, in much the same way as has already been done for fingerspelling (Geer & Keane, 2017).

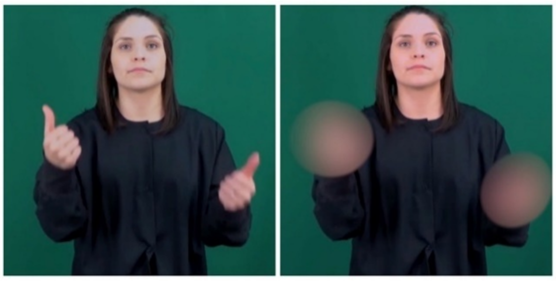

Figure 1. Sample video frames from Normal (left) and Blurred (right) pseudosign stimuli.

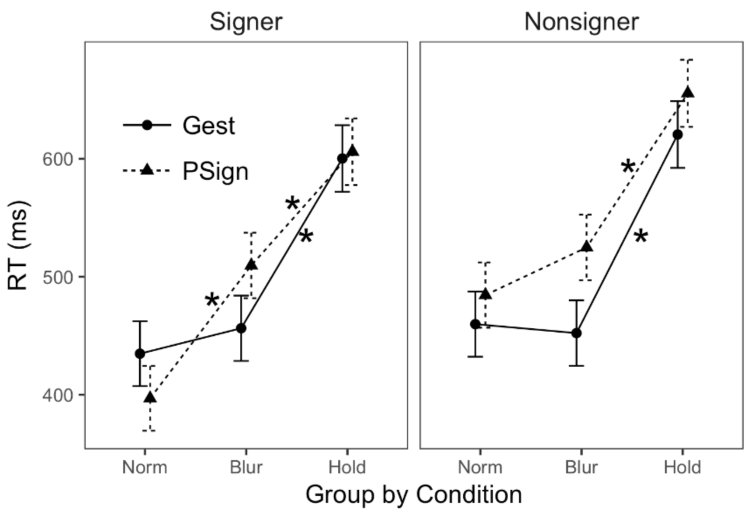

Figure 2. Response Time (RT) parameter estimates for a linear mixed effects model examining the effect of Video Condition and Stimulus Type on RTs for each group. Gest = Grooming gesture; PSign = pseudosign; Norm = Normal videos. Stars indicate a significant difference between conditions ($p < .05$).

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Conditional and concessive constructions in Russian Sign Language

Svetlana Burkova

Thursday, 1.22

The study aims to contribute to the analysis of different types of subordination in sign languages. I will consider in this paper structural and semantic aspects of conditional and concessive constructions in Russian Sign Language (RSL). My analysis is based on a corpus of texts signed by 59 RSL deaf and hard-of-hearing signers (most of these texts are available in the RSL corpus: http://rsl.nstu.ru), as well as on elicited data.

Conditional sentences are usually mentioned in descriptions of sign languages, e.g., Sutton-Spence & Woll (1998), Baker-Shenk & Cokely (1981), Johnston & Schembri (2007), Zeshan (2000). There is also a number of special studies, mainly focused on non-manual marking of conditional relationships, e.g., Liddell 1986, Pfau (2008), Dachkovsky (2008). Much less attention has been paid in studies to concessive constructions in these languages. The available data show that the strategies used across sign languages to realize subordination do not crucially differ from those found in spoken languages (Pfau & Steinbach 2016: 25). In spoken languages, conditional and concessive constructions often employ partially overlapping marking (König 1986). I will try to show that conditionals and concessives in RSL also use partially overlapping marking.

RSL formally distinguishes between the potential and counterfactual conditionals. The former represent a situation described in the protasis as potentially realizable, whereas the latter represent the situation as unreal/unrealizable. Both types of conditionals have rigid order wherein the protasis always precedes the apodosis.

In potential conditionals, the markers of conditional relationships are always located in the protasis. There is a special manual marker of conditional meaning, the sign IF, which always takes the initial position in the protasis clause: IF IX_a ASK.FOR / IX_1 STAY 'If you ask me, I will stay'. However, this sign is optional and can be omitted, since a key role in building conditional sentences is played by non-manuals (NMMs). In particular, there are two NMMs, namely, raised eyebrows and head thrust, that always occur in the dependent conditional clause. The scope of raised eyebrows is typically the entire protasis clause. It is noteworthy that this NMM also regularly occurs in polar questions and marks some types of topics. Head thrust accompanies the final sign of the protasis clause, most typically – its slowing-down phase. This NMM also regularly occurs in other types of dependent clauses, so its function seems to mark the dependent status of a clause. Thus, none of the above NMMs is specialized to express the conditional relationships, the latter rather results from a combination of the two NMMs; each of them contributes in its own way to the structural and semantic frame of the conditional construction.

The potential conditionals can be further divided into two subtypes, namely prototypical (i.e. predictive) and non-prototypical conditionals. In the latter, the proper conditional meaning shifts towards inference ('If P, therefore Q'), or iterativity ('Whenever P happens, Q happens'). The conditional-inferential sentences always have in the apodosis clause a specific set of non-manuals (the head slightly tilted aside + frowned brows + eye gaze directed away from the addressee), and, optionally, a manual conjunction THINK^INSIDE 'therefore': IF IXa CRY / THINK^INSIDE IXa WHAT HAPPEN 'If she's crying, it means that something has happened'. In the conditional-iterative sentences, morphological (reduplication) and/or lexical (adverbs ALWAYS, CONSTANTLY, etc.) markers of the iterative are used in the apodosis: NEED WHAT / HELP+ 'If/when someone needs something, I always help'; IF RAIN / IX1 HEADACHE CONSTANTLY 'If/when it rains, I always have a headache'.

Non-manual marking in the protasis of counterfactual conditionals is similar to that in potential conditionals. One of the most detailed studies of counterfactual conditionals in sign languages has been made by Dachkovsky (2008) in Israeli Sign Language (ISL). She has shown that potential and counterfactual conditionals in ISL systematically differ in facial expression. However, RSL data demonstrate that typological variation can be found in this domain. In RSL, counterfactual interpretation of the utterance is regularly provided by a manual sign #B-Y, which is typically used in both clauses: #B-Y WOMAN IXa MISFORTUNE / #B-Y ALREADY KNOW 'If something bad had happened to her, I would have already known about it'. #B-Y is a fingerspelled borrowing from Russian, its source is a counterfactual modal clitic *бы*, but now this borrowing seems to be fully adapted by RSL. Both fingerspelled elements have been reduced and form a single sign. In addition, the position of #B-Y in a sentence differs from that of *бы* in Russian. Typically, #B-Y occurs at the absolute beginning of clause, while its Russian counterpart is a second-position clitic.

Concessive constructions also have rigid order wherein the dependent clause precedes the main one. Concessive meaning, as is the case with conditionals, is primarily provided by non-manuals. Non-manual marking of the dependent clause is similar to that in the conditional sentences: raised brows typically mark the entire clause, and a head thrust accompanies the final sign of a clause. However, concessive sentences regularly have a specific non-manual marking in the main clause: raised and slightly frowned brows: IX1 UMBRELLA BE (raised brows + head thrust) /GET.WET (raised and slightly frowned brows) 'Although I had an umbrella, I got wet'. Some lexical or morphological means (namely, conjunctions or reduplication) can be additionally used to specify a semantic type of concessive constructions: 'real' concessives (YES IXa LATE / THE.SAME IX1 ANGRY NEG 'Although he is late, I'm not angry with him'), 'conditional' concessives (KNOW HAPPEN HURT / THE.SAME ENDURE 'Even if it hurts, endure it') and 'alternative' concessives (IXa ANY ACT+ / ALWAYS LOSE 'Whatever he does, everything is bad').

I will also touch upon the paths of grammaticalization of RSL manual conjunctions used in conditionals and concessives. For example, the sign IF is related to the verb WEIGHT, the sign YES and a combination of the signs KNOW and HAPPEN can be used at the beginning of a dependent clause as concessive conjunctions 'although' and 'even if' correspondingly. The sign THE.SAME can be used at the beginning of the main clause as a conjunction 'nevertheless'.

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What can number tell us about person? Pronominal reference and person distinctions in Catalan Sign Language

Raquel Veiga Busto

Thursday, 1.23

Introduction. The question of how many person distinctions are marked in sign language (SL) pronominal systems has been deeply discussed in the literature (Berenz 1996, Lillo-Martin & Klima 1990, Meier 1990, a.o.). However, research has mainly concentrated on the morphophonological articulation of singular forms, and much less attention has been paid to their plural counterparts. Berenz's (1996) analysis of Brazilian SL pronouns is an exception, as it contains a full description of the pronominal inventory. In her model, the formal distinction between speech act participants (SAPs) vs non-SAP (third person) is accomplished by taking into consideration the alignment of different articulators (eye-gaze, chest, hand and head). Other accounts, such as Meier's (1990) analysis of American SL, focus primarily on first person plurals to support a first vs non-first person distinction, as they are the only non-compositional plurals. Likewise, when discussing the semantics of space, particularly deictic vs anaphoric uses of spatial locations, little research has focused on the behavior of pronouns with plural referents as antecedents.

Goals. Based on the analysis of Catalan Sign Language (LSC) semi-spontaneous discourse and elicited data, this paper pursues two main objectives. First, it aims to revisit the number of person distinctions encoded on the pronominal paradigm by incorporating into the picture the description of plural pronouns. In order to better understand person distinctions and the nature of spatial locations, this study also seeks to analyze how plural referents are retrieved in discourse using pronominal forms.

Data. LSC pronominal paradigm. LSC data favors a three-person distinction, since there are consistent formal differences between first, second and third person pronouns, both in singular and plurals. Although LSC data fits well with Berenz's model, the alignment of the chest is not mandatory, as it has also been claimed by Alibašić & Wilbur (2006) to account for Croatian SL data. Under some pragmatic circumstances, eye-gaze alignment can also be disregarded. Plural pronouns in LSC are compositional in all three persons, involving an index sign accompanied by an arc-shaped/circular movement that marks plurality[1]. Dual pronouns, unlike the rest of number incorporated pronouns, do not include the plural morpheme. Accordingly, they are considered not as plurals, but as a set of two singular referents (cf. Rathmann & Mathur 2005 for a similar proposal for agreement verbs). Actually, according to Cysouw (2003) two basic properties of plurals are i) that they have to be interpreted as groups and ii) that they are unmarked for the specific number. As for clusivity, given that in most languages the speaker is ranked higher in the referential hierarchy, the most common pattern is that clusivity marks the inclusion/exclusion of the addressee. Although cross-linguistically uncommon, in LSC both dual and non-singular pronouns can convey clusivity in first (1+2; 1+3) and second person (2+2; 2+3). However, the

1 Distributive/exhaustive forms are not taken into consideration in this study.

semantic opposition inclusives/exclusives does not seem to be grammaticalized in LSC and pronoun resolution largely relies on the discourse context.

Reference to plural entities in LSC. When used to refer back to plural entities, either in subject or object position, the plural feature may remain unexpressed in the pronominal sign. However, only non-participants can be recovered by a pronoun not overtly marked for plural, as in (1) and (2). Importantly, the pointing sign seems to license only the set/group reading.

Context: My holidays start today, and so do my friends'.

(1) **IX3PL-a/IX3-a** TRAVEL, BUT IX1 BARCELONA STAY
'They are going on a trip, but I am staying in Barcelona'

(2) IX1 WANT **IX3PL-a/IX3-a** IX1 DINNER COOK
'I want to prepare dinner for them'

Conversely, an index sign with no overt plural morpheme, when directed to the location associated with a SAP, triggers the presupposition that the entity to be recovered is singular, as in (3) and (4). This is in line with Schlenker's (2016) analysis of deictic uses of pronouns, according to which "phi-features on deictic pronouns are presuppositionally interpreted". Therefore, the sign is infelicitous if the intended meaning is plural, as the set inference is out:

(3) #IX1 WANT COMING NIGHT DINNER IX1 MYSELF COOK FOR **IX2**
'I want to prepare dinner for you.pl'

Context: My holidays start today, and so do Alexandra's and Sara's.

(4) #**IX1** TRAVEL ITALY
'We are travelling to Italy'

Given the incidence of the optional number marking shown in (1) and (2) on the corpus, the sign IX-3 could be understood as a form coexisting with IX-3pl to convey plurality in LSC. More importantly, the behavior of pronouns with plural non-participants presents new evidence for the distinction between deictic and anaphoric uses of pronouns in SLs.

Dual pronouns appear to be obligatory when referring to two distinct entities, just as described for ASL (McBurney 2002) and for many spoken languages (Corbett 2000) and, as a result, the plural is restricted to refer to three or more entities. Interestingly, two plural antecedents can be picked up by the dual pronoun, regardless of whether they are SAP or not. Yet, there is variation among informants in this matter.

Context: My parents' holidays start today, and so do my uncles'.

(5) **THE-TWO-a,b** TRAVEL ITALY
'They are going on a trip to Italy'

Context: My holidays start today, and so do my friends'.

(6) **THE-TWO-1,a** TRAVEL ITALY
'We are going on a trip to Italy'

A possible solution to explain these data is by assuming that in LSC the dual pronoun can be interpreted either as referring to two atomic entities, or to two sets of entities which, irrespective of their specific number, are construed as indivisible groups. This would reflect the twofold character of the dual pronoun: it is not purely singular (but a set of two singulars or "restricted group" cf. Cysouw 2003), and it is not purely plural either (as it is marked for number). Against other accounts, these data also suggests that dual pronouns are less indexical than previously assumed.

Conclusion. This study argues in favor of a three-person analysis of pronouns in LSC, providing evidence that first, second and third person differ not only on their form but also on their use. Particularly, pronominal anaphors to plural antecedents show that while third person plurals allow absence of plural specifications, deictic pronouns do not accept it, as the features they specify are always understood presuppositionally.

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Clause delimitation in Spanish Sign Language (LSE): Exploring projections

Carmen Cabeza, José M. García-Miguel, Ania Pérez & Juan R. Valiño

Thursday, 1.24

This presentation forms part of a more comprehensive project aimed at delimiting clauses and clause complexes, as a strategy for constructing discourse in Spanish Sign Language (LSE), through a corpus-based research. From a theoretical point of view, we take conceptual background from two functional perspectives: firstly, Halliday's analysis of the clause provides us a joint vision of simple and complex clauses, at least for the so-called projections; secondly, we hypothesize that Stein & Wright (1995) approach on subjectivity and subjectification contributes to a better understanding of some of the discourse resources linked to the expression of these projections in LSE. Previous research on delimitation manual and non-manual clause boundaries in signed languages include Fenlon, Denmark, Campbell, & Woll (2007); Hansen & Hessman (2007).

In Halliday's clause definition, three structures are mapped into a single wording (Halliday, 2014): clause as representation (process + participants), clause as exchange (elements of Mood organising the interaction), and clause as message (Theme + Rheme).

Clause as representation perspective has guided the first segmentation into clause-like units (CLU, Hodge 2014, Johnston 2016) of our LSE corpus: 29 video recordings have been segmented into CLU, tokenized and annotated. This primary annotation also includes Id-glosses for both hands, constructed action and constructed dialogue (CA / CD), and a literal translation into Spanish. 13 video recordings out of these 29 have also been annotated for lexical categories, argument structure and other information relevant to sign language grammar (e. g., locus). Different types of structures have been identified:

- Single CLU with verbal predicate (V), arguments (A1, A2…) and other constituents (non-arguments, nA).
- Single CLU with non-verbal predicate (or without a clear candidate for predicate function).
- Single CLU with verb complexes (serial verbs).
- Clause fragments and "minor clauses" of different types. Example: ONCE-MORE PT:second ("Once more, the second (time)", where it is contextually inferred "I will try for a second time")
- Complex CLU / CLU complexes (as projections and as expansions, in Halliday's terminology)

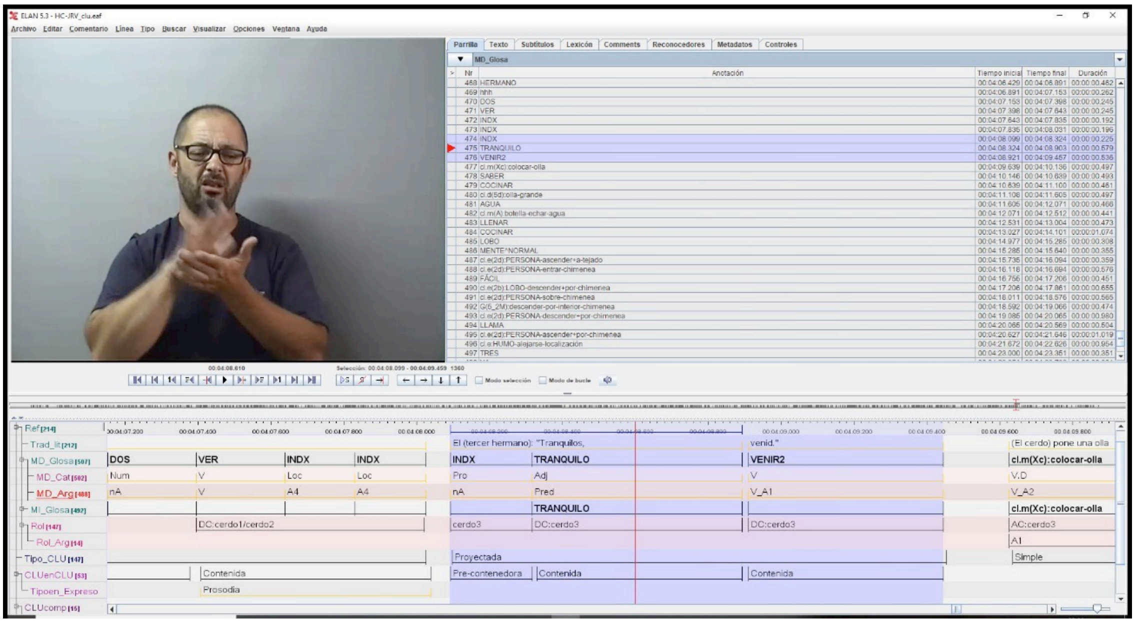
The analysis into complex CLU (or CLU complexes) has been done applying Hodge (2014) complex types annotation to eleven recordings. Hodge's analysis is based on Halliday's types of clauses, but applied to a signed language. Letting aside other types of complex clauses or clause complexes, for a purpose of concision, we will focus on projection, which is defined as a "logical-semantic relationship whereby a clause comes to function not as a direct representation of (non-linguistic) experience but as a representation of a (linguistic) representation." (Halliday 2014: 508). In a language like English it represents an idea, a locution or a fact. In LSE as well as other sign languages, constructed dialogue (CD) is a paradigmatic form of expressing "quoting", but not all the examples of projection use CD.

A total of 60 projections have been identified in our corpus. From them, around 60% appear with a predicate that could be interpreted as the introducer of the projection: SAY, EXPLAIN, THINK… Nouns and pointings are also documented to have this introductory function.

Nevertheless, a relevant amount of data reveal that CD can be the unique way of expressing the projection.

Thus, we are facing a diversity of means for introducing what someone has said, explained or thought in LSE. We hypothesize that what they have in common is that they express the subjectivity of the signer, which is different from the character's perspective usually conveyed in the contained part of the projection (roughly speaking, the expressed or thought thing).

Following this line of reasoning, we propose to use Stein & Wright (1995) background concepts of subjectivity and subjectification, in order to contemplate a possible convergence of subjectification resources in these constructions. The main identified resources are: on the one hand, mental and verbal predicates and, on the other, noun phrases and pointings. However, it is not excluded that other linguistic elements related with the expression of subjectivity, such as modality, appear in the course of this research.



PT:PRO	QUIET	COME
“He (said)”	“Be quiet”	“Come on”
1: minor clause	2: contained (CD)	3: contained (CD)

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Sentence topics and communicative strategies in Italian Sign Language

Chiara Calderone

Thursday, 1.25

The domain of information structure in spoken languages was addressed from a pragmatic [10-11][15], semantic [6][16], syntactic [17-18] and prosodic perspective. The first part of my research focuses on two types of sentence topics in LIS: aboutness topic (AbT)(ex. 1: JOHN), namely, what the sentence is about, if the information is old or given between the speaker and the interlocutor [16], and scene setting topic (SsT) (ex.1: YESTERDAY, SUPERMARKET), setting a spatial or temporal framework within which the main predication holds[3][6][14]. As cross-linguistic differences in the manual (MM) and non-manual markers (NMM) involved in these sentence topics have been detected in sign languages (SLs) [1][5][12-13][21], the purpose of this study is twofold: (i) to investigate the phonological realization of the AbT and SsT in LIS and (ii) to account for their syntactic distribution by comparing the results within a cartographic approach [17-18].

SsT time ___ SsT location ___ AbT ___
(1) **YESTERDAY**, **SUPERMARKET**, **JOHN** FISH BUY.
'Yesterday, at the supermarket, John bought a fish'. [MA_EL_1a]

The second part of the study is focused on AbT and on their categorical realizations as full DPs, pronouns and null arguments, with particular attention to their pragmatic classification as continued or shifted topics [10]. Continued topics are consequential references of the AbT between adjacent sentences, while shifted topics consist in the reintroduction of an AbT mentioned in previous not-adjacent sentences. According to the Accessibility theory of Givón [10] the expectations predict that the more salient the information is the less linguistic material needs to the speaker to codify it. Furthermore, the study investigates the not expected results taking into account language-specific phenomena.

The data (377 AbT and 114 SsT), collected from four native informants, consist in three types: two based on spontaneous discourse, story-telling between two signers and monologues in front of the camera (in order to test the variations due to the pragmatic contexts); while the third type is based on elicited sentences; The data have been analysed through ELAN [7]. Similarly to other SLs studies[12-13][21][23], in LIS the most frequent NMMs associated with topics are: (i) brows raised (br) [9][22-24], (ii) squinted eyes (sq) [8][19], (iii) head tilt back (htb) and head forward (hf) [8]; and finally (iv) eye blinks (eb) and head nods (hn) which are considered prosodic boundary markers [19]. The results show four most common tendencies of NMMs among these two types of sentence topics. They are: (i) br spreading over SsT (30%) and AbT (30%); (ii) sq accompanying object AbT (48%) and SsT of locations (44%), (iii) br + sq which mark 12% of SsT locations and 10% of subjects AbT; (iv) htb marking 21% of pronominal subject AbT topics. Moreover, both AbT (23%) and SsT (37%) may be separated by the remaining part of the sentence by eb; less frequently by hn, or by a combination of eb+hn (ex.2).

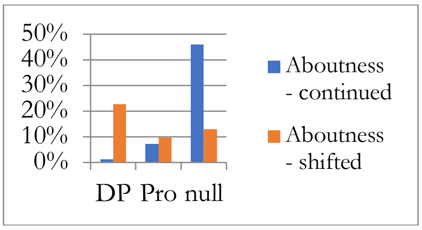
sq______________ br sq______________ hn eb_____eb
(2) **TOMORROW, ESTATE AGENCY, JOHN HOUSE BUY.**
‘Tomorrow, in an estate agency John buys a house’. [MA_EL_2a]

AbT______
(3) **MOUSE$_a$ CAT$_b$ IX-3$_b$ EAT DONE IX-3$_a$**
As for the mouse, the cate ate it, it. [MI_EL_pc]

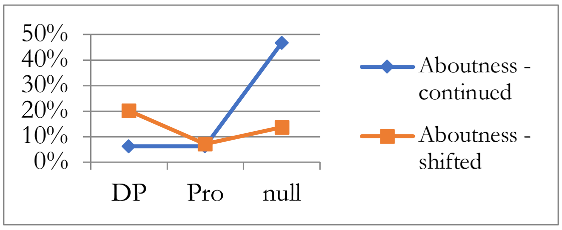
As for the syntactic account, in accordance with [3][17], LIS has a left periphery with dedicated topic positions. However, topics are not completely freely recursive, and by considering the order of topics in my data, I assume the following hierarchy: SsTtime>SsTloc>AbT> [IP].

As for the results about the retrievability of a topic constituent, LIS uses the categorical realization of full DP, pronouns and null argument in line with [2][10][20]. According to the expectations, full DP are mostly used with shifted AbT (20%), while 49% of continued AbT topics are null, as shown by the Charts (1-2) below.

1.



2.



Pronouns and null arguments display a more complicated picture, indeed, both are respectively involved as shifted AbT in 7% and in 14% of the case. They are licensed by language-specific strategies which make unambiguously retrievable a referents [20]. Among the other strategies, predicative classifiers, role shift and agreeing verbs are taken into account. The example below shows one of this exception: the null AbT (dog) can be used as reintroduced topic because the sole predicative classifier (CL:jump) fulfils an anaphoric function, licensing pro-drop of the shifted AbT.

(4) sq___
DOG BARK, BEAR$_i$ IX-3$_{i-a}$ FEAR, (bear) CL-FALL$_a$, **(dog)** CL-JUMP…
‘The dog barks, the bear is scared, (he) falls and (the dog) jumps over him’.
[MI_MO_53-56]

Although both full DPs and pronouns are marked by the same non-manuals, asymmetry in the prosodic realizations have been detected: when AbTs are realized as pronouns they are less marked than when are realized as full DPs. This is particularly true for brow raised, squinted eyes and head forward. One exception is head tilt back, a marker mostly displayed by AbTs produced as pronominal subjects (22% compared to 2% in full DPs), as shown in Table 1. below.

Table 1. Non-manuals marking full DPs and pronominal aboutness topics in LIS

	Brow raised	**Squinted eyes**	**Head forward**	**Head-tilt back**
Full DPs AbT	42/125 (34%)	46/125 (37%)	13/125 (10%)	3/125 (2%)
Pronouns AbT	14/64 (22%)	10/64 (16%)	1/64 (2%)	14/64 (22%)
Total	189	189	189	189

From a generative perspective, this study represents an important litmus test for validating theories on the pragmatic, syntax and prosody of information structure proposed for spoken languages by applying them to the growing literature on SLs in this domain of research [2][10][17].

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‘Iconic’ number signs do not hasten acquisition of number knowledge

Emily Carrigan & Marie Coppola

Thursday, 14:30-15:00

Children’s ability to link linguistic symbols representing quantities (number words) with those quantities follows a protracted developmental trajectory1,2,3,4. Much research has attempted to discern the factors contributing to this process in both hearing5,6,7 and deaf and hard of hearing children8,9,10,11,12. One approach examines whether children can make use of the cardinality inherent in number gestures to help them more easily bridge the gap between an arbitrary linguistic symbol and its corresponding referent. Wiese, for instance, maintains that children 2-3 years old can recognize iconicity in number representations13. In American Sign Language (ASL), the linguistic symbols for quantities 1-5 have iconic characteristics—that is, the number of extended fingers matches the quantity that sign refers to. If children acquiring ASL are sensitive to this iconicity, they should learn these meanings at younger ages (i.e., earlier in development) than children acquiring spoken English, whose number words lack such iconicity.

Data presented are from 131 children aged 3;2-6;8. Children differed in *what language they acquired* (Modality: ASL vs. English) and *when they were exposed to language* (Timing of Language Exposure: Early vs. Later). The “Early” group were deaf children acquiring ASL from deaf, signing parents and hearing children acquiring spoken English from hearing parents; the “Later” group were deaf children acquiring spoken English via assistive devices received after birth, or deaf children acquiring ASL in an early intervention or school program (Table 1). We assessed each child’s knowledge of the meanings of spoken English or signed ASL numerals 1-5 by asking them to generate a set of toys of a specific quantity (Give-N14).

An ordinal logistic regression (Table 2) predicted children’s highest quantity correct on the Give-N task (up to 5) by Language Modality, Age at Test, Timing of Language Exposure, and Socioeconomic Status15. Previous work16 showed that children’s knowledge of number words/signs (measured by their ability to count to 20) uniquely predicted Give-N performance; we therefore included Count List Knowledge as a covariate. To discern whether children learning ASL learned ‘iconic’ number symbols earlier than children learning spoken English, we also included an Age x Modality interaction term.

Children’s understanding of the words/signs for 1-5 was predicted *only by Count List knowledge*. Though age of language exposure affects development in many domains17,18, Timing of Language Exposure did not independently predict Give-N performance. *For this specific aspect of cognition*, knowing the count list (linguistic symbols) plays a greater role than the age at which a child is exposed to language (which presumably affects how many number words/signs children know). Importantly, we detected no significant Age x Modality interaction, indicating that children learning ASL did not acquire the meanings of the signs 1-5 earlier than children acquiring spoken English. Contrary to Wiese, this indicates that children learning ASL either do not recognize, or cannot make use of, the iconicity in ASL number symbols.

This finding accords with work by Nicoladis and colleagues19, who trained hearing children (2;0-5;0) to use conventional number gestures (e.g., holding up the index and middle fingers to represent 2) to generate sets of certain sizes (as in our Give-N task). Children did generate accurate sets in this condition; however, they were less likely to generate accurate sets requested using unconventional number gestures (e.g., holding up the index finger of each hand simultaneously to represent 2) than children trained to use their count lists (number words) alone. This suggests that the iconicity in unfamiliar number gestures did not help children generate accurate sets.

Working memory limitations may have hindered children's ability to use the iconicity present in the number gestures. Representing the extended fingers in a number gesture as individual units, and then using one-to-one correspondence to map those units to individual objects in set they were generating, likely exceeds the working memory of 2-5 year-olds. It might require less working memory capacity to 'package' the units in a number gesture into a single symbol (e.g., a number word) that is independently linked to the quantity that symbol refers to.

Accordingly, Spaepen and colleagues20 found that adult homesigners in Nicaragua treat certain number gestures as a collection of individuals (extended fingers) rather than a summary symbol representing a set. Homesigners made more errors when repeating handshape configurations featuring more extended fingers, consistent with working memory limitations. Indeed, Nicoladis and colleagues also found that children trained on their task with number gestures performed better on smaller vs. larger quantities. *Therefore, iconicity present in the number symbols (of ASL and many other sign languages) and gestures, while quite apparent to and interpretable by adults, does not help children build their understanding of quantities.*

Table 1. Participant Information

	Language Timing	
	Early	Later
ASL (signed)	19	24
English (spoken)	44	44

Table 2. Ordinal Logistic Regression Results

	Dependent variable: Give-N Performance (up to 5)
Language Modality (Spoken English)	1.008 (2.595)
Age (Years)	-0.232 (0.469)
Age x Modality Interaction	-0.105 (0.524)
Timing of Language Exposure (Later)	0.682 (0.474)
Socioeconomic Status	0.024 (0.015)
Count List Knowledge	**0.134** (0.046)**
Observations	131
Akaike Information Criterion	242.408
Note:	$^{*}p<0.05$ $^{**}p<0.01$ $^{***}p<0.001$

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Shared prosodic contours in LSF poetry and its spoken translation

Fanny Catteau & Coralie Vincent

Thursday, 1.26

The translation of LSF poetry into French is a new field of exploration for both sign language linguistics and translation studies. In this study, we are interested in how the gestural flow is segmented and organized in a sign language, and more specifically, in a poetic register, and we look for the footprint of this gestural prosodic organization in the spoken translations of these poems. Based on these questions and on the existing literature on prosody in sign languages, we made several hypotheses: (1) We expect to find correspondences between some prosodic phenomena in sign languages and in their oralized translation: amplitude of hand movement contrasts corresponding to intensity contrasts, sign duration contrasts corresponding to spoken words and syllable duration contrasts, gestural flow rate variation corresponding to vocal flow rate variation in relation with the number of syllables, pauses and holds in sign languages corresponding to silent pauses or lengthening in vocal language (cf. Blondel & Le Gac 2007; Brentari 2015; Catteau et al. 2016; Liddell & Johnson 1989; Wilbur 1999 among others); (2) The more the boundaries of the different prosodic units are marked, the more we expect to match them with a corresponding prosodic structure in the translations. In other words, we expect a correspondence between the prosodic hierarchical structure of the SL and the spoken language. Specifically, it is expected that torso and hip rotation will play a role in how these groups are delimited and entrenched (Boyes Braem 1999). In order to test these hypotheses, we used motion capture as it reveals precise movement information (amplitude, duration, speed and acceleration), and is complementary to our other analyses, which are based on video and manual annotation (Jantunen 2013; Tanaka & Van der Hulst 2004; Tyrone et al. 2010 among others).

For this study, we recorded four deaf poets who performed their own poems. In addition to a standard video camera, we used two different motion capture systems: (i) eleven poems were captured with the portative Noitom Perception Neuron 32 system; and (ii) twenty-five poems were captured with a Vicon system. We then submitted this collection of poems to seven poetic translation experts and obtained fifty-six translations into spoken French.

Motion capture provided us with information on the rotation of the hips of the poets (*Figure 1*), the amplitude of manual movements as well as their speed and acceleration (*Figure 2*). We then extracted pitch and intensity curves from the oscillogram of the voice signal from the spoken translations (*Figure 3*). By comparing the curves for LSF and French, our first results seem to indicate that the prosodic contours identified in the gestural signal correspond to analogous ones in the vocal signal. For example, we observe that large contrasts in the amplitude of movement lead to notable contrasts in vocal intensity, and that gestural contours delimited by rotation of the hips correspond to contours in the oscillogram (in boxes *Figure 3*). Other prosodic phenomena are still to be analysed, such as pauses and holds, and signs and transition duration, but this initial exploration is rather promising. By extending our analysis to all the collected data, we will learn more about the prosodic structure of sign language poetry, and better understand how sign language poetry is translated, as well as verify to what extent sign language prosody can impact its spoken translations.

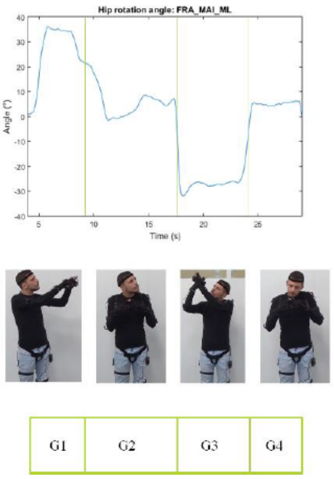

Figure 1: Hip rotation segment sequence in four prosodic groups

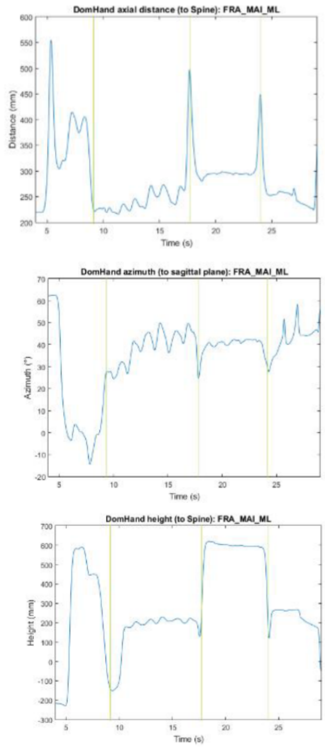

Figure 2: Manual amplitude (calculation with cylindrical coordinates) segment sequence in the same four prosodic groups

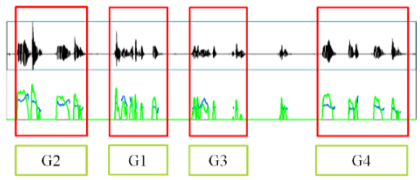

Figure 3: Vocal signal of the translation of the extract in *Figure 1*

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More than a pointing: Pointing sign as an interjective hesitator in Hong Kong Sign Language

Kenith K. L. Chan & Felix Y. B. Sze

Thursday, 1.27

Pointing signs in sign language are regarded as a multi-functional device. They can serve either a referential function (e.g., pronouns, determiners) or a locative function (e.g., locative adverbial) according to existing literature (e.g., Tang & Sze, 2002; Sze, 2012; Cormier, Schembri, & Woll, 2013). In this paper, we will present evidence from conversational data of Hong Kong Sign Language to show that there is a non-referential and non-locative use of pointing signs — they can be used as an interjective hesitator. We propose that such use of pointing signs is a result of pragmaticization, a process of language change through which a grammatical item becomes a discourse particle (Hayashi & Yoon, 2006) and that this universal process of language change occurs in both spoken and sign languages.

Interjective hesitators, such as *uh* used by English speakers, are a subcategory of fillers observed in spoken languages which speakers produce when they meet a word-finding difficulty. It is different from placeholders, another type of fillers which carry a syntactic function and occupies the position of the word that the speaker is trying to remember in the sentence. Interjective hesitator, theoretically, can occur anywhere in an utterance, since it is a unit that fills up the delay rather than being a syntactic constituent of the utterance (Hayashi & Yoon, 2006).

While interjective hesitators have been observed and discussed in various aspects in spoken languages (e.g. Hiyashi & Yoon, 2006; de Leeuw, 2007; McDougall & Duckworth, 2017), neither the fillers nor their subtypes have been thoroughly investigated in sign languages. The lack of the research may be attributable to the fact that very little attention has been paid to word-finding difficulty and disfluency of sign language users. For instance, there are no standardized treatments and assessments established for the signing stutter yet (Cripps, Cooper, Evitts & Blackburn, 2016). Also, previous studies related to sign stuttering require further investigation since they mainly adopted interview or questionnaire (Silverman & Silverman, 1971; Riegar, 2001; Whitebread, 2004; Cosyns, Herreweghe, Christiaens & Van Borsel, 2009). Thus, the current research aims to fill the above-said gap with a direct observation of natural signing material.

In our preliminary study, we analyzed a conversation between two native HKSL deaf signers who were in their 30s and observed that pointing signs were used when they were hesitating about what to say next. The pointing signs were further confirmed to be meaningless and non-referential by a native HKSL deaf signer and thus identified as interjective hesitators. The direction of these pointing hesitators are not fixed, but they tend to avoid directions that would lead to misunderstanding or require strenuous wrist extension. For example, signers did not downward (which may be misperceived as pointing at locative/referential loci on the horizontal plain), toward the signer himself/herself (which may be misperceived as meaning ‘I’), or to the ipsilateral side of the signing hand (which requires wrist extension that is phonetically marked). On the other hand, the pointing hesitators seem not to be related to the break of eye-gaze as closely as those hesitators in spoken languages do. The production rate of pointing hesitators obtained in our preliminary study (~2 per 100 signs) was generally lower than that of interjective hesitator found in spoken language research (e.g. ~5 per 100 words, Altıparmak & Kuruoğlu, 2018).

Interestingly, these pointing hesitators are far less common in another conversation between two older HKSL deaf signer, who were in their 50s–60s. However, it does not mean the older signers met fewer word-finding difficulties than the younger signers. The elders produced fewer pointing interjective hesitators but showed a lot more disfluencies of other types, such as repetitions, pausing within a sign, and delaying the production of the next words. Such uneven distributions of pointing hesitators and other disfluency phenomena between these two groups of signers may suggest that pointing signs in HKSL have been pragmaticized from a referential deictic unit and can be used as a non-referential interjective hesitator for the younger generation. This process is similar to how some demonstrative units in spoken languages, such as *ano* 'that' in Japanese and *nei-ge* 'that one' in Mandarin (Hayashi & Yoon, 2006), undergo pragmaticization and are used while the speakers are hesitating.

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Word order or world knowledge? Effects of early language deprivation on simple sentence comprehension

Qi Cheng & Rachel Mayberry

Thursday, 15:00-15:30

Previous studies have revealed selective age of acquisition (AoA) effects on language outcomes of late first language (L1) learners. Simple sentence structures such as basic word order appear relatively unaffected, while complex morpho-syntactic structures, such as relative clauses, are more vulnerable (Newport 1990; Boudreault & Mayberry 2006). Understanding the nature of these selective AoA effects can illuminate the underlying mechanisms of the critical period for language and the early development of syntactic complexity among young children acquiring their L1.

Still, we do not know whether late L1 learners actually make use of word order when processing simple mono-clausal sentences. Previous studies are insufficient to answer this question as they only looked at reversible sentences with probable meanings and animate subjects. One possibility is that late L1 learners may use alternative strategies, such as agent first and probable event bias, to comprehend simple sentences. Three-year-old children show probable event bias when they were asked to act out improbable sentences, while four-year-olds rely more on word order (Strohner & Nelson 1974). Since late L1 learners acquire basic word order following a similar trajectory compared with young native learners (Cheng & Mayberry 2018), it is likely that they also rely on similar alternative strategies when comprehending simple sentences.

The present study used a sentence-picture matching experiment to explicitly investigate how deaf individuals with early language deprivation interpret simple subject-verb-object (SVO) sentences in American Sign Language (ASL). The design used 4 sentence conditions contrasting in event probability and argument animacy (Figure 1). Each condition consisted of 12 stimuli with matched pictures and 12 stimuli with mismatched pictures that involved reversed thematic roles. There were also 96 control stimuli using noun phrases such as BLUE SMALL APPLE and intransitive sentences such as TALL BOY SLEEP, where the mismatch involved a change of one compositional component. If late L1 learners can use canonical word order to interpret sentence meaning, we would expect them to perform above chance across all conditions. Instead, if they rely on alternative strategies such as probable event bias, we would expect them to perform poorly on the improbable sentence conditions.

Figure 2 shows the results from 22 participants collected so far. Native deaf signers and hearing L2 learners performed well across all conditions. Late L1 learners performed slightly worse and significantly above chance for the filler condition and the probable conditions, but significantly below chance for both improbable conditions, regardless of subject animacy. These results suggest that late L1 learners do not fully rely on abstract syntactic structures such as basic word order when comprehending simple ASL sentences in real time. Instead, they tend to adopt the probable event strategy, just like three-year-olds. We also noted that 4 out of 10 late L1 learners were more prone to accept mismatched pictures in target but not filler conditions, suggesting that they may be more flexible when comprehending sentences with two arguments.

Our preliminary findings suggest that late L1 learners show a discontinuity in syntactic development due to general difficulties in using abstract syntactic rules to map thematic roles, even in the simplest of sentences, which then prevents the subsequent acquisition of more complex sentence structures.

Figure1: test conditions and examples

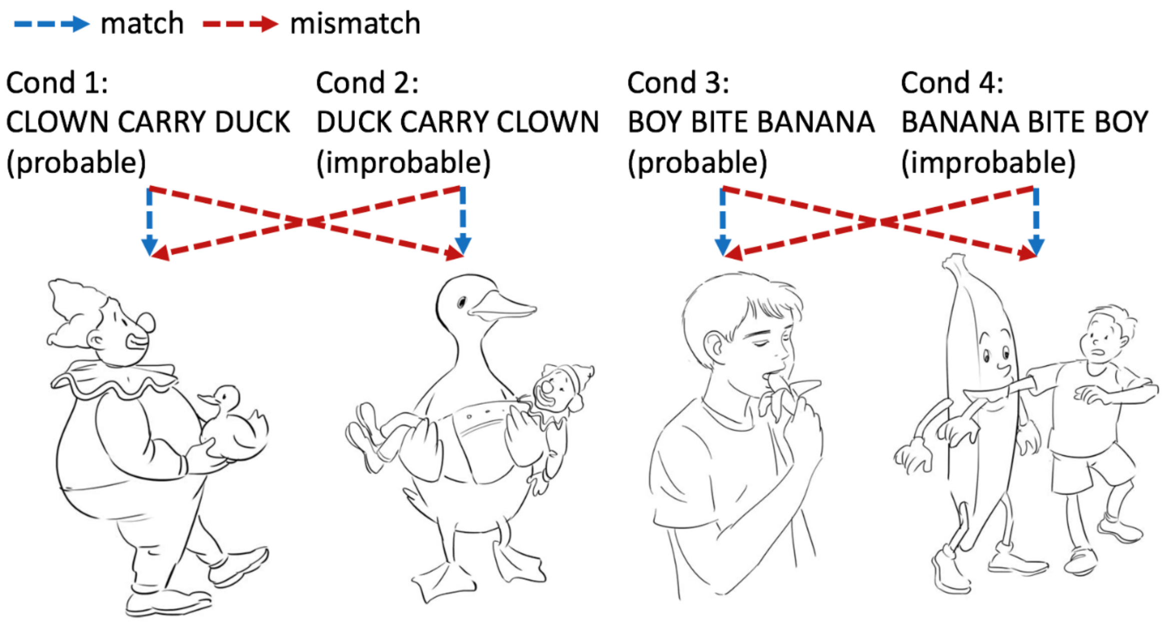
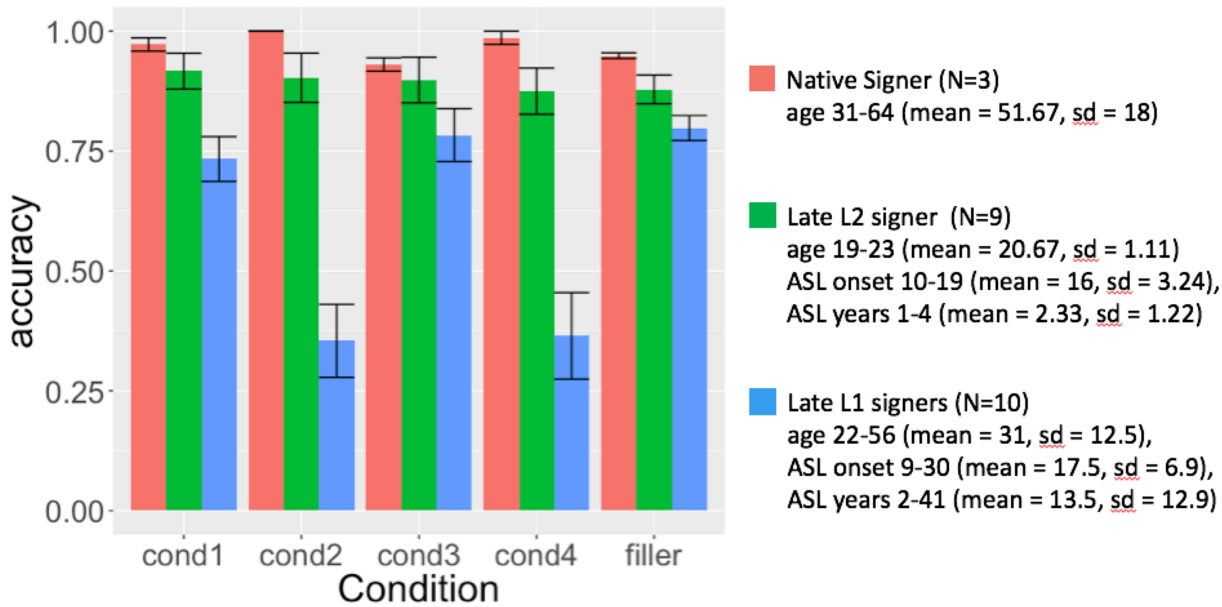


Figure 2: preliminary results -- accuracy by condition and group



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Changes in youth sign language variation in NGT

Richard Cokart & Trude Schermer

Thursday, 1.28

As all other languages *Nederlandse Gebarentaal* (Sign Language of Netherlands, henceforth NGT) is prone to variation. Our previous studies (Cokart & Schermer 2013, Cokart et al 2016) investigated whether the usage of NGT on lexical level and syntactic level has changed within a certain period of time. Interestingly, we found age-related variation in both studies. Age effects language and has been found to be a contribution to language changes in sign languages (Lucas et al 2001, Schembri et al 2009). Very little research has been done on changes in the lexicon over time (diachronic changes) since Frishberg (1975) and Woodward (1976). This is probably due to the fact that only in recent years corpus projects have been initiated which describe sign languages at one point in time.

One phenomenon related to age is the occurrence of youth language (Appel & Schoonen 2005, Mutsaers & Swanenberg 2012). Around 2008 it was noted that deaf young people in the Netherlands had been developing and using their own lexical signs for concepts related to their lifestyle and interest in contrast to previous generation signers. This has been attributed to the implementation of bilingual deaf education around 1995. Schermer (2012:472) points out that "[t]he generation of Deaf children that grew up in this period are the only pupils that were exposed to bilingual NGT/Dutch education." A small study was conducted in 2009 to investigate this so called street language in NGT (de Ronde et al 2010). In total 144 lexical items were found that were being used only by young deaf people, which have been published on a dvd-rom and in the online sign dictionary[1].

Fast-forwarding a decade later, the situation with respect to NGT had undergone many changes. The bilingual model never took off as a full-fledged part of the curriculum in deaf education, as a consequence of the influx of children with a cochlear implant. Currently, bilingual education in both NGT and Dutch is only offered at two high schools for the deaf in Haren and Sint Michielsgestel.

The question was raised whether the current deaf pupils in schools for the deaf, whom still have access to bilingual education in NGT and Dutch, and other deaf pupils who attend regular education still use the lexical items as we found in our 2009 study in a similar manner as 10 years before or whether the signs have undergone phonological and morphological changes.

In the paper we will present the results of our research study which is currently carried out. Given the changes in the landscape of deaf education and the increase of placement of deaf children in regular education with sign language interpreters we expect to find phonological and morphological changes in the use of these lexical items. In our paper we will discuss the results in relation to language planning policies

[1] https://www.gebarencentrum.nl/gebaren/van-dale-ngt-uitgebreid

in general, the development of new lexicon and the results from our previous studies on changes in NGT lexicon.

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PERSON as a rescue mechanism for plural NPs in German Sign Language

Franzi Conradts

Thursday, 1.29 – **CANCELLED**

In this work, I will investigate the syntax and semantics of 'N + PERSON'-constructions in German Sign Language (henceforth DGS) like in (1). I will claim that PERSON ('person') is a classifier that is used to establish the singular/plural-contrast that is necessary to derive the correct reading of plural NPs (Sauerland 2003, Spector 2007, Mayr 2015).

(1) FRAU PERSON>+>+ (Pfau & Steinbach 2003)
'women'

Pfau & Steinbach (2003, 2006) argued that the insertion of PERSON is one possible way to pluralize nouns – the other one being reduplication of the noun (glossed as '>+>+'). They further observed that PERSON can be used to pluralize nouns for which plural marking is blocked because of their phonological properties, i.e. body-anchored signs, like FRAU ('woman') in (1) above, and non-body anchored signs with complex movement, like STUDENT ('student') in (2) below.

(2) a. 1 STUDENT PERSON (Conradts 2018)
b. 5 STUDENT PERSON>+>+
'1/5 student(s)'

Here, I will argue that PERSON is a classifier – similar to the ones that have been observed for Japanese and Chinese DPs (cf. Krifka 1995, Sudo 2016). Evidence for this claim is shown in (3). Here, a non-body-anchored sign which can be pluralized via reduplication, as in (3a), cannot combine with PERSON (cf. (3b)). This means that PERSON is in complementary distribution with pluralizable nouns. This is a typical property of classifiers (Krifka 2008). Moreover, it is used irrespective of whether the noun has a singular or plural denotation, suggesting that PERSON is not just used to pluralize nouns (cf. (2a vs. b)), as it has been suggested by Pfau & Steinbach. Finally, it displays a property of the noun it combines with, i.e. the property of being a person.

Supporting this, DGS lacks (in-)definite articles (Boyes Braem 1995) and has optional plural marking (Pfau & Steinbach 2003, 2006, Conradts 2018), which are both common properties of classifier languages (Chierchia 1998).

(3) a. 5 KIND>+>+ (Conradts 2018)
b. * 5 KIND PERSON>+>+
'5 children'

Now, for Chinese and Japanese, Krifka (1995), Bale & Coon (2014) and Sudo (2016) argue that classifiers combine with the numeral, because the numeral alone has the wrong semantics and cannot combine with the noun. Thus, the classifier fixes the semantic interpretation and enables a combination of numerals and nouns. This is why classifiers are only present when there is a numeral. Following them, I will propose that, in DGS, the classifier combines with the noun, because it fixes the semantic interpretation of the noun. This is why the classifier is present irrespective of whether a numeral is present or not (cf. (1) vs. (2)). The question is: what does the classifier fix in DGS? I will claim that the classifier in DGS establishes the singular/plural-contrast. This explains why the classifier bears plural marking.

According to Sauerland (2003), Spector (2007) and Mayr (2015), the singular/plural-contrast is needed to derive the correct readings of singular and plural NPs. I will follow them in assuming that singular and plural NPs form a scale, < sg, pl >, where singular NPs are logically stronger than plural NPs, because singular NPs have an 'exactly one'-reading while plural NPs have an 'at least one'-reading.

The Mayr (2015)-analysis applied to DGS nouns that can be pluralized works as follows. KIND ('child') denotes a predicate that only includes atoms, i.e. single children individuals ((5a)). Thus, it has the 'exactly one'-reading. Then, the singular morpheme, which is phonologically null in DGS, does not contribute anything semantically ((5b)). The plural morpheme forms sums, i.e. groups, out of the individual children and states that every member of a children group is a child ((5c)). Note that these groups can also consist of only one atom. This derives the 'at least one'-reading. Then, an exhaustivity operator (Exh) is applied at predicate level. It excludes all predicates that are logically stronger ((5d)). Since singular NPs are the logically strongest member of the scale, the application of Exh to a singular NP is semantically vacuous ((5e)). If we apply Exh to a plural NP, we exclude the stronger alternative, namely the singular NP, which has the 'exactly one'-reading. The exclusion of 'exactly one' combined with the 'at least one'-reading of the plural NP gives us the 'at least two'-reading. This is the desired result.

(4) [NP [Exh] [#P [sg/pl][KIND]]]

(5) a. [KIND] = λx. x is a child
b. [KIND-sg] = λX. X is a child ∧ X is an atom
c. [KIND-pl] = λX. ∀x[x ∈ X →x is a child]
d. [Exh] = λP.λX. P(X) = 1 ∧ ∀R ∈ Alt[P * R →R(x) = 0]
e. [Exh[KIND-sg]] = λx. x is a child atom
f. [Exh[KIND-pl]] = λX. ∀x[x ∈ X →x is a child] ∧ ¬[x is a child atom]

By contrast, nouns that cannot be pluralized, like STUDENT ('student'), always end up with the 'exactly one'-reading, because there is no plural morpheme that can form sums out of the atoms. Thus, for these nouns, there is no singular/plural-contrast and, therefore, the application of Exh is semantically vacuous, because the scale only contains one element, namely singular NPs (cf. (6)).

(6) [Exh[STUDENT-sg]] = λx. x is a student atom

Thus, I propose that the classifier's job is to create the singular/plural-contrast and, therefore, repair the analysis. This works as follows. STUDENT and PERSON form a unit. Since PERSON can take a plural morpheme, we have a singular/plural-contrast we need for the application of Exh which, now, can derive the 'at least two'-reading of plural NPs like above, because the scale contains two elements, again, namely singular NPs and plural NPs. This gives us the desired results (cf. (8)).

(7) [NP [Exh] [#P [sg/pl] [NP [STUDENT][PERSON]]]]

(8) a. [Exh[STUDENT PERSON-sg]] = λX. X is a student atom
b. [Exh[STUDENT PERSON-pl]] = $\lambda X. \forall x[x \in X \rightarrow x$ is a student] $\wedge \neg$[x is a student atom]

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Investigating the role of phonological awareness on reading in deaf native signers

Frances Cooley & David Quinto-Pozos

Thursday, 1.30

For years researchers have debated the manner in which deaf and hard of hearing (DHH) children learn how to read [1, 2]. Of particular interest is the degree to which deaf children demonstrate use of spoken language phonology during the reading process. While spoken language phonological awareness (PA) has been reported to account for a portion of reading ability [3], it is likely that deaf children are also utilizing other strategies for reading, including analytical skills gained from competence in a sign language [4]. Unfortunately, there have been no published studies that have investigated deaf children's eye-gaze patterns during reading and the degree to which deaf children are utilizing phonological coding during the reading process.

The current study uses eye-tracking to investigate the linguistic properties influencing deaf children's eye-movement patterns while reading as compared to hearing non-signers. The focus is on whether *phonological recoding*, the mapping of graphemes to speech sounds, is utilized during reading in deaf signing children. Stimuli were taken from a previous study investigating the role of phonological coding in skilled vs. less skilled readers [5]. Here, our goal is to test the use of the *indirect, phonological route* of meaning activation or the *direct, whole-word route* [5, 6]. Children read sentences that contain target words from three conditions that are intended to explore the route of meaning activation during reading [6]:

Correct condition:	Barbara peered through the window to **see** if you were home.
Homophone condition:	Barbara peered through the window to **sea** if you were home.
Control condition:	Barbara peered through the window to **set** if you were home.

Eye-movement patterns are analyzed to compare the disfluency caused by the homophone foil and control conditions as compared to the correct condition. Disfluency is measured by first pass reading time, total reading time, mean number of fixations on the target, and mean regressions to the target word. Reading patterns for each manipulation (i.e. homophone vs. control) provide us with information concerning the use of English phonology during reading (Table 1).

Table 1: Reading pattern predictions

	Expected reading patterns:
Indirect route of meaning activation	Minimal disfluency in homophone condition due to phonological activation of the correct word; both *sea* and *see* activate /si/ and correct word meaning in context. Significant disfluency caused by control condition.
Direct route of meaning activation	Disfluency caused by homophone foil as well as correct condition due to sight word reading; both *sea* and *set* are immediately noticed as incorrect in context.

In addition, we measure phonological awareness skills in English and ASL, as well as speechreading proficiency, in all subjects. PA of English is measured via syllable and rhyme judgement tasks and PA of ASL via an ASL sign-similarity judgement task and the ASL-PA [7]. Finally, we test reading fluency via the WCJ (WCJ-III) Test of Silent Reading Fluency [8].

Data from 26 children (9 native DHH signers, 17 typically hearing non-signers) ages 10;0-12;9 have been analyzed. On the WCJ-III, the DHH group performed significantly above their actual ages ($p < 0.05$) and were not significantly delayed compared to their hearing peers. Hearing participants outperforming DHH signers on measures of English phonological awareness (rhyme: $p < 0.05$; syllable*:* $p < 0.05$). DHH signers outperformed hearing participants on the ASL sign-similarity task ($p < 0.05$). No differences emerged in speechreading or ASL-PA.

Eye-movement patterns while reading suggest that deaf participants are overall faster readers ($p < 0.05$), which has been suggested previously [10], but demonstrate inconsistent reading patterns regarding degree of English phonological activation (see Figures 1-3). Deaf readers show significantly more fixations on the target in both the homophone and control conditions compared to the correct condition ($p < 0.05$), indicating the homophone was detected. Frequency of fixations did not differ between the homophone and control conditions. However, deaf signers perform a similar number of regressions in the correct and homophone conditions, but significantly more regressions in the control condition ($p < 0.05$), suggesting that homophones may not have been detected. Hearing participants' eye-movement patterns follow previous reports indicating that they readers detect the homophone foil and thus are primarily reading via the direct route of meaning activation and are not engaging in English phonological recoding. We suggest that detected reading patterns indicate that deaf children make some use of English phonology when reading, but primarily rely on other strategies when errors are detected.

Current results indicate that native deaf signers may engage in a degree of sound-based phonological recoding despite poor English PA skills, unlike hearing non-signers who have already advanced to sight-word reading and do not demonstrate significant activation of English phonology. Instead deaf signers may employ alternative strategies and rely on context clues when reading English. Further, it may also be the case that some of our current measures of phonological awareness and speechreading are not targeting the specific skills that they are intended to investigate. Additional analysis will include linear mixed-effect models to better understand the predictive power of measured language skills including English, ASL, and speechreading on reading patterns in native deaf signers.

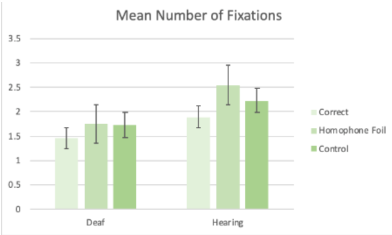

Figure 1

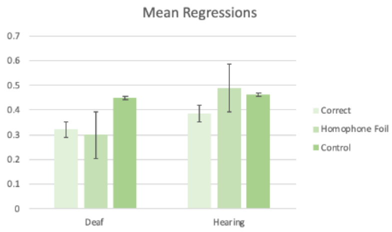

Figure 2

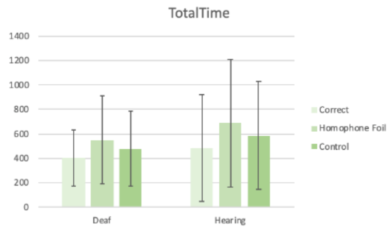

Figure 3

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Datilological sign in Libras – Brazilian Sign Language

Raniere Alislan Almeida Cordeiro & Aline Lemos Pizzio

Thursday, 1.31

This work presents the description of datilological signs of Brazilian Sign Language (Libras) showing their phonological adaptation and proposing a classification of them into categories according to the phonological process they show, such as assimilation, deletion, harmonic movement, etc. The aim of this project is to contribute to the phonological area of sign language, showing how the phonological processes are manifested in the sign language gestures system and can be grouped into types of categories, thus helping the linguistic studies. As theoretical foundation, the main theories addressed: restructuring profile's categories of the datilological signs in ASL according to the phonological processes known as 'loan sign' by Battison (1978); lexical borrowing and lexicalized fingerspelling (BATTISON, 1978; WILCOX, 1992; SUTTON-SPENCE, 1994; VALLI & LUCAS, 2000; FARIA-NASCIMENTO, 2009); the phonetics of fingerspelling in ASL (WILCOX, 1992); types of co-articulation in fingerspelling of the ASL: anticipatory and perseverative effects (WILCOX, 1992; CHANNER, 2012). The methodology is based on a qualitative approach: the description of datilological signs, classifying them in categories with relation of phonological processes. Data collection consists of 146 entries of **datilological** signs taken from the Bilingual Digital Dictionary of Brazilian Sign Language available on: *<http://www.acessibilidadebrasil.org.br/libras_3/> - Dicionário da Língua Brasileira de Sinais V3 - 2011* (FELIPE & LIRA, 2011). This dictionary is the most complete one available online about Libras, in which there are more than five thousand entries. The number of 146 **datilological** signs correspond the total number of them found in the dictionary. The procedures are cataloging, description and analysis of the datilological signs with the citation form of the Libras manual alphabet to identify the phonological changes following Battison's criteria about restructuring profiles which there are nine categories: (i) Deletion – at least one separate segment of handshape that represents letter contained in the fingerspelled word is deleted from the articulation of the datilological sign; (ii) Location – at some point during sign articulation, the location shifts from the citation fingerspelling area in the ipsilateral space in front of the chest; (iii) Handshape – at least one segment of handshape that represents letter in the articulation of the datilological sign changes from the citation form of the manual alphabet; (iv) Movement – in the articulation of datilological sign there is a different movement from the citation movement of the manual alphabet; (v) Orientation – at least one segment of handshape that represents letter in the datilological sign differs from the citation palm orientation of the manual alphabet; (vi) Reduplication – this variant of the datilological sign is made with a reduplicated movement; (vii) Second hand - the datilological sign is made with two hands, not just one as in normal fingerspelling; (viii) Morphological involvement – the datilological sign is inflected or modified to show the addition of grammatical information; (ix) Semantics – the datilological sign takes on a physical feature which by analogy marks it as belonging to a class of signs which has some large degree of semantic commonality. The preliminar data analysis shows a classification of datilological signs for the following types of categories: fusion; deletion; assimilation; weakening; reduplication; harmonic movement of the handshape segment that represents letter 'Z'; acronym. Moreover, assimilation is the category that has the most occurrences into the datilological signs.

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Effects of familiarity, iconicity and phonological density in the LSE lexicon

Brendan Costello, Marcel Giezen, Levi Stutzman, Miguel Ángel Sampedro, Saúl Villameriel & Manuel Carreiras

Thursday, 1.32

Despite the growing interest in the psychology of sign languages, so far only a few studies have investigated the role of phonological and lexical factors such as frequency, iconicity and sub-lexical density on lexical processing (e.g., Baus & Costa, 2015; Carreiras, Gutiérrez-Sigut, Baquero & Corina, 2008; Bosworth & Emmorey, 2010; Vinson, Thompson, Skinner & Vigliocco, 2015). An important reason for this is that information on lexical characteristics is only available for a handful of sign languages. Lexical databases for British Sign Language (BSL) and American Sign Language (ASL) include familiarity and iconicity ratings for subsets of signs, allowing researchers to obtain insight into, for example, the relationship between the degree of familiarity and iconicity of signs (cf. Vinson, Cormier, Denmark, Schembri, & Vigliocco, 2008; Caselli, Sehyr, Cohen-Goldberg & Emmorey, 2016).

As part of an ongoing project to expand the Spanish Sign Language LSE-Sign database, a lexical database of 2400 LSE signs and 2700 pseudosigns (Gutiérrez-Sigut, Costello, Baus & Carreiras, 2016), we collected familiarity and iconicity ratings from 30 deaf native and 30 deaf non-native LSE signers for a subset of 300 lexical signs in the database. In addition, we are in the process of adding a detailed layer of phonological coding to the lexical entries in the database based on the prosodic model of phonology by Brentari (1998) to allow calculations of sub-lexical frequency and phonological neighborhood density for the lexical signs in the database. Based on a previous study of BSL (Vinson et al., 2008), we predict only weak positive correlations between familiarity and iconicity (see also Baus and Costa (2015) for supporting experimental evidence from Catalan Sign Language (LSC)). Finally, we predict weak to moderate positive correlations between familiarity and sub-lexical density (that is, more familiar signs tend to use more frequent sub-lexical elements) as well as between iconicity and sub-lexical density (iconic signs are often part of phonological clusters and are thus more likely to share certain sub-lexical elements).

As a second goal of the study, we have collected lexical decision data from 25 deaf native and 25 non-native LSE signers for a subset of 200 (imageable) signs included in the rating study, to investigate effects of familiarity and iconicity on the speed and accuracy of sign recognition. Furthermore, detailed phonological coding of the signs in the database will be used to explore effects of different measures of phonological density on lexical access, including sub-lexical frequency and phonological neighborhood density based on overlap of subsets of phonological features (e.g., selected fingers) and whole parameter overlap (all features are shared). The comparison between effects of phonological density based on subsets of phonological features and whole parameters is particularly relevant because phonological priming studies in sign languages have yielded mixed results (both facilitatory and inhibitory effects) for different phonological parameters. Critically, these studies operationalized phonological overlap at the level of single or even two parameters, instead of overlap at the more fine-grained level of phonological features that are distinguished in theoretical models of phonology.

Based on the spoken word recognition literature, we predict a facilitatory effect of familiarity for signs on lexical decisions. In contrast, we predict an inhibitory effect for measures of phonological density on sign recognition, reflecting increased lexical competition for signs in dense phonological neighborhoods in the LSE lexicon (cf. Carreiras et al. 2008). Studies on iconicity effects in sign recognition have yielded mixed results (e.g., Thompson, Vinson & Vigliocco, 2009, 2010; Bosworth & Emmorey, 2010; Vinson et al., 2015). Several of these studies did not control for effects of familiarity and phonological density, which may explain the mixed findings. By combining subjective familiarity and iconicity ratings and detailed phonological descriptions of lexical signs, the current study promises to yield new insights into effects of familiarity, iconicity and phonological density, as well as their interaction, on sign processing.

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Mathematical terminology in Brazilian Sign Language: Signs of the conceptual field of equation

Rodolpho Pinheiro D'Azevedo & Patricia Tuxi

Friday, 17:30-18:30 (SIGNopsis) **– CANCELLED**

This work, which is part of the Lexicon and Terminology research line, presents the results of the master's degree's research fulfilled in the Postgraduate Program in Linguistics of the University of Brasília, Brazil. It has as object of study terminological signs in Brazilian Sign Language (Libras) of the area of Mathematics, especially those related to the conceptual field of Equation. Brazilian legislation guarantees to the Deaf the access to information and education through the Sign Language. Among the areas to be taught in the first language of the Deaf student is mathematics, especially the branch of algebra. In view of this panorama, this research has as object of study mathematical equations and the general objective is to present a proposal of bilingual glossary: Brazilian Sign Language (Libras) and Portuguese Language (PL). In order to reach the proposed goal, the methodological approach was based on the Socioterminology Theory (FAULSTICH, 1985) and the sign creation process in Libras (FAULSTICH, 2007). The steps adopted were: i) analysis of signs used informally – in this phase the researcher made a survey on the existing works in the area of mathematics related to Sign Languages, both in Brazil and in other countries, and describes them through a bibliographic report; ii) conceptual study of the term – the second step was to analyze which terms constitute the conceptual field of equation and analyze if the signs found in the first step were coherent with the conceptual aspect of the area; iii) creation of an appropriate sign – the third step occurs when the researcher, after a vast search, does not find linguistically and conceptually proper signs. Thus, it was necessary to participate in the terminological groups of the University of Brasilia, which has the responsibility of organizing the creation of signs in different fields and iv) validation of the proposed sign to the deaf community – the fourth and last step is the moment to take to the Deaf community the signs and see if they are used and understood by them. In this research, the entire glossary was validated by deaf specialists in the field of mathematics. As a result, we have presented a Bilingual Glossary Libras – PL of Mathematics for the specific field of equations. All work is a great challenge for students, listeners and deaf ones, since this branch consists mostly of abstraction within the discipline of mathematics, which presents itself as an epistemological obstacle for all. By possessing adequate terminology in their language, deaf students are faced with the possibility of understanding the content not only at the linguistic level but also conceptual, what is expected as a legacy of this research.

Time will tell: Grammaticalization of time expressions in Israeli Sign Language (ISL)

Svetlana Dachkovsky, Rose Stamp & Wendy Sandler

Thursday, 1.33

Narrating personal stories plays an important role in human communication since it serves as a vehicle for sharing life experiences and construing one's identity (e.g, Schiff, 2012). Speakers (Fleischman 1991; Bestgen & Vonk 2000) and signers (Cabeza Pereiro & Fernandez Soneira 2004; Nilsson 2018; Selvik 2006) employ a number of devices to signal transitions through central events during a narrative. Yet these devices for marking relations between events do not appear immediately in young languages, and some devices develop at a later stage than others (Dachkovsky, Stamp & Sandler accepted). Here we investigate the grammaticalization of a specific time expression in three generations of Israeli Sign Language (ISL) users, paying special attention to the central role played by prosody in this process.

Grammaticalization refers to the process by which lexical material acquires grammatical functions (Lehmann 1995, Traugott & Hopper 2003 *inter alia*). This process also entails desemantization and phonetic change. Grammaticalization of a variety of function words in many languages has been shown to follow a common conceptual trajectory *space > time > text* (Traugott & Hopper 2003). For example, the English temporal conjunction *while* has Proto-Germanic **hwilo* (originally "rest, bed") as its source. Still later, the temporal *while* grammaticalized into a marker of adversative textual relations.

However, one aspect which has received little attention in this area is the role that prosody plays in the development of temporal markers in language. There are incipient studies, though, which have convincingly demonstrated that prosodic changes accompany grammaticalization of some of them forms, such as conjunctions and discourse markers like *because, of course*, etc. (see Wichmann 2011 for an overview). Since in spoken languages prosodic features are usually not documented historically, we refer to a young language in the visual modality, ISL, in order to address these questions.

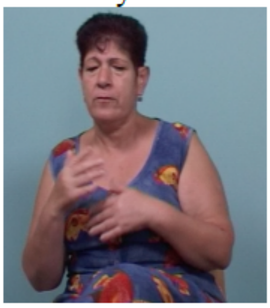
The field of grammaticalization is quickly expanding in sign language research (see Pfau & Steinbach 2012 for an overview). Yet, the emergence of narrative devices in interaction with prosody remains under-researched. In sign languages, prosody is conveyed by alignment of the rhythmic manual cues with intonational cues conveyed by facial expression and head movement (Nespor & Sandler 1999). Here we trace the grammaticalization of a particular time expression in this young language.

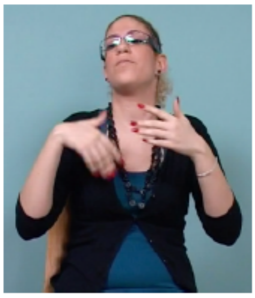
In this study we analyze episode transitions in personal narratives produced by 15 signers of ISL -- a sign language that is only about 90 years old. We draw on the apparent time hypothesis (Labov 1963), which exploits the fact that language users do not change their grammar significantly after their youth, allowing us to interpret the language of older signers as representing the language at an early stage in the emergence of the language (Meir & Sandler 2008).

We analyze the frequency, distribution and behavior of 102 tokens of the time expression, glossed as TIME-PASS (see Figure 1), in 15 life narratives. The study also that its function changes from a predicate signaling the unfolding of time to a temporal conjunction connecting discourse units. These two functions are characterized by distinct prosodic behavior expressed by particular manual and nonmanual features. TIME-PASS produced by older signers typically comprises a whole intonational phrase by itself, accompanied by lowered brows and head down (see Figure 1a). For younger signers, the duration of TIME-PASS is reduced, and it is incorporated into an intonational unit with other signs. In this later form, the sign is accompanied by raised head (see Figure 1b).

These findings demonstrate that TIME-PASS is undergoing grammaticalization in ISL. We interpret our findings in light of spoken language studies which investigate time expressions and discourse markers, and show how prosodic features modify their discourse function (Fox 1994; Couper-Kuhlen 1996). We also compare our findings with a similar cyclic co-speech gesture investigated by Ladewig (2011). She found that speakers draw on the widely accessible metaphor ‘time is motion through space.’ Our results provide further support for the prominence of this metaphor in human cognition while also showing how signers reanalyze and expand its meaning to convey ‘motion through discourse.’ The study indicates that prosodic features are crucial for disambiguating different discourse functions of time expressions in sign language, thus highlighting the importance of multi-articulatory analysis. On a more general level, however, we aim to contribute to the discussion on the relation between cognition, grammaticalization and prosody.

Figure 1: (a) TIME-PASS by an older signer; (b) TIME-PASS by a younger signer.

a) 

b) 

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Turn taking in signed conversations: The state of the art

Connie de Vos

Thursday, 1.34

Social interaction is the primary ecological niche for languages to be used, acquired, and to emerge. Prior work has shown that conversation is remarkably rapid across typologically diverse spoken languages with most turns timed ~200ms after the prior (Stivers et al. 2005). When looking at the *strokes* – i.e. the lexically-specified movements of signs, turn-timing in Sign Language of the Netherlands (NGT) looks remarkably similar to turn-timing in spoken languages (de Vos, Torreira & Levinson 2015). The study reported here has investigated since 2016 whether turn-timing is indeed a constant feature of conversation across both language modalities, and if so, to what extent might this might lead to convergent evolution across unrelated sign languages? To do so, I compare spontaneous dialogues in NGT and Kata Kolok (KK).

KK is an emergent signing variety that has been used by six subsequent generations of native signers in a village community of Bali. Because KK emerged in isolation of any other sign language, it constitutes a unique sample in cross-linguistic comparisons. Data stem from the Kata Kolok Corpus, which covers generations III-IV of adult signers (de Vos 2016), and the NGT Interactive Corpus (van Zuilen, de Vos, Crasborn & Levinson). To allow for systematic comparisons across large samples of spontaneous data I have compared question-answer sequences – e.g. content and polar questions, and repair sequences, i.e. three-turn sequences with a problem sources turn, a repair initiation (*huh?*), and a solution. Each sequence was transcribed for gesture movement phases (preparation, stroke, hold, retraction) as well as prosodic cues marking questionhood and phrase boundaries (e.g. raised eyebrows, nods).

Statistical analyses indicate that NGT and KK question-answer sequences and repair sequences may be strikingly similar in terms of turn-timing. In addition comparisons of the different generations of KK signers to age-matched NGT signers reveal no intergenerational differences that could indicate that KK is still evolving in terms of turn-timing. These findings support the hypothesis that turn-timing varies minimally across a diverse set of spoken and sign languages supports strong linguistic universals in turn-timing across modalities.

Prior work on spoken languages has indicated a facilitatory role for prosody in turn end prediction. Fenlon and colleagues have shown that such signals are indeed accessible to signers from different sign languages when asked to segment discourse in a foreign sign language. Our perception experiments asked participants to predict the ends of turns from spontaneous NGT dialogues. We compared 60 NGT signers to 60 age/education/gender-matched control participants with no knowledge of any sign language. Building on Casillas et al (2015), our most recent results show that at least some prosodic signals enabling rapid turn taking (e.g. brow movements, palm up gestures) are universally accessible to both signers and non-signers alike.

As a third step, this project adopts corpus analyses to assess to what extent both pieces of evidence for universality may lead to convergent evolution of prosodic signals between two unrelated sign languages: KK and NGT. Initial analyses support both language-specific characteristics in the signal forms (e.g. KK signers do not adopt lowered eyebrows for content questions unlike NGT), as well as universal patterns in terms of their alignment with prosodic and syntactic boundaries. While all corpus coding was finalized recently, advanced multi-level statistical analyses are currently still ongoing to determine specific patterns. All in all, our results will be placed within the observed evolution of prosodic boundaries over the course of three generations of Al Sayyed Bedouin Sign Language users (Sandler et al. 2011). More generally, these findings contribute directly to our understanding of the mechanisms underlying grammaticalisation of gesture to sign language grammars (Janzen & Shaffer 2002).

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Before or after? Adposition signs in Finnish Sign Language: Form and position

Danny De Weerdt

Thursday, 1.35

Video abstract:

https://youtu.be/-nnsIJX-J0s

What do abstract spaces represent?

Paul Dudis

Saturday, 16:00-16:30

This paper examines issues associated with, and the conditions necessary for, theorizing a unified analysis of spatial representations. Spatial representations in signed languages are sometimes distinguished based on whether they are "topographic" (Poizner et al. 1987 and others). Generally, topographic space is viewed as reflecting, or motivated by physical structure within the world (Cormier et al. 2015), depicting spatial relationships between objects. Non-topographic space, in contrast, is viewed as "abstract space" (Johnston and Schembri 2007; Janzen 2012; Quinto-Pozos 2014), described elsewhere as a "token" (Liddell 2003).

An issue that arose during my exploration of abstract spaces concerned the identification of abstract spaces in attested video data: what would count as an abstract space? The task of identifying abstract spaces benefited from a consideration of the following aspects of depictions: dimensionality, viewpoint, and dynamicity, which will be briefly discussed in this presentation. An abstract space would show no evidence of three-, two-, or one-dimensional structure, or any spatial relationship between entities. Planar and linear depictions described in Engberg-Pedersen (1993) and elsewhere would not qualify as an abstract space, since points within these depictions would participate in a spatial relationship. Viewpoint pertains to the role of the signer's body vis-à-vis the depictive space. When the signer's vantage point is projected into the depiction, that depiction is viewpoint-internal (similar to character viewpoint in McNeill 1990), participating in spatial relationships with other components within the depiction. Bodily depictions of bodily actions or depictions of one's experience via affective displays (both generally known as constructed action (Metzger 1995) are also examples of viewpoint-internal depictions. Abstract spaces are necessarily viewpoint-external. Finally, dynamicity refers to whether conceived time (Langacker 1987) is a component of the depiction, as in the depiction of events. As conceived time is an aspect of one's experience, abstract spaces are thus necessarily atemporal.

Accordingly, something characterized as abstract could of course refer to its absolute lack of physical characteristics, and the spatial representation and the referent it represents could be characterized in this way. One attested example of an abstract space has an ASL signer beginning a new stretch of discourse by directing a sign towards space in front of him, mentioning a historical figure, and later directing another sign towards that space, which now clearly refers to that historical figure. There is no indication in this expression of any depiction of physical feature or circumstance that may be associated with that figure, or with human individuals in general. This is then taken to indicate that an abstract conception of the figure is being spatially represented.

But something characterized as abstract could instead refer to the construct's generality relative to its instances. Such generality is discussed in my paper as an outcome of schematization, a "process of extracting the commonality inherent in multiple experiences to arrive at a conception representing a higher level of abstraction" (Langacker 2008:17). This is a key component in an unified analysis of spatial representations discussed in this paper. From a cognitive linguistic perspective, spatial representations arise through mappings, or projections, of conceptions into the signer's immediate space. And these conceptions are part and parcel of "meaning [that] derives from embodied human experience (Langacker 2008:28). This perspective is similarly adopted in other cognitive linguistic approaches to iconicity in signed languages. Taub (2001) incorporates both specific, low-level images and image schemas (Johnson 1987) in her Analogue Building model. In his model of cognitive iconicity, S. Wilcox (2002, 2004) employs Langacker's (1987) notion of conceptual archetypes. Among the image schemas/conceptual archetypes particularly relevant to the present analysis is one described as an "object" which figures in another archetype, a "scene" (Langacker 2008). My paper builds on such work to explore the role that the scene archetype has in three-dimensional, topographic spaces. The paper then argues that since the object archetype is not ontologically distinct from the scene archetype—both are embodied constructs—a unified analysis of spatial representations becomes possible, if not necessary.

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Application of Depiction Coding System

Paul Dudis & Miako Villanueva

Thursday, 1.36

Video abstract:

https://www.dropbox.com/s/6mqwnsfzz9dlemj/TISLR13_DudisVillanueva.mp4?dl=0

Sign language avatars activate phonological and semantic representations: Evidence from working memory and priming paradigms

Matthew Dye, Matt Huenerfauth & Kim Kurz

Thursday, 11:30-12:00

In order for comprehension to occur, any linguistic input must be received by the appropriate sensory system, attended to, and the relevant linguistic properties of the input extracted.

These representations can then be used to access long-term linguistic knowledge that permits the decoding of meaning. Experimental paradigms allow inferences to be made about the nature of human language processing: order list recall studies have revealed how linguistic inputs are initially represented within neural systems that mediate language comprehension, and lexical decision studies have been employed to better understand how long-term knowledge is stored and accessed. This kind of research often selects linguistic stimuli with specific properties, to determine their impact upon processing and make inferences about hidden cognitive processes. Over the past few decades, psycholinguists studying spoken languages have used artificial speech synthesizers to obtain a large degree of precision over experimental stimuli, and there have also been attempts to create more realistic speech stimuli based upon modeling of the human vocal tract [1] and speech coding theory [2]. Recently, these efforts have been extended to the development of computer-generated audiovisual speech stimuli [3]. The use of sign language avatars for psycholinguistic research, if successful, would allow a degree of control over stimuli that is difficult to achieve with videos of human signers without introducing artifacts. For example, it would be possible to manipulate the gender or skin tone of the signer without making any changes to the linguistic utterance, or the experimenter could introduce movements that violate the biomechanical constraints imposed by the human body. Here, we report two experiments that sought to assess the viability of avatars for psycholinguistic research. In both studies, experimental results derived from stimuli created by a native Deaf signer of ASL were compared to the results when avatars modeled on the human sign stimuli were used instead (see Figure 1). In Experiment 1, we sought to replicate a seminal study of phonological coding in working memory [4], and in Experiment 2, a classic semantic priming study was replicated [5]. In Experiment 1, deaf signers of ASL (N = 23) viewed lists of signs that each contained four phonologically similar or four phonologically dissimilar signs, produced by either an avatar or a human signer. After viewing each list, they were asked to sign back all of the list items in the same order that they were presented (ordered serial recall). The number of items recalled in correct list position (item scoring) and the number of lists perfectly recalled (list scoring) was recorded. Participants recalled fewer items ($p < .01$) and fewer lists ($p < .01$) in the avatar compared to the human condition. There was a trend towards poorer performance on phonologically similar lists for human stimuli (item: $p = .056$, Cohen's $d = .694$; list: $p = .081$, Cohen's $d = .604$) and for avatar stimuli (item: $p = .073$, Cohen's $d = .631$; list: $p =.103$, Cohen's $d = .544$). As predicted the effect sizes were smaller for avatar stimuli than for human stimuli. In

Experiment 2, deaf signers (N = 34) performed a lexical decision task. On each trial they saw a sequence of two signs and had to indicate whether the second sign was a real ASL sign or not. On half of the trials the second sign was a Malaysian Sign Language sign that was permissible but unattested in ASL. For the pairs of real ASL signs, the pair was semantically related on half of the trials (BASEBALL-BALL) and unrelated on the other half (MOUSE-CHAIR). All participants performed the task with both avatar and human stimuli. Analysis of response times for correct lexical decisions revealed no effect of semantic relationship (related vs. unrelated) or sign type (avatar vs. human). Accuracy data, however, revealed an effect of both semantic relationship ($p = .027$) and sign type ($p = .014$).

Participants were less accurate when responding to avatar stimuli, and less accurate for semantically unrelated pairs. Importantly, these two effects did not interact. Overall, these studies were consistent in revealing that avatar and human stimuli are processed by signers in similar ways. The working memory data suggest that encoding of avatar stimuli into working memory was slower than for human stimuli, although there was some evidence that the resultant code was phonological in nature. The priming data revealed that while overall accuracy was lower for avatars, they still activated networks of semantic representations in the mental lexicon. These psycholinguistic data align well with findings in the human-computer interaction literature which suggest that deaf people prefer a slower speed of presentation for ASL animation than for human video [6] and have concomitantly lower comprehension scores [7]. While suggesting that there is a potential for the use of avatar stimuli in psycholinguistic research into sign language comprehension, these data are based upon a sample of experienced deaf signers (with varying ages of acquisition), and the results may not hold for hearing L2 learners of a sign language.

Figure 1: Still frame of ASL sign ESCAPE produced by native Deaf signer (L) and computer-generated avatar (R)

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Perceptual optimization of American Sign Language: Evidence from a lexical corpus

Matt Dye, Andreas Savakis, Bruno Artacho, Aman Arora, Naomi Caselli, Erin Finton & Corrine Occhino

Thursday, 1.37

Thanks to the pioneering work of Battison 1, Siple 2, Woll 3 and others it is commonly understood that the production of signed languages corresponds to the visual perceptual abilities of those comprehending the signal. Skilled signers look at the face of the person signing during sign perception 4-6 and therefore handshapes and movement that are not located near the face must be perceived using peripheral vision. The encoding of visual stimuli in the periphery is "lossy" and has access to relatively fewer neural resources compared to central vision 7. Together these facts about the visual system mean that signers may be better able to detect more detail about signs that are produced near the face than signs produced at more peripheral locations. If, as early work proposed, sign languages evolve to match the perceptual abilities of comprehenders, signs that require fine perceptual discriminations (e.g. identifying marked handshapes) should be more likely to be produced on or near the face (near the location of the viewer's eye gaze) whereas those that do not require such discriminations should be more likely to be located further away in the sign space. While this prediction is often cited as a property of sign lexicons, there has been no systematic and rigorous investigation of whether this prediction holds. Here we use a recently developed lexical database of ~2,500 ASL signs called ASL-LEX 8 to subject this prediction to an empirical test for the first time.

It is important to note, however, that the evidence for this perceptually motivated structure is largely anecdotal and based upon the selection of exemplars that confirm the hypothesis without consideration of counterexamples or, more importantly, the distribution of sign location parameters as a function of perceptual discriminability. Two recent advances, however, mean that a systematic approach to addressing this limitation is now possible. First of all, we now have access to large lexical databases, such as ASL-LEX 8 and the BSL Sign Bank 9. Secondly, recent advances in computer vision have leveraged "deep learning" approaches to perform pose estimation on video and track the motion of joints over time. Here, we use OpenPose 10 to analyse wrist location of 2,390 signs in the ASL-LEX 2.0 database.

Signs from the ASL-LEX database were sampled to the same resolution/frame rate, and then passed through OpenPose pose estimation software. This gave estimated joint locations for each frame of video. The distance between the neck and hip joints was used to normalize the videos to control for differences in signer framing across videos. Median 11 and Kalman 12 filters were applied to the data, which was then normalized such that the signer's nose "joint" was uniform across all videos. This protocol was applied to each sign in the ASL-LEX database. ASL-LEX includes a phonological description of each sign. For this study, we extracted the features that correspond to handshape (selected fingers, flexion, spread, and thumb position), and used those to classify handshapes as unmarked (B, A, S, 1, C, O, 5) or unmarked 13. Phonological descriptions also included major location 14 (head, body, arm, hand, and neutral space), and sign type 13 (symmetrical/alternating, asymmetrical two-handed, and one handed).

Figure 1. Average heat-maps representing wrist locations for (1A) signs with different major locations (right wrist only), (2A) different sign types, and (1C) signs with marked versus unmarked handshapes (right wrist only).

We first confirmed that pose estimation accurately evaluates hand position by comparing the location of the wrist to the hand-tagged major locations (see Figure 1A) and sign types (see Figure 1B) from ASL-LEX. These analyses demonstrate the face validity of the approach; the wrist positions generally corresponds with the hand tagged locations and sign type.

The effect of markedness on the distance between face and wrist was examined next. As shown in Figure 1C, there was a striking degree of overlap between the location of the dominant hand in signs containing marked and unmarked handshapes. We confirmed these findings by examining only signs produced in neutral space with symmetrical or alternating movements, as these seemed the most likely to be produced in variable locations (i.e., relatively more flexible locations than body anchored signs). Linear mixed models confirmed no differences between the average locations of marked and unmarked handshapes in both analyses. The results suggest that, contrary to received wisdom, distinctions that require visual acuity to resolve are not more likely to be produced near the face than other signs. More work is needed examining other kinds of detailed distinctions, but preliminary evidence suggests that the ASL lexicon may not be as sensitive to the demands of the visual system as previously thought.

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Feeling phonology: The emergence of tactile phonological patterns in protactile communities in the United States

Terra Edwards & Diane Brentari

Friday, 10:00-10:30

The broad aim of this presentation is to argue that, like the visual/gestural modality, the tactile/proprioceptive modality can sustain phonological structure. We are asking this question in a historically unprecedented moment when, for the first time, a network of DeafBlind signers is communicating directly with one another via reciprocal, tactile channels, a practice known as "protactile" (PT). Over the past 10 years, PT practices have led to new norms and values, which have affected the way DeafBlind people interact and communicate (Edwards 2015), and more recently these changes have begun to target the sub-lexical level of sign structure. Based on the findings of a recent pilot study, we argue that as ASL has been adapted to PT environments, the very primitives used to create new signs have been replaced. These changes are no longer mere adaptations to American Sign Language (ASL); rather, they reflect systematic principles that govern what is and is not a well-formed PT sign.

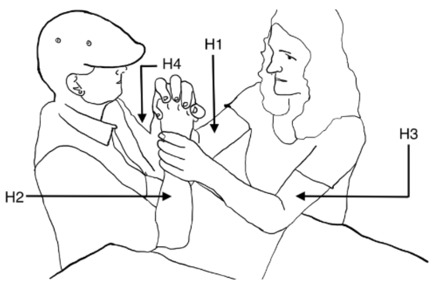
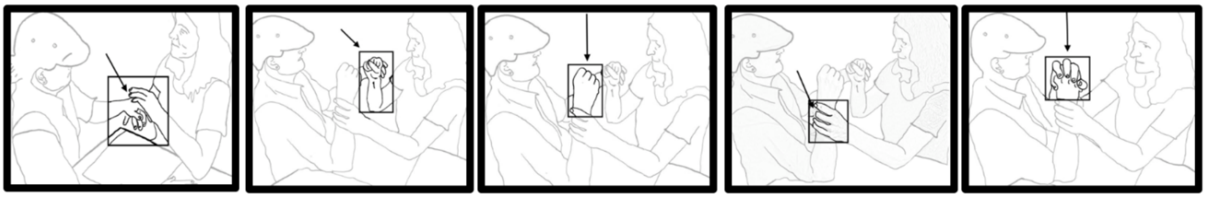


Figure 1: The four anatomical structures used to produce proprioceptive constructions

Unlike visual signed languages, which are produced with the two hands (and arms) of the signer, PT signers incorporate the hands and arms of Signer 1 and Signer 2; each of the four anatomical structures can take on an active articulatory role (Figure 1). The protactile language optimizes the tactile modality by assigning grammatical roles to these anatomical structures, a pattern that is particularly evident in the protactile equivalent of "classifiers", which we are calling **Proprioceptive Constructions (PCs)**. Brentari et al. (2012) argue that minimal pairs and phonological rules are insufficient criteria for deeming a phenomenon "phonological"; rather, emergent phonological patterns can be grasped by way of more basic principles, such as **redundancy, componentiality, conventionalization,** and **well-formedness**, which organize the system slowly, eventually leading to duality of patterning, minimal pairs, and phonological rules. In this presentation, we argue that the assignation of conventional linguistic tasks to specific anatomical structures among protactile signers engages these principles, and therefore constitutes the emergence of phonological patterns. This work targets the spatial component of the lexicon, where classifier constructions are located.

Methods: The data was collected from 11 signers in three participant groups: (1) DeafBlind individuals with at least one year of PT experience, or "PT DeafBlind signers" (3 males, 3 females, ages 32-47); (2) DeafBlind signers with no PT experience, or "non-PT DeafBlind signers" (1 male, 1 female, ages 50-72); and (3): Deaf, with no PT experience, or "non-PT Sighted signers" (1 male, 2 females, ages 22-24. We used two tactile stimuli including a lollipop and a jack to elicit Size and Shape Specifiers (SASSs). For each participant, sessions were videotaped and annotated in ELAN.

Analysis: We have identified phonological functions associated with each of the four hands of a protactile dyad when describing events involving size and shape (Figure 1):



(a) initiate-prompt-tap (b) initiate-prompt- PO (c) PO –sphere (d) prompt-to-continue-hold (e) MC-grip

INITIATE, PO, PROMPT-TO-CONTINUE, AND MC. These four sub-structures occur in a strict order within the proprioceptive construction. The 4-handed apparatus is "initiated" in two steps, first by Signer 1's non-dominant hand (H3) and then by Signer 1's dominant hand (H1). INITIATE tells Signer 2 that their active participation is required. In Figure 2a and 2b, Signer 1 combines INITIATE-PROMPT-TAP (H3) & INITIATE-PROMPT-PO (H3). Next, Signer 2 produces the "proprioceptive object", or "PO" with her dominant hand (H2). Together, INITIATE and PO delimit the active tactile signing space. Next, Signer 1 prompts Signer 2 to hold the PO in place with her non-dominant hand (H3). We call this "PROMPT-TO-CONTINUE". Finally, Signer 1 produces "movement contact types", or "MCs" on the PO to draw attention to different internal aspects of its structure using her dominant hand (H1). Together, this sequence of tasks produces what we are calling a "proprioceptive construction" or "PC". Signer 2's nondominant hand is called on sporadically to produce POs and is otherwise available for backchanneling (H4). H1, the dominant hand of Signer 1, is the most active hand having two roles—prompt and MC. H2, the dominant hand of Signer 2, is the next active hand. H3 and H4 are less active; H3, the nondominant hand of Signer 1, can be used for further prompting, and H4, the nondominant hand of Signer 2, is used for backchanneling.

In addition, among the PT DeafBlind signers, the content of the PC is assigned to H1 and H2 in the roles of MC and PO. The role of PO was assigned to H2 75% of the time (H4 25%; Figure 3). H1 is the most active articulator, which produces 81% of the MCs (16% are assigned to H3). The functional roles of the PC— INITIATE and PROMPT are assigned to H1 and H3. We found that PROMPT-TO-CONTINUE was assigned to H3 83% of the time and 15% of tokens were produced by H1. There are four types of INITIATE: 80% of INITIATE-TOUCH tokens were produced with H1, while only 20% were produced with H3; 75% of INITIATE-GRASP tokens were produced with H3, while 25% were produced with H1; 79% of INITIATE-PROMPT-TAP tokens were produced with H3, and only 21% with H1, while 85% of INITIATE-PROMPT-PO tokens were produced with H1 and only 15 % with H3. These data suggest that among DeafBlind PT signers, novel linguistic tasks are being consistently assigned to specific anatomical structures.

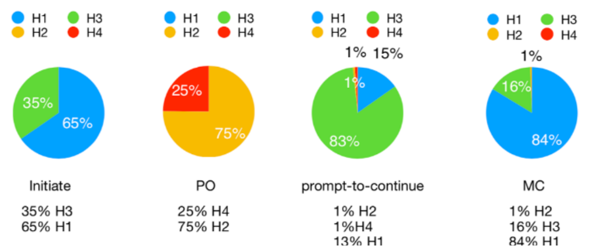


Figure 3: Percentage of tokens (for all superordinate categories) produced by each available anatomical structure.

Among Non-PT participants (DeafBlind and Deaf sighted), articulation was carried out entirely by a single signer using two-handed SASS constructions of precisely the kind that would be expected among Deaf, sighted American Sign Language signers. DeafBlind addressees who made contact with the Non-PT signer's hands did so in a strictly passive capacity; they played no active role in the articulation of the PC. Therefore, among the non-PT signers, not even one instance of a PO was found in the non-PT data. In sharp contrast, in response to the same stimuli, an average of 61 POs were produced per protactile participant. We conclude, then, that this strategy of drawing on the proprioceptive sense of the listener as a way of articulating perceptible forms in a systematic way is specific to protactile signers.

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Encoding spatial information in two sign languages: A Comparison of Ghanaian (GSL) and Adamorobe (AdaSL) Sign Languages

Mary Edward & Pamela Perniss

Friday, 15:00-15:30

In the visual-spatial modality of sign languages, the encoding of information related to referent location, motion and action relies on the use of space, the hands and the body. The iconic representation possibilities thus afforded lead to a high degree of similarity in the expression of such spatial and event information across sign languages (Aronoff et al. 2003; Meier 2002). A majority of sign languages studied to date have been shown to use classifier predicates (or depicting verbs) and to represent event space from character and observer perspectives in these domains (Perniss 2012; Emmorey 2003). In this paper, we compare the encoding of spatial information about location, motion and action in two sign languages used in Ghana: Ghanaian Sign Language (GSL) and Adamorobe Sign Language (AdaSL). GSL is an urban sign language that has developed since the establishment of the first school for the deaf in 1957 (Kiyaga & Moores 2003), and has historical contact with American Sign Language (ASL). AdaSL is a rural sign language that emerged in Adamorobe village in the 18th century (Okyere & Addo 1994). It is used by both deaf and hearing signers in Adamorobe, and has been shown to exhibit typological differences in interesting ways in the spatial domain compared to urban sign languages like ASL. Notable typological exceptions in the spatial domain have been described for AdaSL, in particular the lack of entity classifiers and the lack of observer perspective representation (where the signer's body is external to the represented event space) (Nyst 2007). GSL and AdaSL are unrelated sign languages, but in recent years, and since the previous research on AdaSL was done, there has been considerably more language contact between GSL and AdaSL. This has been due to education of young deaf Adamorobeans in schools for the deaf where GSL is used and communication with researchers who use mainly GSL. We seek to compare how spatial information is encoded in GSL and AdaSL given the language contact situation, the typological differences and the lack of research to date on encoding of spatial information in GSL.

Signers of GSL (N=10) and signers of AdaSL (N=10) were asked to watch the *Pear story* video. The movie was divided into six vignettes (about 1 minute each) to facilitate retelling and to deal with memory limitations. Responses were coded in ELAN (Wittenburg et al. 2006) for strategies of referent representation, including classifier predicates, and for the use of space and the body to encode location, motion and action information, including event space representation from a character (the signer's body is within the event space) or observer (body external to the event space) perspective, the use of simultaneous constructions and the use of constructed action. Coding was done event by event to allow direct comparison of strategies and structures for event encoding. This also allowed us to compare consistency in narration across signers, within and across languages, with respect to which events were encoded and how.

We analyse similarities and differences in GSL and AdaSL in the encoding of location, motion and action information. Coding and analysis of the data are ongoing. A critical finding that has emerged already is the use of entity classifiers to encode referent location and motion information from an observer perspective in AdaSL (see Figure 2), similar to what is found in GSL (see Figure 1). This goes against previous findings for AdaSL (Nyst 2007). Based on demographic information collected from signers, it is particularly interesting that the use of entity classifiers is observed primarily in uneducated AdaSL signers who say that they do not know any GSL. In contrast, the narratives of AdaSL signers who have been to school, where GSL is used, have not been observed to include entity classifiers, suggesting an awareness of their knowledge of the two sign languages and the differences between them. We discuss the possibility of an emerging entity classifier predicate system in AdaSL that is the result of more recent language contact between GSL and AdaSL.

In addition to representing African sign languages, which are underrepresented in cross-linguistic investigation, our study contributes to understanding spatial encoding in language, in general, and the effect of language contact in unrelated sign languages. Furthermore, the study is an important contribution to typological investigations in sign languages as it presents the diversity in encoding spatial information in urban and rural sign languages.

Fig. 1. GSL

Fig. 2. AdaSL

Pear story scene: Boy and Girl ride towards each other (motion depiction with entity CL)

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Neural and behavioral consequences of lexical iconicity in American Sign Language

Karen Emmorey

Thursday, 17:30-18:30

Iconicity (a resemblance between form and meaning) in sign languages appears to be much more pervasive and structured compared to spoken languages because of the affordances of the body and the visual modality. Currently, however, we know very little about how visual-manual iconicity is perceived by signers vs. non-signers or whether iconic signs are processed differently in the brain. My colleagues and I have been exploring the nature of the distribution of iconic forms in the American Sign Language (ASL) lexicon, how the perception of iconicity is impacted by linguistic knowledge and gesture experience (comparing deaf signers and hearing non-signers), and how the perception of iconicity changes when the sign meaning is given versus when it must be guessed (assessing the perceived transparency of signs). We have also been using Event-Related Potentials (ERPs) to investigate the possible role of iconicity in modulating the temporal neural dynamics of single sign processing. Specifically, we examined a) whether iconic signs exhibit a distinct neural signature for deaf fluent signers or for hearing new learners and b) whether effects of iconicity are found in picture-naming and picture-matching tasks, particularly when there is a structural alignment between the ASL sign and the picture (e.g., the ASL sign BIRD depicts a bird's beak and aligns with a picture of a bird with a prominent beak, but not with a picture of a bird in flight). Thus far, this work indicates a) an important distinction between iconicity and transparency, b) linguistic knowledge reduces and changes sensitivity to certain types of iconicity, and c) there appears to be no "neural signature" that tracks with the strength iconicity during sign recognition, but sign iconicity impacts lexical access in picture-naming and picture-sign matching paradigms. Overall, the results reveal neural consequences for grounding language in the body that may only occur under certain circumstances (i.e., when visual features of a picture map to iconic features of a sign).

Fingers on the face: Towards an interactional typology of fingerspelling

Ryan Fan

Thursday, 1.39

Fingerspelling systems are commonly analyzed as a strategy for representing written language in the signed modality (Brentari 2001). Previous research also distinguishes between one-handed and two-handed systems (Cormier et al 2008). However, little attention has been paid to fingerspelling systems that encode spoken language phonemes or that employ the head in tandem with the hands. These latter systems may arise from cued speech or visual phonics, but they also sometimes become a naturalized part of deaf signed languages, as has been described for Danish and Iranian Sign Language (Padden & Gunsauls 2003; Sanjabi et al. 2016).

Drawing on existing descriptions of fingerspelling systems and my own data, I propose a typological framework for describing how a signer's hands can interact with the head and torso to encode written graphemes and spoken phonemes in the signed modality. The results suggest possible constraints on the cross-modal representational capacities of each articulator. Analysis of these affordances and limits can further our understanding of interaction between the signed, spoken, and written modalities.

(i)	Hand	Head
Phonemic		✓/✓
Graphemic	✓	

(ii)	Hand	Head
Ph.		✓
Gr.	✓	✓

(iii)	Hand	Head
Ph.	✓	✓
Gr.	(✓)	

(iv)	Hand	Head
Ph.	✓	
Gr.	✓	

Each fingerspelling system employs one or more of the following four strategies:
(i) Hand as Graphemic, Head as Phonemic: Italian Sign Language users may only fingerspell the initial letter of a word while simultaneously and obligatorily (✓) mouthing the entire word (Jepsen et al 2015). American Sign Language users may fingerspell entire words, with optional (✓) mouthing (Lucas & Valli 1992).

(ii) Hand and Head as Graphemic, (Head as Phonemic): Taiwan, Czech, Italian, and Hausa Sign Language users employ this strategy for some graphemes, and may optionally mouth the phonemes (Chen 2007; Sanjabi et al 2016; Jepsen et al 2015). Figure 1. Hand and Head as Graphemic

		
回 *hui* 'rotate'	H	CH digraph
Taiwan SL (Chen 2007)	Italian & Czech SL (Jepsen et al 2015)	Czech SL (Sanjabi et al 2016)

Figure 1. Hand and Head as Graphemic

(iii) Hand and Head as Phonemic, (Hand as Graphemic): In Egyptian and Iranian Sign Language, a signer combines a specified handshape with contact and movement on the nose, mouth, chin, neck, or chest to iconically represent the articulation of a spoken language phoneme (Deaf 2006; Sanjabi et al 2016). The phoneme [b] is encoded in Egyptian Sign Language by a flat hand tapping the lips. Some specified handshapes also encode corresponding graphemes, such as three fingers for the three dots of the letter ث in Farsi (Figure 2). As in (i) and (ii), the signer may mouth phonemes.

Figure 2. Hand and Head as Phonemic, (Hand as Graphemic)

(iv) Hand as Phonemic and Graphemic: Ethiopian Sign Language users encode graphemic consonant forms in handshape and graphemic-phonemic vowel information in movement (Moges 2011). Each grapheme in the Ethiopian (Ge’ez) syllabary consists of a base consonant and an affixed vowel grapheme. Vowels are attached at different heights and locations on consonants in the written modality, but signers consistently use the same movement to encode each spoken phonemic vowel in the signed modality.

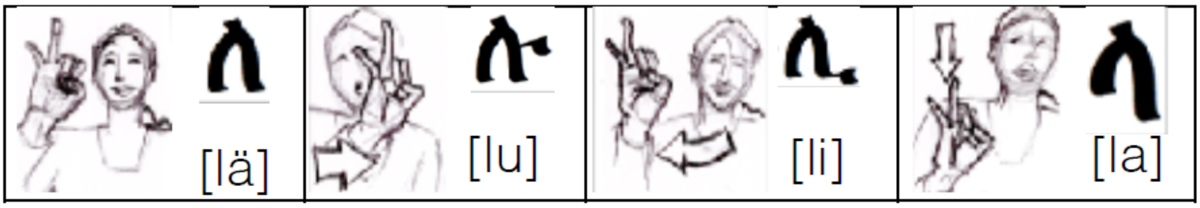

Figure 3. Hand as Phonemic and Graphemic (adapted from Moges 2011)

The prevalence of both Hand as Graphemic and Head as Phonemic suggests that each articulator plays a canonical role in the encoding of written and spoken language, respectively. It appears that the hand can convey phonemic information only if it already encodes graphemes, and the head can encode graphemes only by interacting with the hand. These interactions between articulators license a broader range of cross-modal representation, but they may still be subject to typological constraints.

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Sign language linguistics and sign language teaching: Realigning the two fields

Jordan Fenlon

Thursday, 10:00-11:00

In this presentation, I discuss how the field of sign language linguistics and sign language teaching are currently (mis)aligned and outline possible ways forward for the two fields following the increase in studies involving sign language corpora. Traditionally, linguists have sought to describe the range of linguistic structures in sign languages and to establish them as authentic languages that are distinct from spoken languages. These descriptions have sometimes been based on small samples of native signers using a range of methods (e.g., judgment, elicited, or semi spontaneous data). From this perspective, the similarities and differences between spoken and sign languages have much to contribute to our theoretical understanding of the world's languages (e.g., understanding language universals). However, compared to spoken languages, our understanding of the linguistics of sign languages remain in its infancy; this creates a problem for sign language teachers. Faced with a lack of materials to be mined for teaching purposes, sign language teachers may sometimes resort to using findings from sign language linguistics which have not always been conducted with the sign language classroom in mind. This, coupled with the use of the teachers' intuitions regarding sign language structure, inadvertently creates a challenge for the sign language student. In recent years, studies which have capitalised on larger datasets of semi-spontaneous signing such as corpora have yielded findings which challenge previous findings on smaller datasets. These studies are advantageous since they offer usage-based evidence (as well as frequency data) which are ideal for the teaching of sign languages. Incorporating these findings for sign language teaching is not straightforward however since these findings force us to confront ideologies in the sign language classroom. Integrating a usage-based approach in the classroom which (in future) capitalises on the availability of sign language corpora indicates a recommended way forward for sign language teachers.

Linguistic convergence of International Sign

Jordan Fenlon, Annelies Kusters & Adam Stone

Thursday, 12:30-13:00

What are the factors involved in linguistic convergence of International Sign (IS)? IS takes place when signers of different (sign) linguistic backgrounds come together; its use is variable and dependent on (1) the situational context in which it occurs and (2) the linguistic repertoires of its participants. However, the process by which signers converge on a shared variety is not well understood. This presentation aims to describe linguistic convergence of IS by focusing on a unique setting involving 17 deaf internationals living in a remote location in Denmark while participating in a 9-month deaf-led educational course known as Frontrunners, where IS is the language of instruction and socialisation. Here, we focus on both conventionalised and less conventionalised uses of IS: conventionalised IS is typically observed in formal settings (e.g., conferences or classrooms) where there is evidence of a shared lexicon; less conventionalised IS typically involves informal conversations between signers with limited experience in using conventionalised IS (but can occur in small-scale formal contexts such as classrooms as well). Importantly, at the beginning of the course, students who use unconventionalised IS do not always have extensive knowledge of relevant conventionalised uses. Over time, the students' use of IS while participating in Frontrunners could be expected to converge with other participants. To investigate this hypothesis, elicited and spontaneous linguistic data as well as ethnographic interview and focus group data was collected at two time periods: the first week of the 13th iteration of the Frontrunners program and towards the end of their nine-month stay. Additional comparable data was also collected from the 4 course instructors. By comparing data collected at the start and end of the Frontrunners course, we aim to better understand the factors that contribute to linguistic convergence of IS.

This presentation will draw on the elicited data to demonstrate the degree of convergence at the lexical level. 7 students and all instructors were filmed responding to a lexical elicitation task where they reported the IS sign they would use for 116 concepts presented to them in written English (English is also an official language of the course). A mixture of high frequency concepts (e.g., *have, girl, hearing, why, finish*) as well as specific concepts linked to recurring subject content of the Frontrunners course (e.g., *education, diversity, lecture, disabled*) were used. At both data points, students and instructors were asked to provide the sign that they would currently use with other Frontrunners (which could be different from signs they would use with deaf people in other international contexts). Our preliminary results indicate that (1) fewer unique variants were elicited at the end of the Frontrunners course thus indicating a greater degree of similarity amongst signers, (2) students appear to adopt the instructors' variants for specific concepts as the number of variants they shared with the instructors increased over time, and (3) while the number of ASL-associated signs decreased over time, the overall proportion of ASL-associated signs increased slightly. A closer analysis of each finding reveals that the patterns of convergence at the lexical level are not straightforward. For example, while fewer signs from the first data collection session were elicited in the second data collection session, new signs were elicited that were not produced by any signer in the first data collection session. In addition, there are cases where the instructors actively adopt previously unknown variants used by the students for some of the elicited concepts. These findings are discussed alongside corresponding interview data where students were directly asked to reflect on a change in their choice of a lexical variant in order to consider how language change may or may not reflect underlying language attitudes. For example, while the use of ASL-associated signs appear to be disfavoured, this attitude appears to be mostly towards specific lexical items that have become associated with overreliance on ASL; other ASL-associated signs not carrying a strong ideological baggage, however, continued to be used. We will also compare the results from the elicited data with the spontaneous and interview data to illustrate how much the two datasets align with one another. Differences between directly elicited and spontaneous use of specific concepts allow us to further explore underlying language attitudes towards specific signs. We conclude with a discussion of what these findings mean for an understanding of linguistic convergence over time in IS.

Handshape, movement, and geometry: Communicating shapes in sign languages

Casey Ferrara & Donna Jo Napoli

Thursday, 1.40

Representing shape information is a crucial skill in sign languages; It lays the foundation for several common tasks in signing, including physical descriptions, use of topographical space, and establishing fixed reference points to convey spatial or temporal relationships (Vogt-Svendsen & Bergman, 2007). Rendering shape is also essential to classifier predicates, such as size-and-shape specifiers which use a specified handshape and movement to trace the dimensions of an entity in signing space. Moreover, shape-based descriptions are the origin of many lexical items and may form the foundation for coining new lexical items (Wilcox, 2000). Despite this, little is known about whether the way shapes are signed arises out of linguistic conventions, geometric principles, biomechanical constraints, or some combination of the three.

Our work on the interaction of shape and iconic movement began by asking whether geometric properties of a shape predict whether it is signed using one moving hand or two. When looking at current frameworks used in ASL teaching curricula, it certainly appears so. For example, some texts label shapes as either *symmetrical* (traced with two hands), *asymmetrical*, or *linear* (both traced with one hand), as in Fig. 1 (Smith, Lentz, & Mikos, 2008; printed here with permission). Although it appears that the use of these labels is not coherent with their mathematical definitions (e.g., almost all of the shapes in Fig. 1 are, in fact, bilaterally symmetrical), these materials do seem to be grouping shapes based on mathematical concepts. To determine what geometric properties may actually be determining these distinctions, **Study 1** surveyed 17 deaf signers asking how they would sign each of 49 shapes, including both "standard" shapes (e.g. circles, rectangles) and "novel" shapes (that would be unfamiliar to the signer). A logistic regression revealed the strongest predictors of one-handed vs two-handed production were whether the shape has any curved edges (predicting one hand) and whether the shape is symmetrical across the Y-axis (predicting two hands). We then ran a second preliminary analysis to see if signs for which the movement path is iconic of the entity's shape would reveal the same predictors (**Study 2**). Sampling across four ASL dictionaries (aslpro.com, handspeak.com, signingsavvy.com, and spreadthesign.com) yielded a set of 137 distinct signs of this type, which upon analysis revealed the same predictors (Studies 1 and 2 are reported in Ferrara & Napoli, in press) establishing evidence for what we call the **Lexical Drawing Principle**. The redundancy of having two methods for drawing shapes enhances comprehensibility and resolves ambiguity just as grammatical redundancy in spoken languages does (Wit & Gillette, 1999). For example, it may be typical to reduce and round the corners of a rectangle when rapidly signing, making it confusable with an oval if not for the use of two moving hands– which disambiguates the two. The existence of two methods, then, is an example of the

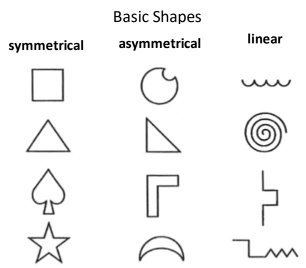

Figure1: Shape categories from Signing Naturally textbook

principle of Contrast Preservation (Łubowicz, 2003) and it is critical that we find it in sign languages, since it should appear in all natural languages.

Study 1 and 2 established a connection between shape of movement path and how many moving hands are likely to be used, and, significantly, the shape of all movement paths in the study were necessarily iconic of the shape of the entity they were conveying. That iconic movement paths and hands (in this case, number of hands) have a relationship, considered alongside importance of iconicity in sign language grammars, led us to next explore the possibility of a relationship between path and handshape where one or both are iconic. One way in which handshape may be iconic is assuming the shape of a drawing tool, with one or more points. Several have pointed out handshapes that draw perimeters of a shape (Collins-Ahlgren, 1990; Corazza, 1990), where the tips of the selected fingers are, in our terms, drawing tools. The data from our initial shapes survey revealed a wide array of these drawing-tool handshapes signers employed when tracing (in addition to the standard 1-handshape). From these data, three initial categories of drawing tools emerged: (1) “point-tip”, which included the 1, i, and flat-O handshapes, which are used as a point to draw lines, (2) “thick-tip”, which included B and flat-B handshapes, where the digits form a line, that is used to draw edges, and (3) “multiple-articulator”, which included baby-C and C handshapes, where the thumb and the finger(s) act as separate drawing tools. When we look again at the relationship between path and one versus two hands (Ferrara & Napoli, in press), now with these categories in mind, the correlation proves to be the strongest when an individual uses a point-tip handshape. To explore the role of handshape further, **Study 3** looked at 16 lexical items in which the movement path draws the shape of the signified object across 34 sign languages (using entries from spreadthesign.com). The use of handshapes here falls into two categories (where the multiple-articulator handshapes are no longer a cohesive group). (1) The *edge-drawing* group contains the 1, i, H, baby-C, 4, V, and 1-I handshapes. These form a natural phonological class in that only some of the fingers are selected. Here the tips of the selected fingers draw edges. (2) The *surface-drawing* group contains the 5, claw, C, O, and various B handshapes, also forming a natural phonological class in that all five digits are selected. Here the entire handshape is a surface drawing a three-dimensional object.

From the shape drawing data (Study 1) and the cross-linguistic lexical analysis (Study 3) we have arrived at three generalizations. (1) **The Dimension Principle**: *If path movement is iconic in that it draws (part of) the signified object, then edge-drawing handshapes should be used for two-dimensional objects, whereas surface-drawing handshapes should be used for three-dimensional objects.* This was shown in Study 3 to apply cross-linguistically. (2) The predictors of one versus two-handed drawing found in Study 1 and 2 pertain cross-linguistically, and hold more strongly with signs that use edge-drawing handshapes than with signs that use surface-drawing handshapes. (3) In arriving at the above generalizations, it was necessary to recognize that handshapes that draw (part of) the signified object of a sign fall into two types, edge-drawing and surface-drawing. These three findings show that there are sublexical correlations between handshape and path movement when we allow ourselves to consider iconicity with respect to phonological parameters.

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Regulating turn-taking with pointing actions in Norwegian Sign Language conversation

Lindsay Ferrara

Saturday, 15:00-15:30

Interlocutors participating in conversation collaborate with each other to coordinate their actions and talk. Research on spoken language conversations has shown that speakers can use interactionally-driven bodily gestures to regulate their interaction, in addition to speech. These gestures, which minimally take the form of the fingers(s) or palm(s) being oriented towards an interlocutor, are used for a variety of discourse functions. Four main functions relate to the delivery of information, citing previous contributions, seeking responses, and managing turns (see Bavelas et al., 1992, 1994; and also Mondada, 2007). These types of interactive gestures enable speakers to index aspects of the discourse itself and contribute to the coordination of the emerging conversation.

In the current study, pointing actions which serve interactive functions are examined in signed language conversations. Studies of pointing in signed languages have largely focused on referential functions, as signers frequently point to reference themselves and others, as well as visible and invisible referents (e.g., Meier, 1990; Liddell, 2003; Barberà & Zwets, 2013; Johnston, 2013; Cormier Schembri, & Woll, 2013). However, the potential interactive functions of pointing actions have received less focus (but are acknowledged in e.g., Baker, 1977; van Herreweghe 2002). To address this research gap, all finger-pointing actions observed in a corpus of more than three hours of Norwegian Sign Language multiparty conversations (between two and five participants) were identified. Over 400 tokens of pointing actions serving interactive functions were then re-visited and examined for their contribution to turn-taking. Preliminary work on these tokens suggests that Norwegian signers use pointing not only to give and take turns, but also to help keep track of the current signer.

An example of such pointing actions is presented in Figure 1 (and is glossed as POINT-INT). Signer C has been talking about the social pressures around using signed language. He sees that Signer A wants to comment (signaled through Signer A's repetition of the sign BUT). To help facilitate a turn shift, Signer C points to Signer A. In this way, he tells Signer B that she must shift her attention from him to Signer A. Once Signer A receives both Signer B and C's gaze, Signer A begins his comment (not illustrated in the Figure).

Figure 1. A pointing action used to direct a participant's attention to the new current signer (Ferrara & Bø, 2015, P-BO1_V.mp4, 0:15:21.8).

A micro-analysis of these types of points and other concurrent indexical actions such as eye gaze reveal how signers coordinate turn-taking in signed language interactions by actively directing each other's visual attention. These types of pointing actions highlight the indexical nature of turn-taking in signed language and are one strategy signers use to mutually orientate to each other and coordinate conversation.

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Regularities in a corpus of spontaneous sign language writing, and a comparison to writing systems

Michael Filhol

Thursday, 1.41

The long-term motivation here is to equip Sign Language (SL) with software and foster implementation as available tools for SL are paradoxically limited in such digital times. A particular goal is to enable manipulating signed contents in the way that every day software allows to process written text, in other words an editable and human-friendly representation to allow for actions like copy-pasting, searching, etc. This issue is functionally and conceptually linked to that of writing, which leads us to first study existing writing systems in use for vocal languages, and the proposals designed for SLs. We present the distinction between logography and phonography, and show how they mix in existing vocal language scripts. We also review the proposed systems for SL writing or typing, including the major SignWriting (Sutton, 2014) and HamNoSys (Hanke, 2004) but several lesser ones too, exhibiting their properties and comparing them with the former, on scales of linearity and iconicity for example.

Then, we present other encountered, more spontaneous uses of pen and paper aimed at SL representation by its users. Aside from designed systems, many SL users put their language in writing, e.g. for preparing a signed discourse or taking notes of one without the support of a second or dominant ("foreign") language. They take the form of 2D diagrams, involving mostly graphics with controlled relative positions and links depicted with lines and arrows. Unfortunately, these are all local or personal productions, usually intended for short-term use and discarded afterwards. Yet after looking at the few shared with us, we came to observe much more consistency and expressiveness than what even their own authors seemed willing to grant them. We hypothesise that many patterns can be found in these diagrams, and formalised.

To test the hypothesis, we have built a corpus of such diagrams, aligned with their signed equivalents, including various discourse genres and lengths, signer profiles and elicitation sources. In this submission, we summarise the methodology used to collect the corpus, and the resulting data. Figure 1 shows an example of a page representing a 30 second long utterance in SL.

Consistent patterns emerge in the associations made between a graphical form and a meaning (or interpretation), both across diagrams of the same person and across signers for the same feature. These include colour changes (when available) or separation bars for a focused event in a set up context, the projection of spatial constructs on the 2d plane, equal signs ('='), anaphoric reuse, and more. We explain these recurrent features, giving examples for each, and compare the general properties observed in the diagrams to those of writing systems and representations of SL. For example, the unbalanced mix of logography and phonography present in all written language scripts is observable here too, which is contrary to every SL writing system put forward so far. On the other hand many of those SL propositions are iconic of what they encode, which is overwhelmingly true in diagrams too, and mostly contrary to written language scripts.

We propose that such regularities should not be ignored if so spontaneously produced by native and professional speakers of the language. They should instead inspire the design of writing systems and scripts integrated to future SL-enabling software. We conclude the presentation by showing a proposition implementing this recommendation, and in what way it would easily be integrated to editing software.

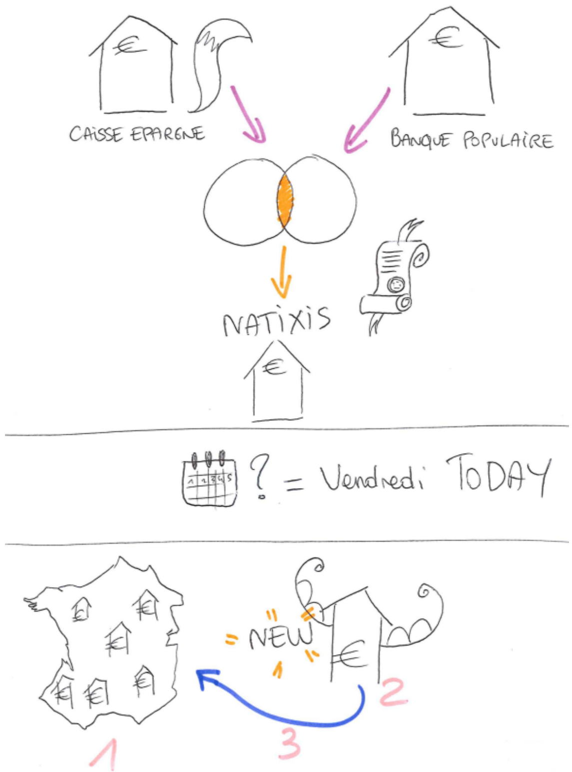

Figure 1: Diagram page capturing 30 s of SL

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The role of early sign language exposure and deafness on visual orienting and disengagement

Allison Fitch & Sudha Arunachalam

Thursday, 1.42

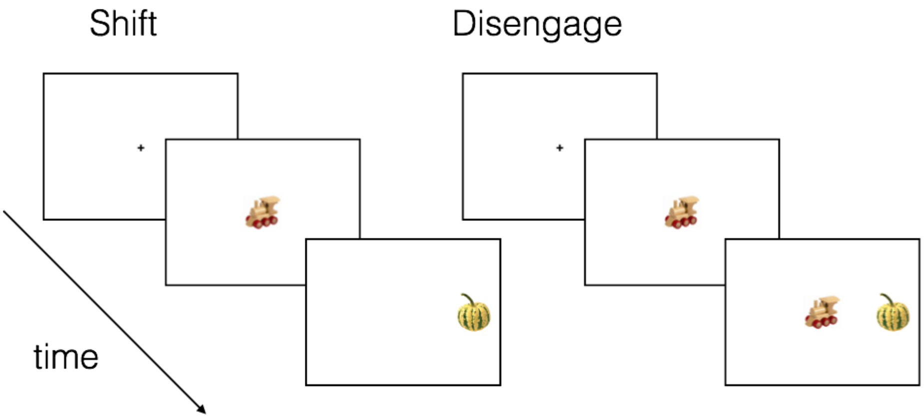
There are many attested cases of deaf individuals demonstrating superior visual abilities relative to hearing individuals. One such case is that of spatial orienting and disengagement—deaf participants are quicker to make eye movements toward peripheral stimuli than hearing participants [1, 2]. Although several researchers have hypothesized that this advantage might be due to early sign language exposure, findings suggest that it is deafness, and not language that promotes quick eye movements [2]. However, these findings assess only top-down attentional orienting, in which stimuli are voluntarily and selectively attended to [3]. Bottom-up attentional orienting, on the other hand, is an involuntary process in which attention is automatically captured by the stimulus. Visual language exposure provides an environment rich in bottom-up cues including visual attention-getting (e.g. waving) and signing in the visual field. Accessing this linguistic environment early may "train" the underlying visual attention system that supports spatial orienting as it develops. To test this, we conducted a bottom-up orienting task (Gap-Overlap Paradigm; adapted from [4]) to determine the role of early sign experience and deafness on spatial orienting and disengagement.

Thirty-two adults (of a planned 48) from three groups participated: Deaf native ASL signers (DN, n = 16), Deaf signers who were late acquirers of ASL (DL, n = 7), and hearing non-signers (n = 9). Orienting and disengagement were measured by comparing saccadic reaction times (SRT) to peripheral stimuli in trials that did and did not require disengagement from a central stimulus. Participants sat ~55cm from a freestanding eye-tracker and free-viewed a series of 240 trials. Each trial began with a fixation cross at the center of the screen, and was replaced by a central stimulus, followed by a peripheral stimulus on the left or right of the screen 500 to 1500 ms later. In **Shift** trials, the central stimulus disappeared 200 ms prior to the onset of the peripheral stimulus. **Disengage** trials were the same, except the central stimulus remained in the center of the screen throughout the duration of the trial. Participants thus needed to disengage their attention from the central stimulus before orienting to the peripheral stimulus. Stimuli were 120 color photographs (200x200 pixels) of people or common objects.

In-line with prior research, participants were slower to orient to the peripheral stimulus on Disengage, relative to Shift trials, $F(1,29) = 21.9$, $p < .001$. Group-level differences did not reach statistical significance, $F(2,29) = 2.34$, $p = .114$. Additionally, there were no interactions between group and trial type. However, planned comparisons demonstrated that DN signers were marginally faster than DL signers at both Shift [$t(7.34) = -1.94$, $p = .09$] and Disengage [$t(10.51) = -1.98$, $p = .07$] trials. DN signers were statistically indistinguishable from the hearing non-signers on both trial types (Shift: $p = .53$, Disengage: $p = .50$). For the Deaf participants, age of ASL acquisition was related to Shift SRT ($r = .523$, $p = .01$), but not Disengage SRT ($r = .313$, $p = .15$).

Taken together, preliminary findings suggest that early acquisition of language in general, and not the modality of that language promotes orienting in a bottom-up attention task. This differs from the literature on top-down attention, in which deaf individuals are faster than hearing regardless of language experience. The exact role early language acquisition plays in gaze shifting remains to be tested. However, we suggest that early language acquisition may be a proxy for experience in high-quality joint attention interactions, which is reduced for DL signers [5]. Regardless of modality, joint attention is rich in gaze cues, which are bottom-up and involuntarily capture attention [6]. This early experience with bottom-up cues may be sufficient to "train" the underlying visual attention mechanisms that promote orienting. These findings add to an ever-growing body of work underscoring the importance of early language acquisition for deaf children, demonstrating its effect on a low-level visual attention mechanism.

Figure 1. Schematic of trials (adapted from Fischer et al., 2016)



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Metalinguistic awareness in sign language: A study on mouth actions

Sabina Fontana & Claudio Ferrara

Saturday, 11:30-12:00

In recent years much research has contributed to the description of Sign language structure, its acquisition and learning. Although metalinguistic awareness (MLA) is very much discussed in Sign language research (Morgan G., 2006; Rathmann *et al*., 2007; Kaul et al., 2014; Rinaldi et al., 2016; Sze, Tang, 2016), factors such as perception and usage are rarely taken into account. In highly standardized spoken languages, metalinguistic awareness means to have an explicit knowledge about the structural features of a certain language and to have a degree of awareness of the linguistic aspects of a language (Pinto & Candilera 2000; El Euch & Huot 2015). Generally, MLA is said to be strongly interconnected to literacy or to the presence of writing systems. Can be said the same for sign languages? To what degree are signers aware of their sign language structures? Deaf children do not happen to acquire/learn sign language very often through institutional teaching and they do not really have the opportunity of thinking about their language as hearing children do. MLA of sign language can be influenced by grammatical categories drawn from spoken languages giving the fact that deaf children are educated to spoken language literacy. Sign language communities are experiencing a paradox: on the one hand Deaf signers access sign language at different ages depending on their family background school and education. On the other hand, the community have developped grammars, vocabularies and descriptions of what they think is their own sign language, showing a certain degree of MLA even in absence of a shared writing system. However, some non manual components of sign language such as mouth actions seem to be quite controversial in their role and this is proved by the fact that they are not systematically included in sign language teaching as other features do.

Starting from a conceptual framework for studying metalinguistic awareness (Fontana, 2016), the aim of the present paper is to explore the degree of MLA of mouth actions in adult signers. Mouth actions include all the phenomena involving the use of the mouth in conjunction with manual signing (Boyes Braem and Sutton-Spence, 2001). Such conceptual framework is based on the following factors: 1) the nature of language transmission 2) the presence of a form which allows a later analysis (a video versus a written form) 3) the status and official recognition of the language 4) the development of a norm. A total sample of twenty participants was recruited, composed of early signers with a different age range (20-40 and 40-80). They watched two different versions of three video recording where a deaf sign language lecturer uses different registers of sign language in three communicative events and specifically: a Sign language teaching setting; a storytelling; a video to inform about an event. The videos have been designed for the purpose of eliciting the threshold of acceptable linguistic behavior in the usage of mouth actions and to enhance metalinguistic analysis. Participants were asked to fill a comprehension test which verified their understanding of the video and to answer some questions concerning the signing style of the lecturer. Data show that the threshold of acceptable linguistic behavior is different in the two groups and a different status of mouth actions is connected to the perception of the language status and the formality/informality of the communicative event, which is strongly influenced by the age variable. Results highlights that people without any formal training on sign language structure, display epilinguistic awareness based on an appropriateness criteria developed through usage (Ducard, 2015) rather than MLA and that are able to judge the acceptability/ inacceptability of certain structure with or without mouth actions. Since MLA seems to be shaped by different sociolinguistic factors, in order to develop any sign language assessment we need to take into account such factors and to develop a dynamic concept of awareness.

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Towards a user-friendly tool for automated sign annotation: Identification and annotation of time slots and number of hands

Manolis Fragkiadakis & Victoria A. S. Nyst

Thursday, 1.43

I. INTRODUCTION

This study is part of a project aiming at the creation of a tool to automatize part of the annotation process of sign language data. This poster presents the framework for that tool, and the implementation of two functionalities: the detection of 1) signing vs. non-signing, and 2) the number of hands involved.

Recent developments in the field of sign language recognition illustrate the advantages of machine and deep learning for tasks related to recognition and classification [1]–[3]. Nevertheless, current approaches are restricted in various ways, limiting their applicability in current sign language research. Thus, training such networks requires vast amount of data as well as adequate computational power. Furthermore, they do not generalize well in other sign languages.

Additionally, current approaches in sign language automatic annotation need manual annotation of the hands and body joints for the training of the recognizer models [4], [5]. Moreover, the application of color and motion detection algorithms [6] as feature extraction methods can be susceptible to errors and possibly skin color bias. Finally, several hand tracking models only work on a particular type of recordings, e.g. a signer wearing gloves, or recordings made with Microsoft's Kinect [3]. As a result, these models are not usable for the majority of the existing sign language corpora.

OpenPose [7] is the state-of-the-art framework when it comes to accurately detecting human body and hands key-points and, thus, has been used in this study. Trained in over 100K images of various person instances reduces significantly the skin color bias. The system developed in this study receives as inputs the various positions of the arms and the head extracted by the pose estimation framework for 7 consecutive frames. Subsequently, it predicts, firstly whether the person is signing and secondly, whether the signing sequence is one- or two-handed. The output is then imported in ELAN [8][9] where empty time slots are automatically generated for glossing.

The combination of the pre-trained pose estimation framework as well as the machine and deep learning architectures provides a robust approach to handedness classification. Current model can be used in any corpus independently of its quality and length.

II. METHODOLOGY

For the identification of signing time slots a dataset of 7800 frames (352 by 288 pixels) has been compiled from the Malian Sign Language corpus [10]. The apparent noise and the low quality of the videos pose an additional challenge on the recognition and classification task. Using this dataset various machine learning classifiers (SVM, Random Forest, XGBoost) have been tested.

Regarding the handedness parameter, using the signing time slot predictor in the previous step, 294 videos have been extracted and labeled as one- or two-handed sequences. Using a sliding window technique, 7 consecutive frames have been obtained from each video sequence resulting in a training set of 1094 frames and a test set of 200 frames. Performance was measured using the metric of Area Under the Receiver Operating Characteristics (AUROC).

III. RESULTS

An XGBoost classifier showed the highest AUC score (0.92) when it comes to accurately predicting whether a person is signing or not.

Subsequently, an LSTM layer with 256 cells (activation:"Relu" and dropout rate: 0.2), followed by two Dense layers of 7 and 1 neuron respectively, has been trained for 64 epochs to recognize the handedness parameter of the signing sequence presented in each video example resulting in 0.89 AUC.

By employing the PyMpi python library [11], the predictions are parsed into annotations directly to ELAN using a sliding window technique.

However, one downside regarding our methodology is that since we are utilizing only a number of extracted features from the videos (namely hands and head positions) it is not possible to account for particular sign identification. Nevertheless, when the handedness parameter is drastically changed from one sequence to another, the tools are able to distinguish the different sign boundaries.

IV. CONCLUSIONS

In this study, the use of a machine learning classifier (namely XGBoost) and an LSTM network for automatic annotation of one- and two-handed signing sequences has been investigated. This research provides the framework for a new tool to annotate sign language corpora. This tool is developed such that it maximally user-friendly, lifting current limitations on automated sign identification, including quality, physical features of the signers, and the sign language presented. Ongoing research is geared towards adding to the tool the automated detection of handshape, movement and location.

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Implicit causality and thematic roles in ASL: A norming study of 239 implicit causality verbs

Anne Therese Frederiksen & Rachel I. Mayberry

Thursday, 1.44

Background. Cross-linguistic research has shown that verb semantics, including thematic roles, predicts implicit causality (IC) bias, with stimulus-experiencer (SE) verbs eliciting NP1-biases (e.g. Lisa inspires Tony, because she is a gifted artist), experiencer-stimulus (ES) verbs eliciting NP2-biases (e.g. Lisa likes Tony, because he is a gifted artist), etc. (Rudolph & Försterling, 1997; Ferstl et al, 2011, Hartshorne & Snedeker, 2012). However, SE verbs are assumed not to exist in sign languages (Kegl, 1990; Meir et al, 2007; Oomen 2017), either because they are used as one-place predicates (Edge & Herrmann, 1977), or because they are interpreted as ES verbs (Winston, 2013). This begs the question of how IC biases in sign languages are distributed, as the strongest and most consistent subject-biases in documented spoken languages are found in SE verbs (Goikoetxea et al., 2008; Ferstl et al., 2011). A lack of SE verbs would imply a different relationship between thematic roles and biases, or a different distribution of IC verbs in signed compared to spoken languages.

Present Study. As the first of its kind, the present paper provides norming results for IC biases in a large number of American Sign Language (ASL) verbs. We used a sentence completion paradigm to test verb biases. After using a small-scale acceptability study to determine a large number of verbs that can be used as transitives in ASL, we asked eight Deaf native signers to complete sentence fragments (N=239) of the type 'NP V NP WHY?', *'NP V NP, because ...'*. Subsequently, their responses were coded by a native signer for whether the subject or object from the fragment was re-mentioned as the subject in their continuation. A second coder independently coded 50% of the data (inter-coder agreement was Kappa = 0.916). 213 verbs remained after exclusion of 26 verbs for eliciting subject/object reference in less than half the trials.

Results. We calculated a bias score for each verb by dividing the number of object continuations by the total number of subject plus object continuations. 41% verbs (N=88) were biased towards the subject, 54% towards the object (N=116), and four percent of the verbs (N=9) towards neither subject nor object (Figure 1). Next, we identified the verbs (N=39) whose translation equivalents have generally been categorized as SE verbs in spoken languages (e.g. *frustrate, embarrass, disappoint*), and analyzed how thematic roles were lexicalized in these verbs in our sample (see Example 1). This analysis revealed that although half of these verbs (N=20) had SE structure in the majority of the signers' productions, nearly a third of the verbs (N=12) were used with ES structure instead. Looking at how thematic roles correlated with verb bias, we found that the majority of verbs with ES structure were object-biased (9/12), and the majority of SE verbs were subject-biased (14/20). Thus, because many verbs that have SE structure in spoken languages have ES structure in ASL, SE verbs appear to be more infrequent in ASL. However, just like in spoken languages, thematic role predicts the direction of the implicit causality bias in ASL

Conclusion. The present study provides norming results for implicit causality biases in 239 ASL verbs. These results form the basis for future psycholinguistic studies of ASL. We show that there is a relatively low occurrence of IC verbs with subject-bias in ASL, compared to those with object-bias in our norming data, something that researchers should take into account in designing experimental studies in ASL. We further show that thematic role predicts IC bias in (at least one) signed language as well as spoken language, suggesting that this principle is universal across not only language (Hartshorne et al., 2013) but also modality. Our results do not support previous claims that the stimulus-experiencer category does not exist in ASL; rather, many potential SE verbs are in fact accepted as transitives, but vary in whether they are interpreted as SE or ES verbs.

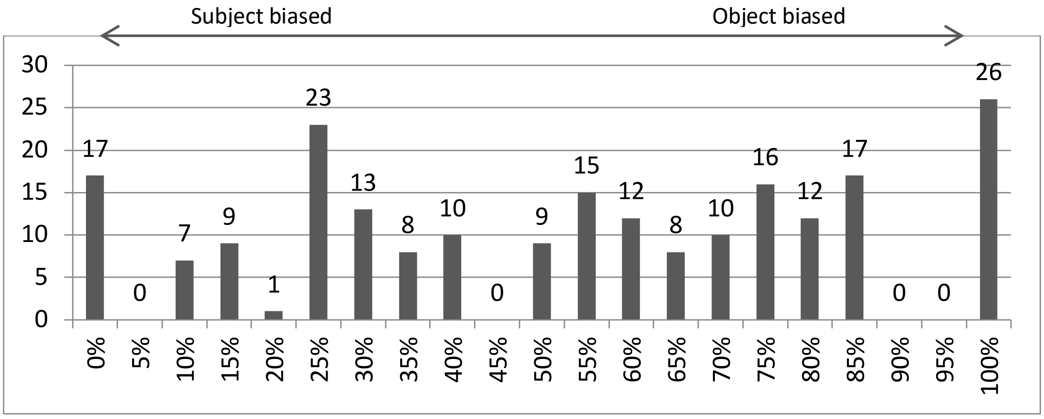

Figure 1. Histogram of object bias in the verbs

1) #DANA ANNOY #JADE WHY? #JADE ALWAYS COMPLAIN. ANNOY
‘Dana is annoyed with Jade, because Jade always complains. [Dana is] annoyed’

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Multimodal motherese in Israeli Sign Language (ISL)

Orit Fuks

Thursday, 1.45

When adults interact with infants they tend, often unknowingly, to modify not only their speech but also their movements (Brand, Baldwin & Ashburn, 2002) and their gestural input (Iverson et al., 1999). Papousek and Papousek (1987) named this tendency 'intuitive parenting'. Recent studies show that parents even recruit iconicity to facilitate word learning and communication with young children (Imai et al., 2008; Perry et al., 2017).

Deaf parents also make their signed input to infants' salient by using large movements, holding the signed forms longer than usual, increasing the repetitiveness of signing, producing the forms slowly and displacing the production of the form away from the normal position (Masataka, 1992).

And yet, most studies till now on motherese in signed languages have focused mainly on phonetic modifications applied on the manual lexical forms without any special reference to the abundant iconicity in these languages: that is, whether deaf parents exploit form iconicity to enhance the transparency of form-meaning connections.

A longitudinal case study followed two hearing children's bimodal bilingual acquisition of ISL and Hebrew from the age of 10 to 40 months. Once every two months we analyzed the communicative input the mothers directed to their infants. The observed sessions were grouped into 4 timeframe groups according to the timetable of the children's early language development. Each modified token of content form was further coded as belonging to one of two categories according to the type of modification performed: modified non iconic production (i.e., repetition, lengthening etc.) and exaggeratedly modified iconic production (i.e., pantomimic signing). Additionally, 514 types of content forms produced by the deaf mothers were coded as being iconic or non-iconic by 3 non-signer volunteers.

The token analysis shows that the deaf mothers alternated between two styles of infant-directed signing, each of which was more prominent in different periods of the infants' early signed language acquisition.

Style 1: modified non-iconic production: This was employed by both mothers more frequently at the beginning of the one-word period than in other periods of early signed language acquisition (Tables 1 & 2). The non-iconic phonetic modifications seem to be employed mainly to enhance the 'visibility' of the signed forms and infant's attention to the communicative input.

Style 2: modified exaggerated iconic production: This involved lexical forms produced with mostly with larger movements simultaneously with unspecified corporal, mouth and vocal iconic gestural actions. This style of infant-directed signing was employed by the mothers more frequently during the mid-one-word period (i.e., when the infants seemed to be more engaged in signed-words learning) than in other periods (Tables 1 & 2). Exaggeratedly modified iconic productions were accompanied by additional communicative actions indicating that the intention of the deaf mothers was indeed to enhance and explicate the iconic base of the form.

The results of the study further show that the rate of iconic forms that underwent exaggerated iconic modification was significantly higher than of non-iconic forms. On the other hand, no statistical difference was found in the rate of iconic and non-iconic forms modified non-iconically. Still, in line with previous studies (Perniss et al., 2017) the results show that overall modifications in general (iconic and non-iconic altogether) were applied significantly more on iconic forms than on non-iconic forms.

The findings support the 'facilitative interaction hypothesis' argument which claims that motherese is not only perceived by caregivers as scaffolding for language learning, but also that caregivers actually change the scaffolding they think is useful for infants' learning over the course of language development. They show that in signed languages motherese is also a multimodal phenomenon (i.e., combining simultaneously vocal, mouth, bodily and manual actions): parents are sensitive to the abundant iconicity in their language and use it to boost language development. Indeed, our data indicate that 'revitalization' of the iconic basis of the forms facilitates vocabulary development, allowing infants to establish links to the more conventional version of the forms.

Table 1: Mean percentage and standard deviation of each type of modification within each timeframe group in the study

Yael's mother

Timeframe groups	**Non-iconic modifications**		**Exaggeratedly iconic modifications**	
(By Infant's age)	**M**	**SD**	**M**	**SD**
10-14 months	33.15	17.04	8.61	4.73
16-20 months	8.70	4.03	24.88	5.36
22-26 months	3.02	1.90	10.35	8.50
28-32 months	.00	.00	4.88	2.51

Table 2: Mean percentage and standard deviation of each type of modification in each timeframe group in the study

Ziv's mother

Timeframe groups	**Non-iconic modifications**		**Exaggeratedly iconic modifications**	
(By Infant's age)	M	SD	M	SD
10-14 months	29.07	7.63	13.37	3.79
16-20 months	9.66	.61	22.37	5.20
22-26 months	2.04	3.54	6.28	3.71
28-32 months	.31	.54	1.65	1.02

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The uses of PALM-UP in interpreted French and LSFB productions

Sílvia Gabarró-López

Thursday, 1.46

Most signers and speakers of Western signed and spoken languages use PALM-UP when they communicate, either in the signing flow or as a co-speech gesture while talking. PALM-UP is articulated with a rotation of the wrist(s) and fingers loosely extended with the palm(s) facing upwards, as in Figure 1. This form has been studied in some signed and spoken languages by analysing how deaf signers and hearing (non-signing) speakers use it in their interactions (see Gabarró-López (2017) for a summary). However, existing descriptions are not fine-grained and quantitative corpus studies are still scarce (Cooperrider et al. 2018). Furthermore, as these authors point out, our knowledge of PALM-UP is sketchy and cross-linguistic corpus-based studies in which the same analytic criteria are used are needed in order to distinguish language-specific meanings from shared meanings.

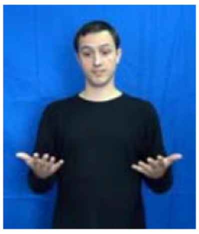

Figure 1. PALM-UP

This paper aims to contribute to the still partial understanding of PALM-UP by investigating it from a novel perspective; that is, the use of this form in interpreted French > LSFB (French Belgian Sign Language) and LSFB > French productions. For this purpose, a sample was extracted from a comparable parallel corpus of multimodal productions (Gabarró-López forth.). On the one hand, the dataset is parallel because it contains signed and spoken dialogues which were interpreted into the language of the other modality. On the other hand, the dataset is comparable because the source dialogues have the same communicative functions and were recorded under the same conditions. The source dialogues (two conversations about a past memory and two conversations about culture) were selected from the LSFB Corpus (Meurant 2015) and the FRAPé (spoken French multimodal) Corpus (Lepeut et al. forth.), which are made up of dialogues guided by a moderator and recorded in a studio. The four conversations were interpreted by all participants, who were also video recorded in the same studio.

The participants are four last year students of the master’s degree in LSFB interpreting. This choice was motivated by the situation of LSFB interpreters in Frenchspeaking Belgium, who had not received formal official training in LSFB interpreting until the start of the university degree in 2014. Therefore, there are many people working as LSFB interpreters without the necessary skills. Taking last year students ensured that productions were comparable because the four students have received the same training and they have attained a minimum of skills in interpreting. The four subjects were selected from a group of six students (who will constitute the first class of graduated LSFB interpreters) seeking a balance in terms of profile; that is, two of them had previously worked as LSFB interpreters (I002 and I006), whereas the other two had not (I001 and I003). All of them are French L1 speakers (Belgian variety) and LSFB L2 signers. The sample lasts for 1 hour 30 minutes and the functions of PALM-UP were annotated in ELAN using a multimodal protocol for the annotation of pragmatic gestures (Bolly & Crible 2015).

The objectives of this paper are threefold: (i) to examine the functions of PALM-UP in French and LSFB interpreted data, (ii) to compare the functions found in interpreted productions of the two languages, and (iii) to study intra-personal and inter-personal differences and similarities in the dataset. So far, 37 minutes of data have been analysed. There are 153 PALM-UP tokens, 85 in French and 68 in LSFB. PALM-UP is more polyfunctional in French (18 functions) than in LSFB (15 functions). Of the 11 functions which are shared between the two languages, parsing functions (i.e. planning upcoming speech/signing and punctuating discourse) are the most frequent. While PALM-UP frequently signals modal functions (i.e. expressing the speaker's degree of certainty, possibility, or hypotheticality) in LSFB, it usually signals rhetorical functions (i.e. adding information at the metadiscursive level) in French.

There is variation in the use of PALM-UP among interpreters (see Figure 2). All of them produced this form in their interpreted French and LSFB productions (except for I002, who produced no PALM-UP tokens in French). I001 stands out as the most different participant of the sample because of the high number of PALM-UP tokens used as co-speech gesture in French, which may indicate that she uses this form as a support for her spoken productions. She also produced the lowest number of PALM-UP tokens in LSFB.

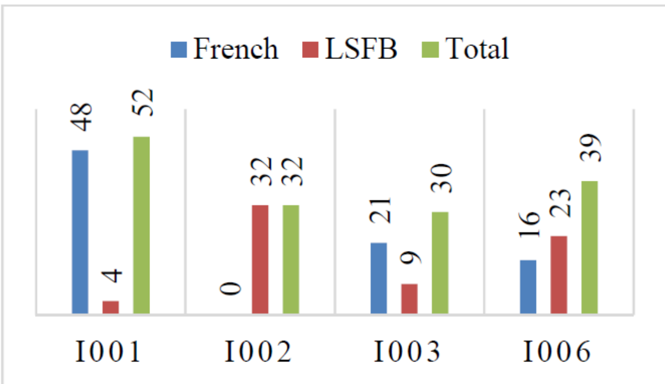

Figure 2. Distribution of PALM-UP per participant

As for LSFB, I002 and I006 (who had previously worked as LSFB interpreters) produced the highest number of PALM-UP tokens. This suggests that experienced interpreters may use more PALM-UP tokens in order to make their productions more fluent or deaf-like, which is in line with the high frequency of use of this form in LSFB dialogues (PALM-UP is the fifth most common ID-gloss in the LSFB Corpus). In contrast, a higher frequency of use of PALM-UP in interpreted spoken productions may be due to lower interpreting skills and fluency in French (see the higher number of

PALM-UP tokens in French as compared to the number in LSFB produced by I001 and I003, i.e. non-experienced interpreters).

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The influence of same-age peers on language emergence

Deanne Gagne, Ann Senghas & Marie Coppola

Saturday, 12:00-12:30

Video abstract:

https://youtu.be/Vfo0SXGOzzI

Impersonal human reference in French Sign Language (LSF)

Brigitte Garcia, Marie-Anne Sallandre, Marie-Thérèse L'Huillier & Hatice Aksen

Thursday, 1.47

The study that we will present is a first systematic approach to the expression of the impersonal human reference in French sign language (LSF). It extends and deepens a prior study carried out by the authors on the basis of a large scale discourse corpus (L'Huillier et al 2016). The description proposed here is based primarily on data elicited through a specialised questionnaire on impersonal human reference ('TypoImp questionnaire',see Barberà & Cabredo-Hofherr 2018), initially developed for spoken languages (SpLs) and adapted for sign languages (SLs). The strategies revealed are compared with those discussed in our prior study.

We will begin with a brief review of the literature on impersonal human reference in SpLs and SLs, and a presentation of our theoretical framework for the analysis of LSF, the 'Semiological Model' (e.g. Garcia & Sallandre 2014). We will then elaborate on our methodology and more specifically the issues raised by the elicitation protocol adopted, from initial stages of its preparation to the representation of our data. Overall our analysis concerns two sets of data: (i) sentences elicited via the TypoImp questionnaire; the protocol offers 13 major contexts which are likely to generate utterances with impersonal human reference; the stimulus sentences were initially presented in written French to two Deaf signers (one woman, one man); (ii) naturalistic data extracted from various existing corpora of LSF discourse: Creagest (Garcia & L'Huillier 2012) and LS-Colin (Cuxac et al. 2002); the samples we considered come from the productions of seven signers.

We will next present and discuss our main results. Our data exhibit the structuring character of the existential/universal (unrestricted) opposition in LSF; the first tend to occur with overt agent marking, while the preferred strategy in the latter appears to be null subject. There is also a clear contrast in existential contexts, between a singular agent (marked by ONE (SOMEONE) and those that evoke a non-singular agent or a vague plurality (marked by IX3pl). However, the existential vs. universal opposition must be nuanced. First, existentials with a generalizing / habitual predication clearly involve the idiomatic sign PI, which is a strong habitual/typicality marker in LSF. A central feature of this marker seems to be the exclusion of an overt impersonal agentive subject. Second, the null subject strategy, the preferred strategy in unrestricted universals, seems to be a possible alternative in most contexts, existential or universals.

Our elicited data also confirmed an observation made in our previous discourse corpus study, namely: the highest degree of impersonality (in unrestricted universals) is expressed in LSF through subject ellipsis without any spatial anchoring for the lexical sequence of the utterance.

In addition, we have identified two particularly interesting impersonal markers used in universal contexts: the 2nd person pronoun and the "instructional personal transfer"

("Transfert personnel prescriptif", Sallandre 2003). The instructional personal transfer, rare in our elicited data, is prevalent in our discourse corpora, and appears to be restricted to specific semantic contexts—the presentation of a sequence of instructions, a manufacturing process or a recipe. As other languages, LSF uses specific forms for cooking recipes. Instructional personal transfer seems to be one of these possible forms. We will suggest to relate this specific type of personal transfer to the impersonal 2nd person used in some SpLs, particularly in their oral (non-written) form.

Another significant point that must be addressed is the use of the upper area of the frontal plane as a marker of impersonal human reference in LSF. We note that this location has been identified as a central impersonal marker in Catalan sign language (LSC), which echoes past observations with respect to LSF (Cuxac 2000). It should be noted, first, that the relevance of this high ipsilateral zone was noted in our discourse corpus study, where we identified it as the starting point of agreement verbs such as SAY or GIVE used to indicate an undefined/impersonal human agent (commonly translated by French *on*). We must stress the importance of the 'high zone' marker in LSF for constructions of this type (indefinite agent with directional verbs). Secondly, the upper area associated to the IX3pl marker in existentials with vague plurality clearly conveys the low referentiality of the agent.

Finally, we will be discussing an issue with respect to the null subject strategy. At this stage, we can offer one hypothesis, which requires further research. We have observed that the null subject strategy is an available option in almost all contexts tested by the questionnaire. We noted that, in the vast majority of cases, the target sentences could be translated to French with the pronoun *on*. This pattern corresponds to analyses of French *on*, namely that it covers all impersonal uses identified so far in SpLs (see Gast & van der Auwera 2013). As such, it seems reasonable to hypothesise that the null subject in LSF is the closest equivalent to French *on*, and not the circular pointing forms (annotated IX3pl for lack of a better gloss), although the latter would appear close to French *on* in some of its values. In our analysis of the IX3pl marker, we have raised the possibility, also left for future research, that it may be equivalent to the 3pl-IMP markers (i.e. impersonal use of the 3rd person plural personal pronoun) described in the literature on SpLs, or that it is a marker unique to LSF.

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Laying the groundwork for a comparative approach to the study of European Sign Languages: The international research network EURASIGN

Brigitte Garcia & Carolina Plaza-Pust (in collaboration with the EURASIGN network team[1])

Saturday, 3.04

Over the last decades, linguistic research on SLs has expanded and diversified, leading also to an increasing interest in comparative and typological approaches. Thus far, however, studies undertaken from an explicitly typological approach have concentrated on comparisons of Western with non-Western, and frequently non-institutionalised, SLs. While the study of non-Western and 'village' SLs will undoubtedly contribute much to our understanding of variation across SLs, most significantly with regard to the impact of the cultural environment on SL structure (see Hansen 2015), a systematic comparison of institutional SLs is needed to determine commonalities and differences between these languages.

In Europe, home to several unrelated SLs, a fine-grained systematic comparison based on large-scale corpora is only beginning (for possible reasons for this situation, see among others Vermeerbergen 2006, Slobin 2008). Several comparative corpus studies have been carried out in recent years, but these were frequently limited to the comparison of two SLs, focusing on selected phenomena, mostly from a common theoretical perspective (among others: Garcia & Meurant 2010 on LSF/LSFB; Notarrigo et al. 2016 on LSFB/VGT). Comparative studies involving more than two European SLs are quite rare and even more recent and they are all based on the same theoretical original framework (e.g. Sallandre et al. 2016; Förster et al. 2016). By assumption, the diversity of approaches adopted and methodologies used by SL researchers in European countries has acted as a major hindrance to a broader comparison, and, hence, dissemination of the knowledge gathered. In particular, approaches differ regarding the role attributed to iconicity and the use of space in discourse. This situation raises the question of whether a framework could elaborated that would allow for an integration of the knowledge gathered, paving the way also for a comparison of European SLs.

Against this backdrop, the recently launched international research network EURASIGN (2018-2022) seeks to set the basis for the exchange and collaboration needed for such an approach. It brings together representatives of different schools of thought, that is, formalist (either or not generativist) and functionalist approaches (including the French semiological model, see Garcia & Sallandre 2014).

In this paper, it is our aim to present the basis, objectives and first insights obtained by EURASIGN. This network brings together researchers from nine European institutions

[1] Gemma Barberà (Universitat Pompeu Fabra), Claudia Becker (Humboldt-Universität zu Berlin), Olga Capirci (ISTC-CNR Roma), Laurence Meurant (Université de Namur), Victoria Nyst (Leiden University), Marie-Anne Sallandre (Université Paris 8 & CNRS), Myriam Vermeerbergen (Katholieke Universiteit Leuven), Mieke Van Herreweghe (Universiteit Gent), Adam Schembri (University of Birmingham).

(Belgium [French and Flemish], France, Germany, Italy, Netherlands, Spain) specialising in Sign Language linguistics and gesture studies, with the objective of laying the groundwork for a comparative approach to the study of European sign languages[1]. We will elaborate on the theoretical framework and the methodological requirements needed for a comparative study that aims to refine our understanding of the typological characteristics of these languages. In our presentation, we will focus on the results obtained regarding two main objectives the network has set for the first year of its collaboration, that is, (a) the elaboration of a framework for the description of different types of SL "units" and their orchestration in discourse, and (b) the application of this framework in the comparison of a set of data. This first step constitutes the basis for collaborative work, as it is directly related to the mode of analysis that will be chosen and the understanding of how discourse is segmented.

Our examination of the "units" distinguished in the analysis of sign language data depending on the theoretical framework adopted is related to the circumstance that while there is consensus in the literature on the existence of two main types of SL units, there is disagreement on their status. Basically, scholars agree on a distinction of units with respect to their differing degree of conventionalisation, with less conventionalised units at one end and fully lexicalised units at the other end of a continuum. SL theoretical approaches differ in the linguistic status ascribed to the types (and sub-types) on this continuum (linguistic, partially linguistic, non-linguistic), in the description of their functions, in the analysis of their interactions (diachronically and synchronically), and in the place given to them in language (central/peripheral). Hence, for example, non-conventionalised units/constructions are frequently distinguished into two types: on the one hand, units/constructions referred to as 'classifier constructions' 'productive signs', 'depicting signs', or more generally characterised as 'partly lexicalised signs'; and, on the other hand, constructions referred to as 'role shifts' or 'constructed actions'. In the "semiological model", by contrast, all of them are unified through the concept of 'transfer construction'.

The second step involves an exemplary comparison of annotated sequences in the various SLs that are object of study in this network. This will allow for an initial comparison of the modes of analysis used by each team, and, in a next step, to establish a sufficiently explicit shared framework to allow for future comparison. For this purpose, data available from the corpora available to the members of the network will be used and matched (by type, genre, monological/dialogic). The presentation concludes with an outlook of the next steps defined for the collaborative work in 2020.

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[1] At this stage, the network focuses on the following Sls: LSC, DGS, LIS, LSFB, NGT, LSF, VGT, RSL and BSL.

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Pragmatic constraints on extra-grammatical morphology in Japanese Sign Language (JSL) onomastics

Johnny George

Thursday, 1.48

Onomastic lexicalization in Japanese Sign Language (JSL) exhibits many characteristics of extra-grammatical morphology such as: the generation of alternative outputs, loss of transparency, emergence of non-standard segments, and dependence on analogy (Mattiello 2013, p. 55); therefore, typical phonological or morphological rule paradigms do not adequately account for selection among competing outputs. For instance, the distribution of word formation patterns for personal name signs differs from that for prefectural name signs. In the case of prefectural signs, JSL users have general social knowledge that favors the spread of monomorphemic metonymic name signs. In contrast, personal name signs sacrifice phonological economy in order to preserve loan translations from Japanese (Nonaka et al. 2015); as a result, personal name signs remain recoverable in new contexts with unfamiliar interlocutors. The contrastive outputs of these two onomastic classes demonstrate that pragmatics potentially determine optimal onomastic outputs. Additionally, consideration of extra-morphological operations reveals the competing influences of transparency, economy and analogy in the formation of onomastic signs.

JSL has a number of patterns for the formation of words created from written and spoken Japanese (Ann 1998, Nonaka 2005, Nakamura 2006, George 2011, Nonaka et al. 2015). Semantic mapping or loan translation perhaps serves as one of the most prolific lexicalization patterns. For instance, the word *BUNPO* 'grammar' consists of two concatenated signs, *BUN* 'sentence' + *HO* 'rules', derived from written Japanese. Nonaka (2005) and Nonaka et al. (2015) show that semantic mapping acts as the most ubiquitous pattern for JSL personal name signs. Nonaka (2005) and Nonaka et al. (2015) categorize a number of name formation strategies that incorporate Japanese characters, homonymic loan translations, or descriptive signs. Nonaka et al. (2015) categorize 421 JSL signs from 216 Japanese names and find that 92% (386/421) of the signs map with their Japanese source morphemes via loan translations, Japanese characters and/or fingerspelled forms. [1]

Although the Nonaka et al. (2015) personal name sign data suggests that JSL onomastic formation favors semantic faithfulness to the source Japanese over phonological economy, roughly 60% of JSL prefectural place names are made up of monomorphemic signs, including metonymic (or symbolic) signs and truncated versions of loan translation signs. This study analyses the distribution of naming strategies in prefectural names, sourced from the Yonekawa (1997) dictionary, along with comparisons from independent sources[2]. Prefectural names privilege economical,

[1] Typically, a Japanese name consists of two characters, each which represents a morpheme, e.g. 田中, TA+NAKA, is made up of two signs, 'rice field' and 'inside'.
[2] These citation forms are compared with forms in video such as Kawabata Shinya's prefecture signs (https://www.youtube.com/watch?v=frbr39raMkk) and available data from the JSL corpus project at the National Institute of Informatics (Bono et a. 2014).

phonologically reduced forms, such as those illustrated in Frishberg (1975) and seen crosslinguistically. Over a third of the prefectural signs are metonymic. For example, “Fukuoka” could be created with the sign concatenation, *FUKU* ‘good fortune’+ *OKA* ‘hill’; however, the sign consists of the monomorphemic, *OBI* ‘sash’, which refers to famous sashes produced in Hakata, Fukuoka (Yonekawa 1997). Around 20% of prefecture signs are truncated signs; for instance, the name “Saitama”, made up of the characters, *sai* ‘cape, peninsula’ + *tama* ‘ball’, is represented by the sign, *BALL*.

The preponderance of metonymic and truncated signs over loan translations indicates that economy outranks transparency in prefectural onomastic formation. A confounding factor is that nearly 40% of prefectural name signs remain faithful to the source Japanese in the same way as the Nonaka et al. (2015) personal name signs. The semantically mapped prefectural signs that survive are not particularly economical, nor are the metonymic or truncated names derived from especially complex source words. As a result, the phonotactics of potential or actual outputs do not account for prefectural name variation.

JSL word formation is an extragrammatical process, which does not conform to a single set of rules, although particular patterns persist based on: constraints, analogy and contextual appropriateness (Mattiello 2013, p. 255). Well-formedness constraints promote economy and transparency, subject to alternation. Analogy from categories such as name signs may preserve semantically mapped tokens. Finally, context may motivate output variation; the 47 prefectural signs make up a closed set of familiar references, while a significantly larger pool of personal names index a wide range of people.

While there exists a relatively rich descriptive history of onomastic lexicalization in JSL and languages with similar lexicalization processes, such as Hong Kong Sign Language (Tang 2015), and Taiwan Sign Language (Ann 1998, Su and Tai 2009), little has been discussed about the nature of the constraints that motivate selection of varying output forms. This study uses onomastic data from JSL to show how extra-grammatical operations can aid our understanding of lexicalization in JSL and sign languages with comparable word formation strategies.

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Theory-description-theory: A round trip in French Sign Language phonology

Carlo Geraci & Justine Mertz

Thursday, 1.49

Goals. We use French sign language (LSF) data to evaluate descriptive and explanatory adequacy of current models of Sign Language (SL) phonology. Specifically, we show that LSF poses several problems for current theories of orientation both in terms of feature inventory and in terms of general accounts of orientation as a relative relation between the hand and the plane of articulation.

Background. SLs are natural languages that are perceived visually (vs. acoustically) and produced gesturally (vs. vocally). The perception-production systems of SL give rise to one macroscopic modality effect, namely the simultaneous production of a significant amount of contrastive phonemic (and morphemic) material (Vermeerbergen et al. 2007). Phonological contrast is accounted in SL phonology via feature geometry (Brentari 1998, Sandler and Lillo-Martin 2006, van der Kooij 2002). These models introduce three major classes of phonemes of primitives (*handshape*, *place of articulation* and *movement*), and derive a forth, *orientation*, as the result of the interaction between handshape and place of articulation. In other words, hand-*orientation* is not computed in absolute terms with respect to the signer's body serving as a landmark, but it is defined in relative terms. *Absolute orientation* is typically left as a phonetic implementation or as a lexical specification in iconically motivated signs (van der Kooij 2002).

Problematic Data. A source of problematic data has to do with the inventory of features that is crosslinguistically attested and necessary to derive *relative orientation*. A second source are those signs that do not meet descriptive adequacy at the *phonological* level, if *relative orientation* only is considered.

The first case is illustrated by the minimal pair EGG / SHIT in LSF, fig. (1a) and (1b). The two signs are identical except for *relative orientation*. Specifically, the radial part of the non-dominant hand is involved for EGG, while the web between the two selected fingers is involved in SHIT. The current set of features for orientation cannot capture this contrast. Orientation for EGG is derived with a [+radial] feature on both hands. Orientation for SHIT has the same feature for the dominant hand, [+radial], but no specification can capture the relevant part of the non-dominant hand. Indeed, Brentari (1998) explicitly exclude [±web(ing)] from the set of active features. According to her, apparent contrasts for ASL can be derived as cases of [+radial]. The other models implicitly assume Brentari's proposal.

(1) a. EGG: final frame

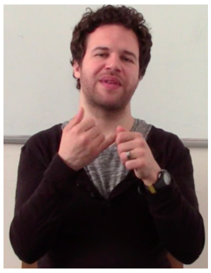
c. ALL: initial frame

e. STRING BEAN: initial frame

b. SHIT: final frame

d. ALL: final frame

f. STRING BEAN: final frame



The second case is provided signs like ALL and STRING BEAN, fig. (1c)-(1d) and fig. (1e)-(1f). Both signs involve orientation change and are problematic for different reasons. *Relative orientation* for ALL is captured by specifying [+tip] & [+palm]. However, this specification does not capture the fact that *relative orientation* is kept constant throughout articulation while the sign involve orientation change. Current models would predict surface forms that are near minimal pairs FLIP-PAGE and LATE (not illustrated here).

Both relative and absolute *orientations* are problematic for STRING BEAN. One could try to derive *relative orientation* of the initial frame (fig. 1e) with [+tip] & [+fingerfront]. However, this would leave unaccounted *relative orientation* of the final frame (fig. 1f), which cannot be reasonably derived via redundancy. *Absolute orientation* is also problematic, as the orientation change leaves the main features unaffected ([+tip] always faces [+fingerfront]). Other problems that are raised by signs like STRING BEAN will be illustrated during the presentation.

Analysis. Fixing the first problematic case does not introduce major consequences for current frameworks. These are normally modeled after one particular sign language (ASL, NGT, Israeli SL) and tacitly extended to others. It is expected that the feature inventory may not capture typological variation. The EGG / SHIT contrast in LSF simply shows the need to add a feature to the inventory of possible contrastive features in sign language. Descriptive adequacy is met by introducing a [±web] orientation feature in the pool (see Liddell & Johnston 1989), while explanatory adequacy is met by allowing individual languages to select that feature as phonologically contrastive. Alternative solutions, like positing a [±webing] movement feature (cf. Stokoe 1960) will be discarded during the presentation.

The second case is more problematic: the effects of orientation change cannot be captured by *relative orientation*. These are far from being just phonetic adjustments, and iconic motivations cannot be argued for. Indeed, ALL is not an iconic sign, while STRING BEAN has an iconic handshape which is not affected by orientation change. In order to account for this second set of data, we propose to introduce in the feature geometry system a second (recursive) layer for orientation specification. This would be a "secondary" plane of articulation. For sake of illustration, we take it to be the signer's body in the case of ALL and STRING BEAN. The configuration [+tip] / [+torso] would capture the final frame in ALL (fig. 1d), while [+tip] / [+palm] captures *relative orientation*. Similarly, [+palm] / [+torso] would capture *absolute orientation*, while [+tip] / [+fingerfront] captures *relative orientation*. In both cases, the initial status of absolute orientation can be redundantly recovered by movement features.

At the global level, our account introduces a major innovation in sign representation as it call for *absolute orientation*. However, it does so by minimally modifying current frameworks. Indeed, the requirement to obtain absolute orientation is to have a "secondary" plane of articulation. Notice that by specifying only one pair of features for absolute orientation leaves ample margins for phonetic adjustment, so that the flexibility required by the cases discussed in van der Kooij (2002) are still accounted for.

Conclusions. Theoretical models are extremely important to capture linguistic generalizations. However, blind extension from a language to another may lead to empirical inaccuracies. We showed that the inventory of active features is not fixed in SL. Exotic features (e.g., [±web]) may be active in creating minimal pairs in some SLs but not in others.

Reasons of elegance and economy have led researchers to eliminate *absolute orientation* from SL description. Data from LSF showed that this move is premature and that both *absolute* and *relative orientations* are needed to meet descriptive and explanatory adequacy.

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Emerging functions of manual holds in Zinacantec Family Homesign

Austin German

Thursday, 1.50

The ability to maintain one hand in the signing space while producing related information with other articulators is a unique feature of sign languages (Vermeerbergen, Leeson, & Crasborn 2007). Manual holds, also referred to as 'manual spreading' or 'perseveration', have been attributed various functions in sign language: they may delineate prosodic boundaries (Nespor & Sandler 1999), create complex morphosyntactic constructions (Miller 1994), and contribute to the structure of the discourse (Liddell 2003).

To date, research on manual holds has focused on 'established' sign languages, with little input from studies of 'emerging' sign languages (Meir et al. 2010). Here, I present preliminary observations on the use of holds in Zinantec Family Homesign ('Z sign'), a first-generation sign language spontaneously developed by three deaf siblings and three close hearing relatives in an indigenous Mayan community of Chiapas, Mexico (Haviland 2013). I draw on a corpus of 221 descriptions of cartoons, 109 of which were signed by the eldest deaf signer "Jane" and 112 by the youngest deaf signer "Will". Given the large age gap between these two signers, I hypothesized that there would be differences in the distribution of different types of holds used by each, reflecting structural development within a single generation of homesigners.

To analyze the production of holds in Z sign, I follow Sáfár & Kimmelman (2015) who categorize holds as *phonetic, syntactic, iconic,* or *discourse-related*. An advantage of this classification is that it acknowledges the variable relation between the form and function of holds, in contrast to previous analyses (e.g. Liddell 2003) which describe holds in terms of fixed form-function pairs. In an emerging system, where neither form nor function is fully conventionalized, a flexible classification such as that of Sáfár & Kimmelman is more appropriate for the analysis of holds. Below I introduce the categories of holds along with relevant examples from Z sign. I then report the distribution of each type of hold used by each signer, and finally compare my results for Z sign with the results for NGT and RSL reported in Sáfár & Kimmelman (2015).

Phonetic holds are defined as those which have no semantic interpretation; they are motivated by ease of articulation. In contrast, the function of syntactic holds is to mark a syntactic domain. The non-dominant hand spreads over syntactically related signs within a clause. A common syntactic hold in Z sign links a predicate and a negative sign, as in (1). Holds are notated with underscores:

(1) DH: DRIVE____ SPIN____
NDH: DRIVE NEG NEG
'(The car) doesn't drive, (its wheels) don't spin'

Iconic holds convey locative relations and simultaneous events. In (2), the non-dominant hand represents the Ground for the movement of the Figure represented on the dominant hand:

(2) DH: entity: flat.object.FALL
NDH: handle: TOSS__________________
'He tosses the pancake and it falls out of the pan'

Discourse-related holds mark topicalized elements and relations between clauses. In example (3) below, a Z signer produces a series of predicates, indicating a sequence of events. He 'punctuates' the discourse with the sign FINISH, produced on the non-dominant hand simultaneously with a hold at the offset of the dominant hand predicate.

(3) DH: SPRAY______ WASH_______ DRY______ MASSAGE_______
NDH: FINISH WASH FINISH_____FINISH MASSAGE FINISH
'It gets sprayed with water, then its body is washed, then it gets dried off, and then it gets massaged'

Distribution of holds by grammatical function

signer, age	*total # of holds*	*# phonetic*	*# syntactic*	*# iconic*	*# discourse-related*
Jane, 42	53	8 (15%)	3 (6%)	37 (70%)	5 (9%)
Will, 29	78	12 (15%)	11 (14%)	45 (58%)	10 (13%)
total	**131**	**20 (15%)**	**14 (11%)**	**82 (63%)**	**15 (11%)**

Overall, the majority of holds had an iconic function. Phonetic, syntactic, and discursive holds occurred in much smaller proportions.

The distribution of each type of hold in NGT and RSL narrative reported by Sáfár & Kimmelman (2015) was approximately 50% iconic, 30% syntactic, 10% phonetic, and 10% discourse-related, in both languages. Overall, Z sign exhibits a slightly higher proportion of iconic holds, a lower proportion of syntactic holds, and similar proportions of phonetic and discourse-related holds. The lower proportion of syntactic holds in Z sign relative to the two established languages is expected, assuming that a sign language would increase in syntactic complexity over time. In light of this, it is interesting that Will produced more syntactic holds than Jane. However, further quantitative analysis is needed to establish whether this difference is reliable.

The results reported here indicate that the same kinds of manual holds attested in established sign languages also occur in emerging systems, suggesting that holds are a modality feature exploited even at the earliest stages of language emergence. Although there were small differences between the two siblings, it cannot be concluded with certainty that these differences reflect structural development in Z sign. Further annotation of the Z sign corpus will allow for the calculation of the normalized frequency of holds in the corpus for better comparison among the Z signers as well as with other sign languages.

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NGT lexicon used in IS interpreting by a team of deaf interpreters

Aurélia Nana Gassa Gonga

Thursday, 1.51

Transnational signing practices summarized as international sign (IS) is a way of communicating that is frequently used in international deaf events (Hiddinga & Crasborn, 2011). Despite its debated linguistic status (Hansen, 2015), IS is an effective way of communication used by deaf people who do not share the same sign language and by interpreters in front of a multilingual deaf audience. Previous researches have shown that IS is strongly dependent on the location where it takes place. For instance, IS can be a more predominantly ASL form when the event takes place in the U.S. (see Sheneman and Collins, 2016), or a more predominantly LSF form when it happens in France (see Monteillard, 2010). Above all, IS has been recognized as a form of sign language with less conventionalized lexicon (Rosenstock, 2008; McKee and Napier, 2012) taking maximum advantage of different types of iconicity (Cuxac, 2000; Taub, 2001). Therefore, IS is constructed in a way that uses the most accessible iconic forms for a deaf audience, whether in lexicon or other strategies. So, when a lexical sign from a national sign language is used in IS interpreting, the interpreter might assume this lexical item as highly iconic and widely understandable, possibly combining it with other linguistic strategies to make it understandable.

For this study, we look at a dataset of IS interpreting done by a team of two Dutch deaf interpreters working from a lecture in Sign Language of the Netherlands (NGT), in the Netherlands. This corpus lasts 40 minutes and was recorded in October 2018. The analysis focuses on the strategies used by the interpreters when using the same NGT lexicon sign in their IS interpreting. How are NGT lexicon signs used in IS interpreting?

The preliminary results highlight two main strategies. The first one is with a “pedagogical-like” aim, and the second one with a “clarifying-like” aim. The pedagogical-like strategy is to repeat the NGT lexicon at the beginning and at the end of a meaning-unit, with constructed actions in between. The clarifying-like strategy is to explain the concept first, and to finish with the NGT lexicon. These strategies shed light into patterns of IS construction while interpreting, most of all, how to bring a lexicon item from a national sign language into IS. The study has the double advantage to get insight from a deaf perspective and an interpreting perspective.

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Mastering depicting constructions in the L1 acquisition of Austrian Sign Language (ÖGS): Issues of lexicalization

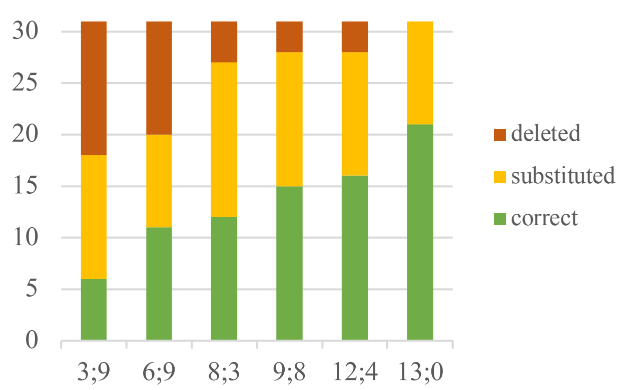
Julia S. Gspandl

Thursday, 1.52

Depicting handshapes or *"sign language classifiers"* represent certain groups of referents through different configurations of the manual articulator in a "complex morphological system" (Schick, 1990) called *depicting constructions* or DCs here. The present study examines the acquisition of depicting handshapes in native-signing Deaf children learning Austrian Sign Language (ÖGS). The study's main research objective was to assess whether type (object versus handling) influences the proficiency in selecting standard depicting handshapes of native-signing children. The terminology used follows Cormier et al. (2012, "depicting constructions") as well as Brentari et al. (2016, "object/handling handshapes") to reflect both DCs' key purpose as describing and tracking – rather than classifying – referents as well as the existence of less lexicalized constructions and handshape choices in this system.

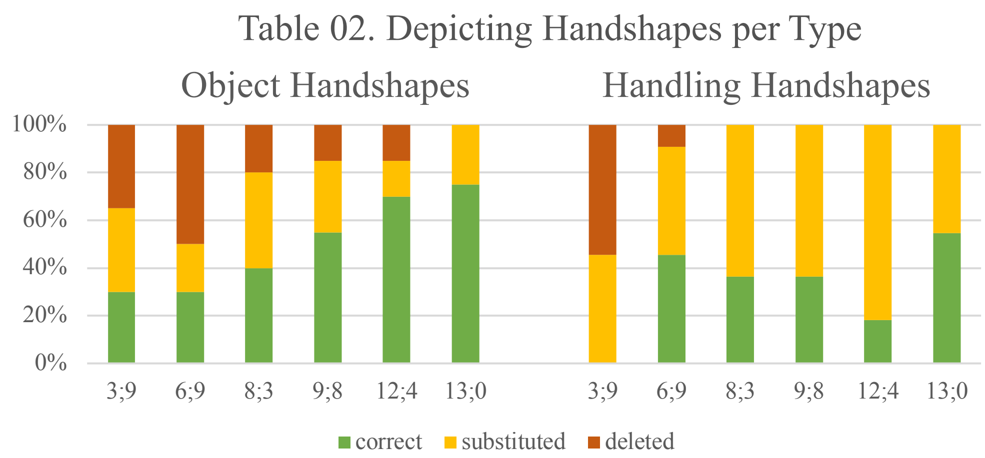
Six participants aged 3;9 to 13;0 were tested on their depicting handshape productions in two tasks by one of two Deaf examiners. Task 01 used picture cards to elicit descriptions of spatial relationships containing *object handshapes* (which prototypically imply non-agentive utterances). In Task 02, children were asked to describe short video clips prompting the use of *handling handshapes* (which characteristically indicate agentive sentences). The selected target handshapes were documented (Hilzensauer, 2015) standard depicting handshapes in ÖGS for the referents used in the vignettes and had been varied for morphosyntactical (Schick, 1990) and phonological (Boyes-Braem, 1990) complexity. Each child was recorded in an individual session, yielding about 90 minutes of total material for analysis. The videotapes were annotated using ELAN and tokens of depicting handshapes were counted and rated according to type.

Table 01. Depicting Handshapes (total)



Quantitative results demonstrate that the younger the child, the more likely they are to substitute a less lexicalized handshape or delete the target DC (i.e. avoid it or replace it with a non-localized or inappropriate citation form). This is illustrated in Table 01 in which the axis of abscissas features the children according to their age, while the axis of ordinates shows the number of tokens.

Moreover, findings reveal a significantly higher correlation of handshape productions to the targets for object handshapes than for handling handshapes. In other words, handling handshapes are more likely to be substituted with less lexicalized forms. Table 02 on the following page shows the tokens tallied as object and handling handshapes, respectively, for each of the children in the study. In addition to the lower frequency of substitutions in object handshapes, Table 02 demonstrates a clearer path of acquiring more lexicalized handshapes with increasing age for object handshapes. The acquisition of handling handshapes, on the other hand, seems to be subject to idiosyncratic differences between the individual children and their signing styles to a higher degree.



For both handling and object handshapes, substitutions for handshapes of another type than the target were few, suggesting that the subjects have acquired their respective differences in meaning. Substitutions for completely lexicalized citation form constructions were comparatively rare as well. Lastly, the video analysis revealed alternate handling handshapes from the Deaf examiners beyond those they had previously identified as correct which may only in part be explained by child-directed speech.

For native-signing children, observed substitution strategies for both handshape types indicate that the greater challenge in acquiring DCs in ÖGS is not the agentive/non-agentive distinction nor recognizing the environments requiring DCs in the first place but rather the mastery of conventionalized handshapes. A link to an overall higher tolerance concerning the grammaticality of handling handshapes in ÖGS is suggested to explain the differences in performance of object and handling handshapes, indicating that the development of more lexicalized handling handshapes may be considered part of the acquisition of a more formal register, rather than of the language as a whole.

Selected references. Boyes-Braem, P. (1990). Acquisition of the Handshape in American Sign Language. A Preliminary Analysis. In W. Levelt, V. Volterra, & C. Erting (Hrsg.), From Gesture to Language in Hearing and Deaf Children. Berlin, Heidelberg: Springer. I **Brentari, D., Coppola, M., & Senghas, A. (2016).** Handshape Complexity as a Precursor to Phonology: Variation, Emergence, and Acquisition. Language Acquisition. I **Cormier, K., Quinto-Pozos, D., Sevcikova, Z., & Schembri, A. (2012).** Lexicalisation and De-Lexicalisation Processes in Sign Languages. Comparing Depicting Constructions and Viewpoint Gestures. Language & Communication, 32(4), pp. 329-348. I **Hilzensauer, M. (2015).** Ikonizität und Klassifikatoren in Gebärdensprachen. Unpublished habilitation dissertation, University of Klagenfurt. I **Schick, B. (1990).** Classifier predicates in American Sign Language. International Journal of Sign Linguistics, 1(1), pp. 15-40.

Phonological processes in Shanghai Sign Language

Shengyun Gu

Thursday, 1.53

The study investigates phonological processes through the lens of Shanghai Sign Language (SSL), an understudied sign language variety of Chinese Sign Language.
Data: Our data are citation forms of lexical signs (N=2070) produced by two SSL Deaf signers and a mini-corpus of naturalistic signing (time length: 2h, 56min; genres: speech, narrative, conversations) collected from seventeen SSL Deaf signers (mean age: 56; five females, twelve males).

Methodology: Among the citation forms of lexical signs, we examine the morphologically complex signs by analyzing the phonological modulations the constituting signs have undergone in the word formation. The citation forms of the lexical signs are employed as underlying forms in comparison to the variations in form that are detected in the connected signing from the mini-corpus. Given the limited size of the mini-corpus, each variation would be regarded as a phonological process as long as it occurs consistently in more than one signer or is observed more than twice on the same signer.

Findings:
(1) Phonological processes in SSL are found to occur at two levels: lexical (within word) and post-lexical (across words):
(**1a**) The processes at the lexical level occur within morphologically complex word formation, which encompass concatenative morphological operations such as compounding and affixation (instantiated by negative incorporation), as well as the nonconcatenative morphology operations such as initialization and numeral incorporation.
(**1b**) The phonological processes at the post-lexical level are observed in connected signing, i.e. when words are positioned in context during fast speech.
(2) The phonological processes at the post-lexical level apply optionally, whereas similar processes within morphologically complex word formation are obligatory in SSL.
(3) All the major types of phonological processes that are found in spoken languages, i.e., assimilation, deletion, coalescence, reduction, epenthesis, and metathesis, are attested in SSL. This testifies to the universality of phonological processes as a modality-free property (see **Table 1**).
(4) During these phonological processes in SSL, either handshape, location, movement, or weak hand could be modulated alone, which accounts for their status as natural classes. Handshape assimilation could be further divided into selected fingers assimilation and joint position assimilation, which reflects the complexity of the internal structure of handshape (see **Table 1**). The phonological processes can thereby be formally stated as spreading and/or delinking of feature/class nodes in the sign phonology model (Sandler 1989; van der Hulst 1993, 1996; Brentari 1998; van der Kooij 2002; Sandler & Lillo-Martin 2006; van der Hulst & van der Kooij in press).

Conclusions:

The findings from SSL echo studies from other sign languages and provide arguments to the universality of phonological processes as a modality-free property of language, be it signed or spoken. The units that are affectable during the phonological processes in SSL justify the notion of natural classes and features in constituting the internal structure of a sign. Meanwhile, the dichotomy between the obligatory phonological processes at the lexical level and the optional processes at the post-lexical level is robust across sign languages and leaves query for future investigation.

Selected references. [1] Brentari, 1998, A Prosodic Model of Sign Language Phonology. l **[2] Sandler, 1989,** Phonological Representation of the Sign: Linearity and Nonlinearity in ASL. l **[3] Sandler & Lillo-Martin, 2006,** Sign Language and Linguistic Universals. l **[4] Van der Hulst & van der Kooij, in press,** Phonological structure of signs-theoretical perspectives.

Appendix:

Table 1 Phonological processes observed in SSL (the blank cells in the rightmost two columns are construed either as accidental gaps or not yet attested due to the limited size of SSL data in this study)

<table>
<tr><th>Types</th><th>Units modulated</th><th colspan="3">Subtypes</th><th>lexical</th><th>post-lexical</th></tr>
<tr><td rowspan="6">Assimilation</td><td rowspan="4">handshape</td><td colspan="3">total assimilation</td><td>√</td><td></td></tr>
<tr><td rowspan="3">partial assimilation</td><td rowspan="2">selected fingers</td><td>total</td><td>√</td><td>√</td></tr>
<tr><td>partial</td><td>√</td><td>√</td></tr>
<tr><td colspan="2">joint position</td><td></td><td>√</td></tr>
<tr><td>location</td><td colspan="3"></td><td>√</td><td>√</td></tr>
<tr><td>movement</td><td colspan="3"></td><td></td><td>√</td></tr>
<tr><td rowspan="3">Deletion</td><td>handshape</td><td colspan="3"></td><td></td><td>√</td></tr>
<tr><td>movement</td><td colspan="3"></td><td>√</td><td>√</td></tr>
<tr><td>weak hand</td><td colspan="3"></td><td>√</td><td>√</td></tr>
<tr><td rowspan="2">Epenthesis</td><td>weak hand</td><td colspan="3"></td><td>√</td><td>√</td></tr>
<tr><td>movement</td><td colspan="3"></td><td>√</td><td>√</td></tr>
<tr><td>Metathesis</td><td>location</td><td colspan="3"></td><td></td><td>√</td></tr>
<tr><td rowspan="2">Reduction</td><td rowspan="2">movement</td><td colspan="3">distalization</td><td></td><td>√</td></tr>
<tr><td colspan="3">manner</td><td>√</td><td>√</td></tr>
<tr><td>Coalescence</td><td>handshape, location, movement, weak hand</td><td colspan="3"></td><td>√</td><td>√</td></tr>
</table>

Meaning of ‘bflap’ in Iranian Sign Language

Ardavan Guity

Friday, 17:30-18:30 (SIGNopsis)

Video abstract in IS:

https://youtu.be/ToFJtmupdng

The main purpose of the study is to investigate the usage of a sign temporarily glossed as Bflap in Zaban Eshareh Irani (ZEI) within the Iranian Deaf community. Bflap can be used to express affirmation, negation, possession, and existence (and is a homonym of the ZEI verb "to come"). Bflap has no direct correspondence to a single word in Farsi and appears to be unique to ZEI.

This project is being conducted within a larger project – the language documentation of signed language used by the Deaf Iranian community. Ten deaf, native signers or other fluent ZEI users have been recruited for participating in this study. The Iranian locations included Tehran, Mashhad, Isfahan, Shiraz, Tabriz, and Zahedan. A secondary but important objective will be achieved from doing this study in context of a larger language documentation project - the demonstration of how to conduct sign language research ethically.

For this study, I make the following hypotheses. First, Bflap can be used to express sentential possession (e.g., like "have" in English), Second, Bflap could mean existence, affirmation, or possession. I also ask: Which Bflap signs belong to which meaning categories (affirmative, modal, existence, possession, others?)? Determining the usage of Bflap will help further the linguistic field specializing on verbs with both existential and possessive meanings. I also look at the distribution of Bflap in Zaban Eshareh Irani (ZEI). My presentation explores possible answers to these questions with regard to the apparently polysemous Bflap signs.

Lexical competition correlates with articulatory enhancement in ASL

Kathleen Currie Hall, Oksana Tkachman & Yurika Aonuki

Thursday, 1.54

Recent research in the domain of spoken language phonology has found that words that have a greater degree of lexical competition are prone to both acoustic and articulatory enhancement (e.g., Baese-Berk & Goldrick 2009; Scarborough 2013; Hall et al. 2017). Lexical competition can be measured in multiple ways, including the notion of minimal pairs (words with minimal pairs tend to be enhanced as compared to those without them) and neighbourhood density (ND; words in denser neighbourhoods tend to be enhanced as compared to words in sparser neighbourhoods). As van der Kooij (2002) points out, signed languages tend to have fewer minimal pairs than spoken languages, which leads researchers to rely more on ND as a measure of lexical competition. While some work has been done on ND effects in signed languages, it has mostly focused on its effects on perception (e.g., Corina & Hildebrandt 2002, Carreiras et al. 2008).

In this paper, we investigate whether there is articulatory enhancement associated with greater ND in American Sign Language (ASL). As our measure of articulation, we use the notion of *visible amplitude*, introduced by Tkachman et al. (under review), which is a visual-world analog of acoustic amplitude. It is calculated using the root-mean-square of a motion velocity time-series extracted directly from video of a sign, via a video analysis technique known as Optical Flow Analysis (OFA; see e.g., Horn & Schunck, 1981). It essentially provides a measure of what the magnitude of movement is during the production of a sign.

We examine the correlation between the visible amplitude of signs and their ND as given in the ASL-Lex database (Caselli et al. 2017). Signs in ASL-Lex are coded for their ND in two ways. The “maximal” ND of a sign is the number of signs in the database that share at least four of the five main formational characteristics coded for in ASL-Lex, i.e., number of hands, major location, major movement, selected fingers, and flexion of fingers. This measure is maximally conservative when it comes to defining neighbours; Caselli et al. (2017) report that the median maximal ND is 27. On the other extreme, the “minimal” ND of a sign is the number of signs in the database that share at least one of the formational characteristics. This is therefore a much more generous measure, and the neighbourhoods defined this way are quite large; Caselli et al. (2017) report the median minimal ND is 780.

The videos of signs were also taken from the ASL-Lex database, which are all recorded by one female, middle-aged, White, deaf native signer of ASL. For this particular analysis, we included the entire video of the sign, i.e., including the transitional movement before and after the stroke of the sign, for the 691 videos that were not clipped, were not compounds, and did not have “unusual” codings for their basic parameters (see Tkachman et al. under review).

To examine whether ND affects visible amplitude, we controlled for other characteristics that are also known to affect it (see Tkachman et al. under review). We thus built an ANOVA that predicted visible amplitude from number of hands, major location, minor location, major movement, and ND. Two models were built; one with maximal and one with minimal ND.

As expected, number of hands and major location are each statistically significant predictors of visible amplitude ($p < 0.001$ for each predictor in each model), while minor location is not quite significant ($p \approx 0.06$ in each model) and major movement is not significant ($p \approx 0.24$ in each model). Interestingly, maximal ND, the more conservative measure, is also not significant ($p = 0.36$), but minimal ND is a significant predictor of visible amplitude ($p = 0.02$). Building an equivalent multiple linear regression model shows that the direction of the effect is as predicted, i.e., on average, signs with a larger ND have greater visible amplitude [$\beta = 0.0003$, $p = 0.02$]. Figure 1 shows the added-variable plot for this multiple linear regression, i.e., it shows the relationship between visible amplitude and minimal ND, partialling out the effects of the other predictor variables.

These results suggest that lexical competition may affect articulation in signed languages in a manner similar to that in spoken languages. That is, there is preliminary evidence that some kinds of increased competition may lead to increased magnitude of movements in signs. These findings can be understood in the context of language as a communicative system; increasing the distinctiveness of a signal is most likely to happen when there is the greatest chance of miscommunication (cf. Lindblom 1990).

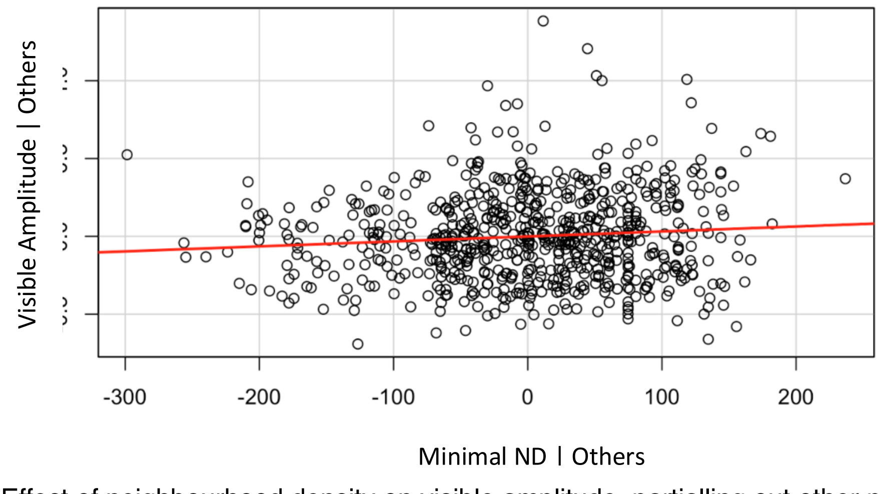


Fig. 1: Effect of neighbourhood density on visible amplitude, partialling out other predictors

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Language access profiles: A better way to characterize DHH children’s early communicative input

Matthew L. Hall & Stephanie De Anda

Thursday, 1.55

In order to reach their full developmental potential, d/Deaf and hard of hearing (DHH) children need early access to language. Researchers (and other stakeholders) currently lack tools that appropriately characterize the communicative input to which DHH children have access during infancy and toddlerhood. Instead, most research along these lines relies on the construct of “communication mode”. Communication mode -as currently construed- *cannot* provide a full, precise, or accurate description of children’s early access to language: it does not provide a cumulative history, often fails to distinguish natural sign languages from other forms of manual communication, and does not capture how long a child went without access to *any* form of input. Therefore, alternative constructs are urgently needed. Here, we propose such an alternative construct (“language access profile”), and present two new tools for measuring it.

The construct of a **language access profile** is intended to capture a DHH child’s cumulative experience with communicative input (or lack thereof) during a specific time window: here, we focus on birth to age 3, since this is the period during which language access is most crucial, and most under parental control. The profile is represented as 100% distributed across 8 input categories; Figure 1 displays 5 common profiles. Because DHH children’s experiences are so diverse, it is rare for two children to have exactly the same profile; therefore, when grouping/predictor variables are needed, cluster analysis is used to identify groups of children with similar experiences (i.e. located at similar points in a multidimensional space).

In order for this alternative construct to be empirically useful, there must be a way to measure it. To that end, we present two new empirical tools that are designed to measure language access profiles: one that provides a higher-resolution picture but is more difficult to administer, and one that is simpler to use, but provides less detail. Both are based on parent-report, as is standard for assessing children’s early language background. Both begin with the interviewer introducing the distinction between children’s “language *exposure*” (signals sent) and “language *access*” (signals received), and then explaining the 8 different categories of language input in parent-friendly terms.

(1) The D-LEAT is an adaptation of the Language Exposure Assessment Tool (DeAnda et al., 2016): an already-validated measure used for hearing children who have access to more than one spoken language. In this approach, caregivers first list all of the interlocutors who were potentially significant sources of input (operationalized as at least once/week for some portion of the 0-3 period). The caregiver lists all the types of communication that each caregiver uses, and rates their skill level on a 3-point scale (novice, intermediate, advanced). The caregiver and interviewer then estimate how much time the child typically spent with each interlocutor in a given week, and how that changed from birth to 3. For each interlocutor at each time interval, the caregiver

estimates the distribution of communication across the 8 categories shown in Figure 1 (e.g. 2 hours total, of which 10% was sign-supported speech and 90% was English without signs). Based on these values, Excel-based software calculates an overall distribution for the entire birth to 3 period.

(2) The Language Access Profile Tool (LAPT) is a novel measure created for this study. In this measure, when the interviewer explains the different types of input, the caregiver indicates whether or not the child has had access to that type of input from birth to 3. Having eliminated any irrelevant categories, the caregiver then makes an overall estimate of their child's experience by distributing 100% across the remaining categories. This estimation process then repeats for age 0-1, age 1-2, and age 2-3. Web-based software calculates the child's profile as an average of these three year-by-year estimates.

Method. We have administered the D-LEAT and LAPT to 49 families with DHH children age 12 and under, sampled from across the United States. Participants were eligible if their child had confirmed hearing loss known or suspected to have begun before age 3, regardless of level, type, laterality, or etiology. Interviews to date have been conducted in English or ASL; we are currently recruiting 50 additional participants and offering interviews in Spanish as well. Roughly 60% of participants to date have also participated in a second session with either the same or different interviewer, to assess test-retest and inter-rater reliability. In all cases, the less-detailed LAPT was administered first, to prevent the more detailed D-LEAT from influenced responses to the LAPT. Reliability analyses include only children older than age 3 at the initial interview.

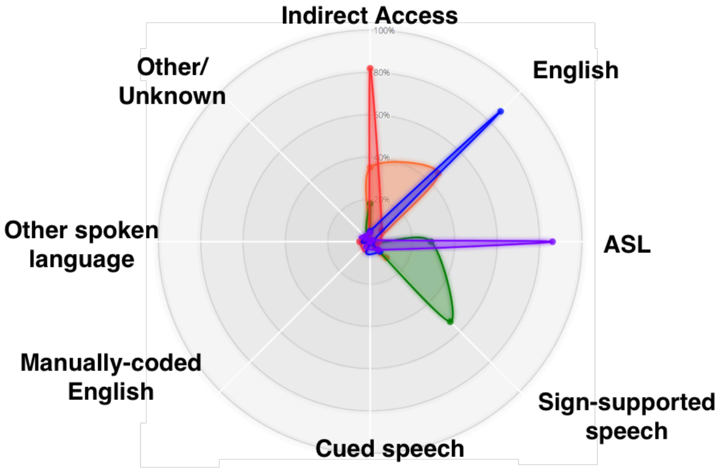

Figure 2. ***Radar plot of the 5 profiles at the center of each language access cluster. The center corresponds to 0%, with 100% at the outer edge. Each profile's total sums to 100% across all axes. An example of Indirect Access is***

Results.

<u>D-LEAT</u>: Cluster analysis revealed 5 common types of profiles, color-coded in Figure 1. Reliability analyses found that 20/24 participants (80%) were sorted into the same cluster in both interviews, Cohen's $\kappa = .73$ (Cohen's $\kappa > .7$ is considered satisfactory, while > .8 is excellent).

<u>LAPT</u>: Cluster analysis also revealed 5 clusters, whose averages are highly similar to those revealed by the D-LEAT. Reliability was similar: 21/24 (83%) agreement, Cohen's $\kappa = .77$.

<u>D-LEAT vs. LAPT</u>: Each participant's D-LEAT and LAPT profiles were submitted to a single cluster analysis. For 42/49 (85%) of participants, both profiles were assigned to the same cluster, Cohen's $\kappa = .81$.

Discussion. Although data collection is ongoing (target enrollment *n* = 100), results to date suggest that both methods are promising. Reliability for the both methods is already acceptable, and likely to increase with sample size. Both methods are highly consistent with one another. The D-LEAT provides a higher-resolution picture, but is also more difficult to administer. The LAPT provides less detail but is more user-friendly. Both methods can doubtless be improved, but they nevertheless represent substantial advances over continued reliance on “communication mode” in that they more precisely describe children’s early communicative input.

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Against communication mode

Matthew L. Hall & Sheila Dills

Saturday, 3.05

The construct of communication mode has played an important and contentious role in the literature pertaining to deaf and hard of hearing (DHH) children: especially for the ~95% who are born to hearing parents. Controversy has been especially acute with respect to understanding what types of communicative input during early childhood are most likely to yield optimal outcomes in later childhood and beyond, including language proficiency, literacy/numeracy, cognitive & social-emotional development, and more. We term this “the crucial question”.

Despite strong and contradictory claims about the impacts of approaches that exclude all forms of manual communication versus those that include some form of manual communication, several recent systematic reviews conclude that the empirical literature offers no compelling answers to the crucial question (Belzner & Seal, 2009; Erbasi et al., 2017; Fitpatrick et al., 2016). These authors rightly identify important methodological shortcomings in the existing literature and note that the results are also highly mixed. We concur with these results; however, we argue that they do not go far enough.

In our view, the very construct of communication mode itself is a critical barrier to answering the crucial question. Despite its centrality in the field, there is little critical examination of the communication mode as a construct, including how it is defined, understood, and used in the empirical literature. If a construct is poorly defined, misunderstood, or misused, then even the most rigorous study cannot yield meaningful answers to its research question, *regardless of what the data show*. We argue that this is precisely the case with communication mode, especially with respect to the crucial question of what kinds of communicative input in early childhood optimize later developmental outcomes in DHH children.

Method: We developed a rubric to document how various empirical studies operationalize communication mode. We began by applying this rubric to the 75 unique publications that were evaluated in the three largest and most recent reviews (Belzner & Seal, 2009; Erbasi et al., 2007; Fitzpatrick et al., 2016). Two independent coders scored 100% of the articles; all disagreements were resolved by discussion.

Results: We found that there was no consistent operational definition of communication mode: either between research groups, or even within the same research group. Studies frequently divided participants into 2 categories, but the basis of this division varied greatly. Communication mode was most often conceptualized as a nominal variable, but over 40% of the studies we reviewed conceptualized it as an ordinal scale with one dimension, although there was not agreement about what that dimension was. To determine communication mode, nearly all studies considered only a partial history, rather than a cumulative history. Studies did not typically distinguish among different types of manual communication that are all derived from the structure of spoken language (e.g. sign-supported speech vs. cued speech vs. manually-coded English). In addition, studies did not typically distinguish natural sign languages from these artificially-invented sign systems. Communication mode groups tended to reflect the inclusion or exclusion of manual communication (variously defined); they did not typically consider the *extent* of this access. We also did not find any studies that considered how long a child went without access to any type of input.

Discussion: These results reveal at least 7 fatal flaws in the construct of communication mode, as currently conceived:

1. No consistent operational definition: prevents generalizability across studies
2. No cumulative history: infancy/toddlerhood often overlooked, despite that being the most crucial time window. Including present environment hopelessly confounds cause and effect.
3. Failure to distinguish among various forms of manual communication based on English: prevents understanding what a child's input actually was
4. Failure to distinguish natural sign languages from invented manual communication systems: encourages inappropriate generalization
5. Failure to describe extent of access to different types of input: impossible to know whether the system is a poor choice, or whether the child has insufficient access to it
6. Failure to describe the extent to which a child lacked direct access to any type of input: this may the single most important predictor of outcomes across domains.
7. Failure to appropriately capture the multidimensional nature of most DHH children's experience with input, leading to groups that are heterogeneous and non-representative.

These shortcomings preclude any study that uses communication mode as a variable from provided compelling answers to the crucial question, regardless of what the data show. They help to explain why so little progress has been made in this debate, and identify new ways forward: specifically, through developing better ways to conceptualize and measure DHH children's early access to communicative input.

Limitations & Future Directions: The studies we reviewed were selected by previous authors and may not be representative of the current literature as a whole. We are currently conducting a follow-up study that samples more broadly from the literature published in the past 10 years.

Conclusions: If we aim to find answers to the crucial question, we must abandon the construct of communication mode, in favor of an alternative construct that does not suffer from these problems. We conclude by articulating the desiderata of such an alternative.

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The phonotactics of type-III syllables of Japanese Sign Language

Daisuke Hara & Makoto Miwa

Thursday, 1.56

The purpose of this study is to try to find the rules that function to distinguish the well-formed and ill-formed syllables of Japanese Sign Language (JSL). This presentation will focus on so-called type-III syllables, where the non-dominant hand remains still while the dominant hand moves, and show some of the well- and ill-formedness conditions of the JSL type-III syllable in the light of syllable constituents. The JSL syllable is composed of one or two handshapes, one location, one or two movements, palm and finger orientations, and some others, but not all the mathematically possible combinations are unattested: Some of the non-existent ones are accidental gaps whereas the others never exist because they violate the phonotactics of JSL. We call syllables that violate it ill-formed syllables (IFS's) while syllables that observe it well-formed syllables (WFS's) regardless of whether their existence is attested or not. To find out the conditions involved in the distinction of the WFS's and IFS's, we have collected both types of syllables.

1. Collecting of WFS's: to collect well-formed syllables, we have specified the *Japanese-and-JSL Dictionary* as a corpus. All signs listed there have been decomposed into about 2,500 syllables, which have been in turn analyzed into syllable-constituting elements such as the handshape, location, and movement. Syllables thus decomposed have been recorded in Excel as a sequence of symbols representing syllable constituents.
2. Collecting of IFS's: we have specified a series of dictionaries named *New Signs* as a corpus for the ill-formed because it has been widely known that it includes a certain percentage (which is about 15% shown by Hara elsewhere) of ill-formed syllables. We have extracted from them and have videotaped about 600 syllables, and then asked ten JSL native signers to watch the videos and judge their ill- and well-formedness. This has resulted in about 400 ill-formed syllables (Figure 1), which, after being decomposed into constituents, have been recorded in the same way as the well-formed ones.

First, by using the data from the well-formed syllables, we have shown what the typical type-III syllable of JSL is like in terms of syllable constituents. The statistics show that of about 2,500 well-formed syllables listed, there are 464 type-III syllables. Of 464 type-III syllables, 405 (87%) have one of Battison's seven handshapes (B, A, S, C, O, 5, and 1) on the nondominant hand (See Table bellow), 405 (87%) have at least one path movement (they may have a path movement only or a path movement with another type of movement), 438 (94%) have neutral space (NS), and 317 (68%) have the dominant hand contact to the other hand. More than half of the type-III syllables (i.e., 238) consist of all together one of the seven nondominant handshape, path movement, neutral space and hand contact, the combinations of which we call **prototypes of the type-III syllable**. Note that more than half of the type-III syllables have the B handshape just as in ASL (Hara 2003), that JSL also has Battison's seven handshapes as the most frequent nondominant handshapes, and that JSL has more variety of nondominant handshapes than ASL.

Second, by comparing the WFS's with the IFS's in terms of syllable constituents, we have tried to find some well- and ill-formedness conditions of the JSL type-III syllables. In our previous study (Hara and Miwa 2018, and 2019), we found that both hands of the type-III syllable must be specified for the identical location, which is either NS (neutral space) or TK (trunk) (See Figure 1a-c). In the case that the location is NS, mutual hand-contact is optional (Figures 2a, b) whereas in the case of TK, both hands must contact (Figure 2c). Our current research, however, has revealed that there exist some syllables that have one hand in TK and the other in NS (Figure 3). These syllables, although well formed, obviously are against a condition that both hands must be in the identical location. If we will maintain the condition, we will have to postulate the existence of a superordinate location category that has NS and TK as its sub-locations. We tentatively call it **AZ** or **A-zone** (which stands for Anterior Cuboid Zone), which is the cuboid zone in front of the body that has the height from the hip to the shoulder, including both TK and NS (Figure 4). If we adopt AZ as a location, then previous conditions will be revised as follows:

1. Both hands of the type-III syllable must be specified for AZ.
2. If both hands are located in TK, they must contact each other. Otherwise, mutual hand-contact is optional.

Note that syllables as in Figure 3, although well-formed, do not appear in the *Japanese-and-JSL Dictionary*, but are found only in *New Signs*. As of now, we have too few examples of this type to determine whether we should maintain the previous conditions considering those syllables to be exceptions, or to conclude that AZ is an existential, natural class that has TK and NS as its members.

Figure 1: Three Examples of IFS's

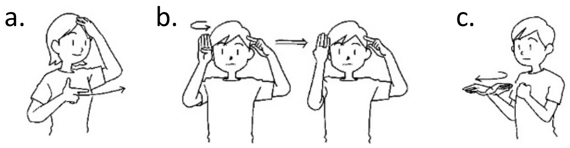

Figure 2: Three Examples of WFS's

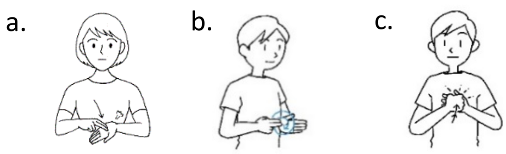

Figure 3: Syllable with TK and NS

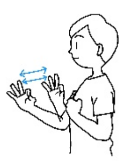

Figure 4: F-area

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	TYPE-III Nondominant Handshape			
Rank	Handshape	Frequency	Percentage	Accumulation
1	b	257	55.39%	55.39%
2	s	38	8.19%	63.58%
3	a	36	7.76%	71.34%
4	c	33	7.11%	78.45%
5	1	16	3.45%	81.90%
6	o	13	2.80%	84.70%
7	5	12	2.59%	87.28%
8	i	6	1.29%	88.58%
9	v	6	1.29%	89.87%
10	y	6	1.29%	91.16%
11	5-b	5	1.08%	92.24%
12	b-f(q)	5	1.08%	93.32%
13	f	5	1.08%	94.40%
14	L-b	5	1.08%	95.47%
15	u	4	0.86%	96.34%
16	L-f	3	0.65%	96.98%
17	L-f(q)	3	0.65%	97.63%
18	7	2	0.43%	98.06%
19	b-b	2	0.43%	98.49%
20	L	2	0.43%	98.92%
21	4	1	0.22%	99.14%
22	1-b	1	0.22%	99.35%
23	b-f	1	0.22%	99.57%
24	ko	1	0.22%	99.78%
25	w	1	0.22%	100.00%

Lexical variation in Central Taurus Sign Language

Ethan Hartzell, Rabia Ergin, Leyla Kürşat & Ray Jackendoff

Saturday, 3.06

Central Taurus Sign Language (CTSL) is a village sign language that emerged in the absence of a conventionalized language model. It is used in three adjacent villages in the Central Taurus Mountains of Turkey by 36 deaf and approximately 100 hearing individuals (e.g., Ergin, 2017; Ergin et al., 2018). Previous studies on village sign languages show remarkable amounts of lexical variation, such as in Al-Sayyid Bedouin Language (ABSL) and San Juan Quiahije Chatino Sign Language (SJQCSL) (Sandler et al., 2011; Hou, 2018, respectively). In the context of an emerging language, this variation seems to be the rule rather than the exception, as it is indeed for CTSL. The nature of how this variation may conventionalize is an open question.

This study investigates lexical variation in responses elicited from thirteen deaf CTSL signers (M_{age} = 40.8; Range: 16-53, seven females and six males). 38 digital images of culturally relevant common objects and food items from the villages were used as stimuli, resulting in 507 responses in total. Following Meir et al. (2010), the number of variants of each stimulus item (across thirteen signers, how many distinct utterances appeared), the frequency of the most common variant (i.e, mode of variants), the number of distinct individual signs, and the frequency of the most common individual sign (i.e., mode of distinct signs) were quantified as a measure of variation. We considered signs to be the same as long as they represented the object in the same iconic way irrespective of their low-level phonetic variations (e.g. finger flexion). A surprising amount of variation was found overall: the 13 signers produced a mean of 8.09 variants per stimulus, with the most common variants having an average frequency of 4.93, a mean of 7.09 distinct signs per stimulus, and the most common distinct signs having an average frequency of 9.25 (see Figure 1 for individual items). Among individual stimulus items, we found cases where no signer produced an identical sign/sign string, cases where signers all produced the same sign/sign string (albeit with phonetic variation), and cases where some signers produced the exact same signs/sign strings, but others produced strings of varying length, word orders and components (see Table 1). Some responses appear to be conventionalized naming of stimuli, while others seem more like descriptions. The difference between the two cases is not clear-cut and stimuli elicit both types of responses. For example, 'cheese' elicits both COW MILKING CUT EAT, a description of where the cheese comes from and what is done with it in chronological order, and CUT^MILKING produced with anti-chronological order and articulatory reductions in the second sign. This process of reducing description to a name due to pressure for ease of articulation mirrors the development of the compound APPLE from homesign to Nicaraguan Sign Language (Morford & Kegl 2000).

Table 1. *Examples of conventionalized, semi-conventionalized, and non-conventionalized items.*

	Elicited Utterance	Frequency of occurence
A conventionalized item: 'Glasses'	LENSES	9
	LENSES TEMPLES	2
	EYES LENSES	2
A semi-conventionalized item: 'Teapot'	TEA POT	5
	TEA POT FLAME	1
	TEA DRINK / TEA DRINK	1
	TEA TALL / TEA TALL	1
	TALL	1
	FLAME PUT-ON POT	1
	TEA POUR POT	1
	TEA POUR	1
	DRINK FLAME CUP	1
A non-conventionalized item: 'Gas tank'	BLOW FLAME	1
	POT-PUT MATCH FLAME	1
	SWITCH TALL WIDE	1
	SWITCH TALL / TALL SMELL	1
	TALL SWITCH	1
	SWITCH FLAME	1
	FLAT SWITCH FLAT	1
	SWITCH / SWITCH	1
	MATCH FLAME WIDE	1
	MATCH SWITCH	1
	SWITCH FLAME SWITCH	1
	SMELL COOK POT-PUT	1
	SWITCH FLAME / FLAME	1

Overall, we find a remarkable degree of lexical variation in the initial stages of a newly emerging system, and a mélange of conventionalized and improvised signs and sign sequences and competing lexical variants. This contrasts sharply with the degree and distribution of variation found in a Deaf community sign language of a similar age (Morgan 2015). We found that despite nonidentical signs/sign strings on many items, signers draw on the same set of signs to fill lexical gaps, and that these gaps are not uniform across signers. These results corroborate the findings on ABSL, SJQCSL, and the signs of Amami Island (Sandler et al. 2011, Hou 2018, Osugi et al. 1999).

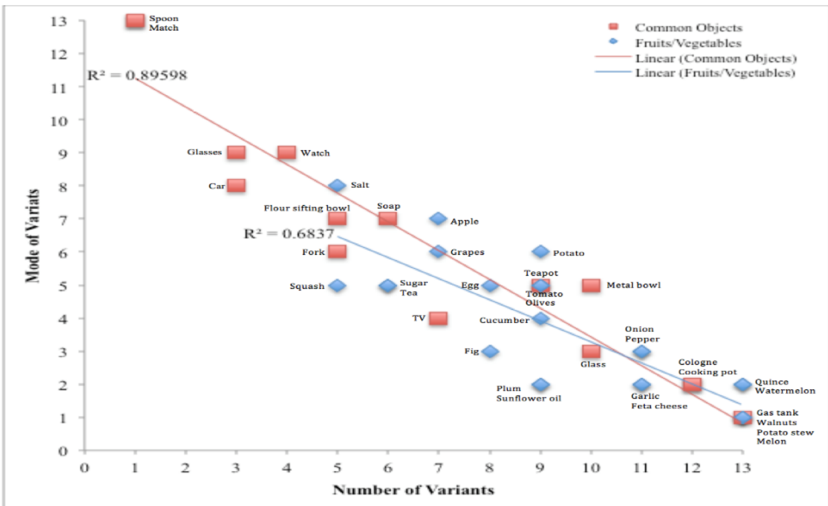

Figure 1. The variation of 38 individual items in terms of number of different utterances elicited and the frequency of the most common identically produced utterance.

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A question? An answer? Why not both?!

Charlotte Hauser

Friday, 17:30-18:30 (SIGNopsis) **– CANCELLED**

In short: During my five minute video I would like to promote the work of a linguist researcher when confronted to sign language data. Based on my work on question-answer pairs [3] in French Sign Language, I want to illustrate how morpho-phonological, semantic and syntactic properties can be uncovered through formal tests based on the linguistic literature. To make it both accessible and entertaining, my video will present a crowd confronted with only the literal gloss of each sign of the sentence instead of having the general translation. While a lot of different propositions may arise from the crowd, the confrontation of the data to formal linguistic tests shall settle the debate.

Scientific background: A growing literature has emerged on sign languages describing a particular construction which looks like a question followed by its fragment answer, but which crucially is not interpreted as such. An example of this construction is given for French Sign Language in (1).

(1) ______________ ___br ________

BOY OFFER GIRL **WHAT** FLOWER[1]

'What the boy offers to the girl are flowers.'

In sign language literature, it has successively been referred to as pseudoclefts (see [7] for American Sign Language (ASL), and [1] for Italian Sign Language (LIS)), rhetorical questions (see [4] onASLand also [5] for some cases in Sign Language of theNetherlands (NGT)), question-answer constituents ([2] for ASL), or, more recently, Question Answer Pairs (QAP) in [5] on NGT. The aim of our video will be to explain how such differences can appear between analyses. To do so, we will show that the comparison of QAP in LSF, ASL, LIS and NGT reveals that the four languages are minimally different from each other with respect to the type and number of clauses that they involve. In all of them, the "question" constituent behaves differently from a proper question with respect to morpho-phonological, semantic and syntactic properties. But while LIS exhibit typical properties of a pseudocleft, LSF however emerges in exhibiting a QAP that is more distant from questions from a syntactic point of view than NGT and ASL, not reaching however the step that LIS displays. Given this state of affairs, we will suggest that there exists a grammaticalization path leading from a purely rhetorical strategy to a proper (pseudo)clefting strategy, and that LSF is on the path between ASL/NGT and LIS. We will therefore follow a very similar proposal made by [5] on the base of the coexistence of different types of QAP in NGT that we extend to the cross-linguistic dimension.

[1] Following conventions established in ([6]), text appearing on top of sentences indicates the presence of a set of non-manual markers which lasting is indicated through spreading of the line going in pair with it. In addition, small caps are used to represent the literal translation of signs.

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Argument realization and event delimitation in Hong Kong Sign Language and Tianjin Sign Language

Jia He & Gladys Tang

Friday, 2.02

Wilbur (2003, 2008, 2009) observes that there is a uniformity in the representation of telicity in lexical verbs across many sign languages, such as American Sign Language, Croatian Sign Language, Italian Sign Language, Australian Sign Language and Sign Language of the Netherlands, etc. She argues that lexical verbs in sign languages display non-arbitrary form-to-meaning mapping, which she terms as "Event Visibility Hypothesis (EVH)". Specifically, telic lexical verbs end with a sharp deceleration/stop, while atelic verb do not.

Recently, following the theories of scales as proposed by Hay at al (1999), Kennedy and McNally (2005) & Kennedy and Levin (2008), Aristodemo and Geraci (2018) claim that scales can be iconically represented in gradable adjectives in Italian Sign Language. Kuhn (2018) further extends the iconic scale analysis of adjectives to capture telicity in events in signed languages. He argues that certain verbs in ASL with phonological path movement iconically represents a scale associated with a change-of-state along three dimensions: (1) time elapses; (2) distance travelled by the hand; (3) maximal distance. End-marking, proposed by Wilbur as a phonetic realization of telicity, actually represents the maximum of a closed scale (Kuhn 2017). For instance, the scale of the verb GROW-UP in ASL is phonologically represented by a path movement of the hand. When the path movement reaches an abrupt stop, the event of GROW-UP will reach the maximal degree of a closed scale, that is the height that the boy finally end up with.

While previous analysis focuses on lexical verbs, in this paper, we will extend it to classifier predicates. In the literature, classifier predicates are morphologically complex constructions and handshape is said to be associated with argument realization, both in terms of external and internal arguments (Benedicto and Brentari 2004; Benedicto et al 2007; Grose et al 2007). Since properties of scales for event delimitation actually comes from properties of the internal argument, we hypothesize that classifiers representing the internal argument will play a role in event delimitation, namely, in the cumulative effect of telicity as a function of verbs and their arguments.
In this paper, we propose that classifier predicates can be further divided into scalar classifier predicates and non-scalar classifier predicates depending on whether the morphological components of the classifier predicate can encode scales for event delimitation or not.

As for scalar classifier predicates, scales for event delimitation, which can be encoded by different morphological components, are also subject to phonological constraints and semantic constraints. For instance, most of semantic classifiers cannot encode size and shape scale but may combine with path movement to encode change of location, due to phonological constraints, in which handshape change is not allowed. Handling classifiers that can potentially encode size and shape property of the object may combine with hand-internal movement, whereas handling classifiers that just encode manner of manipulation without specifying the shape of the object are not compatible with hand-internal movement. But almost all type of classifier predicates can encode scales required for location change.

As for non-scalar classifier predicates, the morphological components of the predicate do not encode scales for event delimitation.

Among the scalar classifier predicates, different morphological components may represent different dimensions of scales. Take SASS as an example, phonologically, hand internal movement of certain SASS classifiers may denote a dynamic event of change of state of an internal argument along the size and shape scale as specified by the verb semantics in event delimitation. The argument “box” in examples (1) and (2), may be analyzed based on different dimensions of scale (height dimension vs. width dimension) through a C-handshape in different orientations. The change along these scales reaches its maximum value (i.e. telic) when the hand internal movement is phonetically marked by an abrupt deceleration or stop (ref. Wilbur 2009). In (1) and (2), it is represented by aperture change from open to closed handshape. In other words, the event of ‘flattening a box’ comes to its natural endpoint when the SASS changed from an open to close C-handshape.

(1) BOX$_i$ BOY$_j$ CL$_{sem\text{-}j}$+CL$_{SASS\text{-}i}$: boy$_j$ sits on the box$_i$ CL$_{SASS\text{-}i}$:box$_i$ flattens (dimension of height)
“The boy flattens a box by sitting on it”

(2) BOX$_i$ CAR$_j$ CL$_{SASS\text{-}j}$+CL$_{SASS\text{-}i}$:car$_j$ hits the box$_i$ CL$_{SASS\text{-}i}$:box$_i$ flattens (dimension of width)
“The boy flattens a box by crashing it”

As for non-scalar classifier predicates, we argue that the morphological components, such as the path movement of the hand or aperture change of the classifier handshape, do not encode scales for event delimitation. Instead, the classifiers for internal argument have the grammatical function of individuation only, turning mass nouns into count ones for event delimitation, following Borer’s assumptions that nouns of natural languages with classifiers are by default mass, as in (3) & (4) and (5) & (6). Classifiers encoded boundedness of internal argument required for event delimitation.

(3) YESTERDAY APPLE$_i$ BOY$_j$ CL$_{SASS}$: eat apple (atelic)
“The boy ate apple(s) yesterday.”

(4) YESTERDAY APPLE$_i$ ONE BOY$_j$ CL$_{SASS}$: eat apple (telic)
“The boy ate one/an apple yesterday.”

(5) YESTERDAY WATER BOY CL$_{SASS}$: drink water (atelic)
“The boy drank water yesterday”

(6) YESTERDAY WATER CL_{SASS}: glass (of water) ONE, BOY CL_{SASS}: drink water (telic)
"The boy drank a glass of water yesterday."

In other words, telicity of non-scalar classifier predicates show similarity to incremental theme verbs in spoken languages (Dowty 1991; Krifka 1998). The telicity is not determined by the lexical meaning of the verb, but by whether the affected theme is quantified or not. Under those circumstances, classifiers turn mass nouns into count ones for event delimitation. Mass nouns without classifier will give rise to atelic events, as shown in (3) and (5), and telic events are encoded by quantified events through classifier predicates.

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The effects of form and meaning in responses chosen by test takers in a language based analogical reasoning assessment

Jon Henner & Emily Carrigan

Friday, 2.03

Introduction: Cognitive linguists have pushed back against the theory that phonology in signed languages are arbitrary (see Occhino, 2017). As Occhino writes, handshapes in American Sign Language (ASL) exhibit "patterned, motivated form-meaning mappings". Here, we explore the extent that form and meaning influence participant abilities to respond appropriately on ASL based analogies that focus on phonological relationships.

Methodology: Data from 952 participants aged 4;6 – 21;6 who completed the American Sign Language Assessment Instrument (ASLAI) between 2012 and 2016 were used in this analysis. **We selected items on the Analogies subtask that focus on ASL phonological awareness (Items 10, 12, 19, and 22) to help us better understand if participants can detect phonological relationships in language based analogical reasoning questions.** We examined the percent of participants who chose each item response, and the distribution of response frequency by age.

Results (Figures 5 & 6): In **item 10 (Figure 1)**, the intended phonological relationship was a *handshape change* (CL:F : CL:C). The prompt was (2h CL:Bent-L), and intended target was (2h CL:C). The majority of test takers chose BIG Dish (2h CL:Bent-L) (which involved a location change but no handshape change). In **item 12 (Figure 2)**, the phonological change was a *location change* (APPLE : ONION, cheek to chin). The prompt was PREFER (on chin), and intended target was HEART (on chest). COMMAND and SERIOUS (both of which share a location with the prompt but use a different movement and handshape, respectively) were selected by more test takers than the target. In **item 19 (Figure 3)** the phonological change was a *movement change* (STAMP : SWEEEP). The prompt was CANS STAMPED VERTICALLY and the target was CANS SWEEP VERTICALLY. Over 60% picked EVERY CAN COLUMN, the correct answer. In **item 22 (Figure 4)***,* the phonological change was a *handshape change* (SINGLE : MASS). The prompt was SINGLE SIT IN CIRCLE. The target was MASS SIT IN CIRCLE. Almost half of respondents chose CROWD IN CIRCLE, the correct answer. 30% chose CROWN (location change). As expected, all of these responses were moderated in different ways by age.

Conclusion: We wondered if children could separate form from meaning and focus solely on phonological relationships. Our results did not provide an easy answer to the question we posed. For some questions (19 and 22) where the form-meaning relationships were more transparent (EACH : EVERY, SINGLE : MASS), test takers chose the correct answer more than incorrect answers. In item 10, (2D : 3D) most participants chose the phonological change that inflected for *size* and not *thickness* suggesting that some form-meaning pairings may exist on a hierarchy. For item 12, participants did not recognize the intended phonological relationship, and instead most often selected answers that shared a location with (and may have been slightly more closely semantically related to) the prompt. To conclude, while our results are interesting and derive from a large number of participants, the research question may be too complicated to answer using only four items. Future attempts to answer this question should rely on the same number of respondents, but also a wider number and variety of items.

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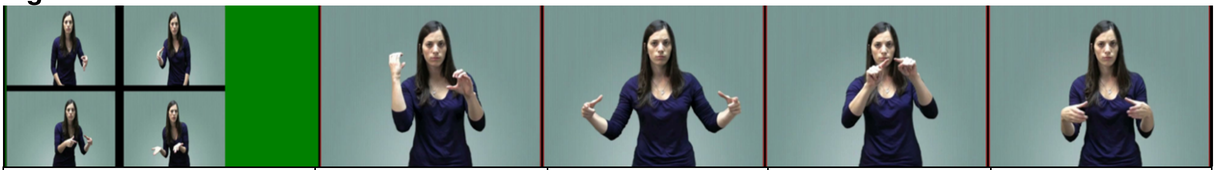
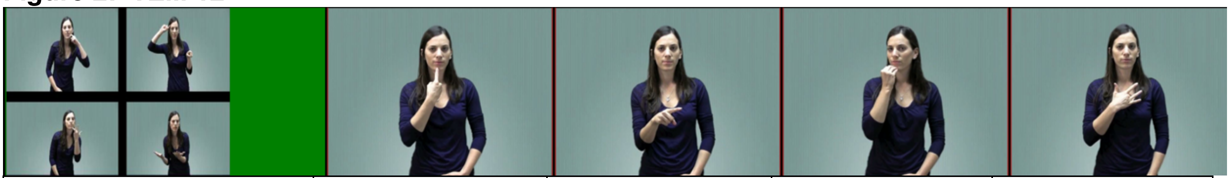
Figure 1: ITEM 10



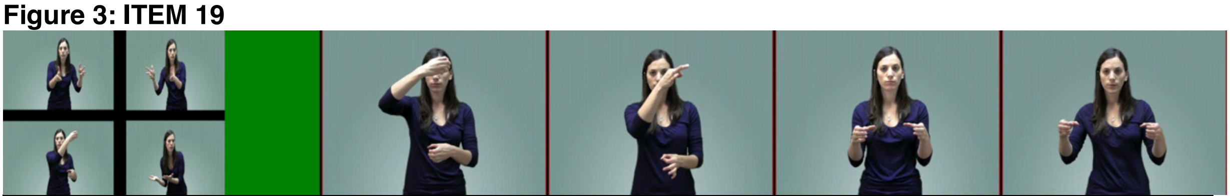
COIN : PIPE :: 2D DISH	**3D PIPE**	**BIG 2D DISH**	**TRACE CIRCLE**	***3D DISH***

Figure 2: ITEM 12



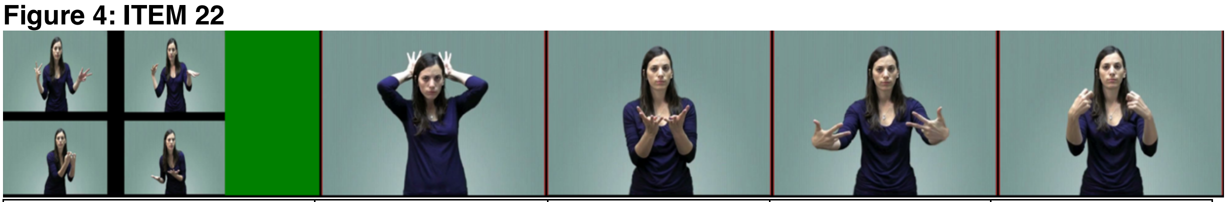
APPLE : ONION :: PREFER	**SERIOUS**	**COMMAND**	**DINNER**	***HEART***

Figure 3: ITEM 19



EACH CAR ROW : EVERY CAR ROW :: EACH CAN COLUMN	***EVERY CAN COLUMN***	**VERTICAL TUBE**	**TWO CANS ROW**	**EVERY CAN ROW**

Figure 4: ITEM 22



CAR IN LINE : TRAFFIC :: SIT CIRCLE	**CROWN**	***CROWD IN CIRCLE***	**CARS IN U SHAPE**	**EACH SITTING IN A CIRCLE**

Figure 5: Percent of test takers who chose responses by item

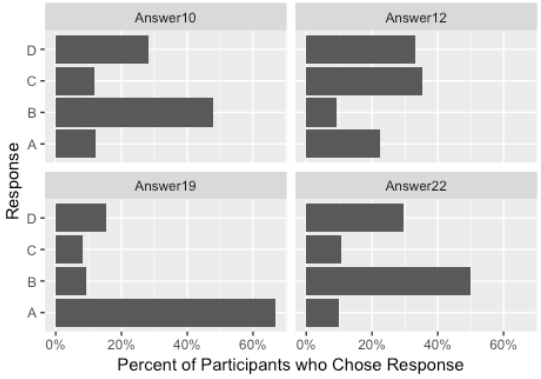
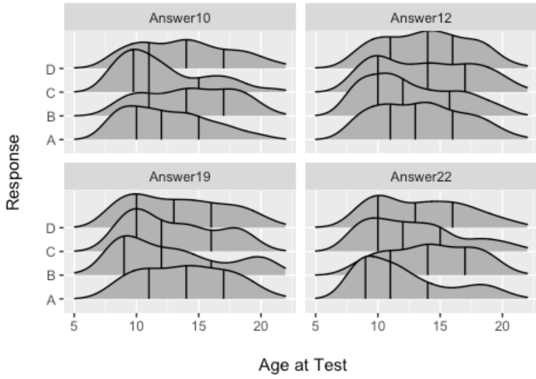


Figure 6: Distribution of response selection by item and age at test



Absence of reduplication in American Sign Language nominal plural morphology

Julie Hochgesang & Amelia Becker

Friday, 2.04

Reduplication is well documented in spoken language nominal plural morphology (Dryer & Haspelmath 2013). Previous work reports that the same process is possible in American Sign Language (ASL). For example, Padden (1998) writes, “Nouns accept plural affixation in the form of reduplication of the stem” (p.43). Other strong theoretical claims have been based upon the assumption of this grammatical process (e.g., Berent et al. 2016). But specific examples and descriptions of data elicitation are lacking, so it is unclear how frequently signers spontaneously apply this process, if at all. The present study asks whether reduplication expones nominal plural morphology in a dataset of naturalistic video-recorded ASL. Our data lack evidence of this process. We are also exploring whether nominal plurality is marked through other phonological forms and have found none so far.

We analyzed the signing of six adult participants in the current dataset of the Sign Language Annotation, Acquisition, Archiving and Sharing (SLAAASh) project, a small specialized child acquisition corpus (Lillo-Martin, Prunier, Hochgesang, & Chen Pichler 2017). Since the dataset is not yet coded for grammatical processes, we searched for repetition as plural morphology through the two methods, which are described below:

<u>Method 1, process and results:</u> SLAAASh annotators code nouns with “unusual repetition” as [+]. We searched for all instances of [+] (excluding pronouns and classifier constructions) and referred to the video data to determine whether the repetition constituted plural morphology or served another purpose, such as emphasis. For example, the screenshot in Figure 1 shows an example of [+] marked for the ASL sign CRACKER. The free translation tier also indicates plural sense in the English translation “Crackers”. This search result would therefore prompt a check of the video data to check the ASL sign itself for plural morphology marked with repetition of the sign.

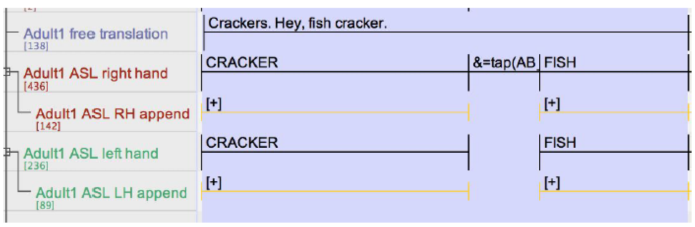


Figure 1. Search result for [+] with plural in English translation (free translation)

Out of 39,382 total signs produced by the six participants, repetition was noted 1,546 times; 291 repeated tokens were nouns, 34 or which were translated as plural on the English free translation tier. However, repetition potentially marked plural meaning in only one instance: the utterance “two classes”, with CLASS signed twice, separated by an added path movement, referred to as “sideward reduplication” (Pfau & Steinbach 2005). TWO and CLASS are shown in Figure 2.

Figure 2. ASL signs for “two” and “class” (ASL Signbank, 2018)

Method 2, process and results: Because [+] relies on annotator intuition and isn’t a direct coding of plural marking, we are also searching the free translation (or English translation) tiers for any utterances with plural marking in the English translations. Search results for words ending in *-s* are hand-checked for plural English nouns. We also search for all irregular plural English nouns (9 total) which occurred in the 1,000 most frequent plural nouns in the Corpus of Contemporary American English spoken language data (Davies 2008). We then referred to the video data to determine whether the relevant ASL nouns were repeated or used any other phonological form to mark plural morphology. This process has been completed for two/six participants and has so far yielded no examples of repetition marking plural morphology on nouns.

Although lack of evidence does not disprove that reduplication *can* mark plural morphology in ASL, this preliminary study represents the first step toward a usage-based verification of an assumption which pervades a large amount of signed language research. The advent of large signed language corpora has only just begun to facilitate such investigation. Thus the significance of this work is two-fold. First, the findings suggest that studies that assume reduplication as a frequent or productive marker of plural morphology in ASL must be re-examined. Second, as signed language corpora become more widely available, other explicit and implicit assumptions about the structure of signed languages should be tested against these data to verify the perceived wisdom of the field.

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Sign language acquisition, annotation, archiving and sharing: The SLAAASh project status report

Julie Hochgesang, Donovan Catt, Deborah Chen Pichler, Corina Goodwin, Carmelina Kennedy, Lee Prunier, Doreen Simons & Diane Lillo-Martin

Thursday, 1.57

Video abstract:

https://www.youtube.com/watch?v=EZT5A5eeBPM

Gallaudet University Documentation of ASL (GUDA) – Whither a corpus for ASL?

Julie Hochgesang, Jennifer Willow, Rafael Treviño & Emily Shaw

Saturday, 3.07

In this presentation, we discuss the challenges of creating a nation-wide representative corpus for American Sign Language and describe our preliminary efforts in sourcing primary data from existing video collections at Gallaudet University to create a language documentation of ASL. We propose that our developing language documentation, the Gallaudet University Documentation of ASL (GUDA), has the potential to become a monitor-style corpus (McEnery & Hardie, 2011). Although not designed as a corpus from the start, GUDA aims to pull together video resources already existing somewhere on Gallaudet from the early 1900s to today showcasing the use of ASL across users, discourse genres and time. GUDA will hold digital centralization, accessibility, cross-disciplinary benefit, community stewardship and collaboration within its core vision (Berez-Kroeker, Gawne, Kung, Kelly, Heston, Holton, Pulsifer, Beaver, Chelliah, Dubinsky, Meier, Thieberger, Rice, & Woodbury, 2018).

One of the challenges to creating a representative and nation-wide ASL corpus is the size of North America and the large diverse communities of Deaf ASL users. The geographical distribution of Deaf Americans is unique compared to signing populations represented by other sign language corpus projects. This need to account for representation of multiple communities within the larger Deaf community in North America presents challenges at every step of corpus development (from collecting the films, to storing/archiving the data, to annotation and analyses). Given that Gallaudet has brought people together from all over North America, it is well-positioned to represent this significant regional variation and the language as a whole over time. GUDA will work to centralize diverse video datasets of ASL use that could be representative of a wide range of ASL usage, language register, settings, and content.

For any corpus to be a “lasting multipurpose record of a language” (Himmelman, 2006), it must include cross-disciplinary cooperation, lasting stakeholder involvement and sustainable resources. Gallaudet University, established over 150 years ago, is uniquely situated to provide all these. GUDA is able to build its digital infrastructure using a web platform supported by Gallaudet University (which is advantageously situated to keep up with modern technological needs and the evolving nature of web accessibility). The digital landing site will act as a point of access for those interested in the data as it is enriched over time even prior to becoming a full corpus, including Deaf community members and researchers both on and off Gallaudet campus. This infrastructure (see Figure 1) will both house data and point to stable sources of data.

Figure 1. An Overview of the GUDA Infrastructure

For existing datasets (primary data only or comprehensive datasets) that already have a stable URL, GUDA will point to these sources and offer searchability through its infrastructure. For other data sources without stable URLs, GUDA will house the data using current video hosting services by Gallaudet (Kaltura). The data sources will be organized and searchable along with their metadata, annotation files (using the SLAAASh data annotation protocols and ASL Signbank (Hochgesang, Lillo-Martin, Crasborn, 2018)), and terms of use through the GUDA landing site. This site is in development and features include graded levels of access and protocols for participant re-consent. This infrastructure is ideal for others to link their research, further enriching GUDA as a monitor corpus. Not only does this provide them the benefit of sharing their data in a platform that they may not have the resources to construct themselves, but it can also fulfil ethical responsibilities by making materials available to their stakeholders. For the community, these collections contain retellings of their histories, stories, culture, and ways of being.

Having been given access to the Deaf communities' histories and languages, linguists reciprocate as stewards. By using already existing ASL video sources, we are salvaging the "digital detritus" (Bird & Simons, 2003) of Gallaudet ASL video collections and hopefully creating a representative ASL corpus that will become a resource. During this massive endeavour, care must be taken to complete and standardize the metadata within collections for more comprehensive searchability resulting in fuller cross-discipline benefit. We also must take special care to document sources accurately and ethically, especially participant consent which will require re-consent measures (Chen Pichler, Hochgesang, Simons, & Lillo-Martin, 2016). Although it may take some extra work that's unprecedented for current best practices for sign language corpora (Fenlon, Schembri, Johnston & Cormier, 2015), it's well worth the effort given that GUDA can become a vital resource to test claims that have been made about ASL in the literature based on a small number of signers and their grammaticality judgments as well as a lasting resource for the creation of new research.

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A corpus-based investigation of how deaf signers signal questions during conversation

Gabrielle Hodge, Jordan Fenlon, Adam Schembri, Trevor Johnston & Kearsy Cormier

Friday, 2.05

How do deaf signers signal questions during their face-to-face conversations? The topic of questions in deaf signed languages has mainly been investigated from the perspective of language structure and linguistic typology, with particular focus on signer's use of manual and/or non-manual elements and how these are distributed cross-linguistically (e.g. Zeshan, 2004). Particular attention has been given to the presence or absence of conventionalised manual question signs in polar and content questions, and the role of non-manual elements such as eyebrow movements, eye aperture, and head and body movements for marking questions grammatically (see Zeshan & Palfreyman, 2017). It has been claimed, for example, that the prototypical marking of polar questions in British Sign Language (BSL) is eyebrows *raised*, eyes *open* and head and body *forward*, whereas content questions are usually marked with *lowered* eyebrows (e.g. Deuchar, 1984; Sutton-Spence & Woll, 1999). Although some early descriptions noted that the distribution of non-manual elements may vary according to other factors such as discourse function (e.g. Deuchar, 1984), these nuances have not been emphasised in practical applications such as signed language teaching. The position of manual WH-elements within content question clause structure, and the implications of this for a rightward versus leftward movement analysis in generative syntax, has also been hotly debated (see Cecchetto, 2012, for an overview). However, many claims in the literature about how deaf signers signal questions have not been based on large samples of spontaneous data. Here we test the application of these claims to BSL by investigating the discourse functions of questions in the BSL Corpus and describing the distribution of attested manual and non-manual elements.

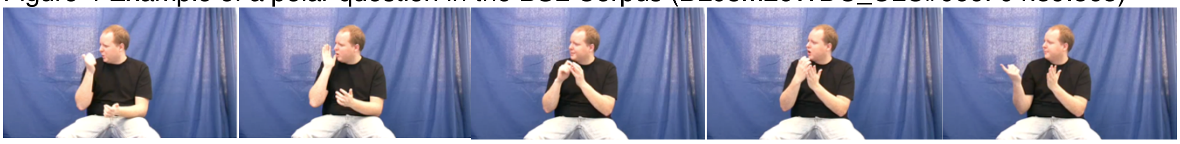
Our aim was to undertake a systematic and comparative investigation of all identified questions in the BSL corpus data using an interactional approach (Stivers & Enfield, 2010). From this perspective, question signalling is seen "not merely as a kind of grammatical structure or illocutionary type, but primarily as a way of mobilising a response from an interactant" (Stivers & Enfield, 2010: 2626). Preliminary results from a pilot investigation of questions (*n*=140) identified in five dyadic conversations in the BSL Corpus demonstrates this approach results in the identification of a wide range of question types. These types range from the information-seeking questions prevalent in the signed language literature (e.g. polar questions, content questions, see Figures 1 and 2 for examples), to repair and interaction-based questions that have so far largely been ignored (but see Manrique, 2017, for one recent exception). Quantitative analysis of all identified types (i.e. not only polar and content questions) suggests that many manual components of questions in BSL appear to be systematic. However, it also suggests that non-manual elements such as eyebrow movements, eye aperture and head/body movements may not be. For example, there appears to be no major differences in the prosodic patterns of eyebrow movements for polar and content questions, with lowered, neutral and raised eyebrows used in both types, with none of these brow positions used prominently to mark one versus the other. In this talk, we present further analysis from 15 additional dyadic conversations and explore alternative explanations for the distribution of non-manual elements in questions as evidenced in corpus data. These include spatio-temporal contextual factors and comparisons with observations from face-to-face conversations between non-signing speakers. We consider what these findings mean for the role of manual and non-manual elements in the domain of questions in signed languages, sociolinguistic variation in BSL and the semiotic diversity of human communication, as well as their application to the teaching of signed languages.

Figure 3 Example of a content question in the BSL Corpus (BL08M26WDC_CLU#028: 02:04.244)

HOW-MANY WANT?

How many teams does he need?

Figure 4 Example of a polar question in the BSL Corpus (BL08M26WDC_CLU#066: 04:59.565)



KNOW HEAR FS:BSL CURRICULUM PT:PRO2SG

Do you know/have you heard of the BSL Charter?

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Chinese Language Influences on Tibetan Sign Language users in Lhasa: Cardinal numbers and days of the week

Theresia Hofer & Keiko Sagara

Friday, 2.06

In a context of increasing influences from spoken and written Chinese on Tibetan languages and Tibetan society within China (Tournadre 2002, 2003; Yeshe 2003), aspects of Chinese and Chinese Sign Languages are also incorporated into the Tibetan Sign Language (TSL) and into TSL-based interactions. This poster offers the first study of how this takes place and presents and analyses influences in two domains: the use and the morphology and phonology of TSL lexical items cardinal numbers and days of the week in day-to-day TSL-based interactions. In these two areas there already exist strong influences from spoken Chinese on spoken Tibetan (Tournadre 2003:4). We analyse original data from ongoing anthropological and linguistic fieldwork with 25 deaf Tibetan signers in Lhasa documenting day-to-day discourse (Hofer) and comparison with typological linguistic research on Chinese Sign Languages based on linguistic elicitation (Sagara). This is in order to contribute to the emerging, but still understudied, field of sign language contact and unimodal sign-bilingualism (Adam 2012: 842).

TSL has been the native sign language of the deaf community, emergent in Lhasa from about the year 2000. It continues to be used as a dominant sign language by about 150 to 200 Tibetan signers today, largely those above 30 years of age. Since 2012, this number is matched by roughly an equal number of deaf Tibetans who are dominant in Chinese Sign Languages (CSLs). They graduated from the local deaf boarding school established in 2000, where Chinese and CSLs are key languages of interaction between students.

In the first part of the poster we discuss daily use of cardinal numbers by TSL-dominant Tibetan signers. TSL has its own system of cardinal numbers that follows closely the written and spoken Tibetan language. We present the TSL signs for cardinal numbers 1 to 10 and of selected numbers between 10 and 100. It is also common that hearing and deaf Tibetans use Chinese numbers in market places in Lhasa, which we present for 1 to 10. We then compare these systems with cardinal numbers in Chinese Sign Languages of the Beijing, Shanghai Lhasa Deaf School varieties. The comparison shows that the numbers used by hearing and deaf Tibetans in Lhasa market places and in the local Deaf School varieties are entirely derived from Chinese numeral systems and have no resemblance to Tibet's own cardinal number systems in gestures and TSL. Based on anthropological fieldwork with deaf Tibetan signers we report that in TSL-based interactions, TSL cardinal numbers continue to be used by some TSL-dominant Tibetan signers, but the majority of TSL-dominant signers are, in a majority of their interactions, borrowing and using Chinese-derived cardinal numbers, even when signing in TSL and with other TSL-dominant signers.

However, when cardinal numbers are used as free morphemes in either compounded lexical items or as grammatical features in TSL, they are not changed to CSL cardinal numbers. Instead TSL cardinal numbers continue to be used, such as in TSL signs for days of the week, which is the topic of the second part of the poster.

Days of the week in spoken and written Tibetan make reference to the planets, such as the sun, moon, and mars (e.g. *gza' nyi-ma* "sun-day", *gza' zla-ba*, "moon-day", *gza' mig-dmar* "mars-day" for Sunday, Monday and Tuesday); modern Chinese, meanwhile, counts the days of the week, starting on Monday with "Day One" (*xingqi yi*) to Sunday as "Day Seven" (*xingqi er*). In speech, Lhasa Tibetans almost always use the Chinese, i.e. *xingqi yi*, "Monday", *xingqi er*, "Tuesday" instead of the traditional terms referring to planets. (Tounadre 2003:4). While many sign languages mirror the spoken and written languages in their references to the planets, TSL signs for days of the week do not do that. Instead, in the first part of the compound signs, one points to parts of the head and face and in the second part they are formed by TSL cardinal numbers from one to seven, starting with one on Monday and ending with seven on Sunday.

The pointing to parts of the head and face in the TSL sign derives from the gestures that accompany Tibetan children's songs about the days of the week, sung in Lhasa pre-schools and during Tibetan language classes in primary school. The correlation between the name of the planets and parts of the face is made via homophones, such as "*migs*" for "eye" which sounds like "*mig*" (mars) as in *gza' mig-dmar* for "Tuesday", even though they have a different spelling. However, instead of just using the pointing to relevant parts of the face and head to refer to days of the week, TSL signers also use the counting of the days akin to modern Chinese "Day One" for Monday, "Day Two" for Tuesday, and so on.

Wider hearing society's use of the Chinese system for counting the days of the week appears to have "rubbed off" on the TSL signs for days of the week. Yet, in contrast to the cardinal numbers discussed above, there is no wholesale borrowing of CSL signs for days of the week, or even use of Chinese number signs. Instead, TSL combines influences from the pointing to parts of face and head (derived from Tibetan children's songs), with counting days of the week using TSL cardinal numbers. As such, this works to "fill in" both parts of the two-part compound terms that are features of the prosody of both spoken/written Tibetan (e.g. *gza' zla-ba*) and spoken Chinese (e.g. *xingqi yi*) for days of the week.

In sum, a "goat-and-sheep sign language" (Hofer, forthcoming) is now emerging in Lhasa, joining the mixing of spoken Tibetan and Chinese languages, known as "speaking half-goat half-sheep", or "neither goat nor sheep language" (*ra-ma-lug skad*) (Tounadre 2002,2003; Yeshe 2003). A common feature of the "goat-and-sheep sign language" is that signs and terms show variable phonological, morphological, semantic and voiced influences from Tibetan and Chinese spoken, written and signed languages. This poster is making a start in documenting these variable pathways in the formation of new signs and their use in signed interactions in the Tibetan context.

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A note on phonological acquisition of novice/L2 signers through a sign repetition task

Ingela Holmström, Magnus Ryttervik & Krister Schönström

Friday, 2.07

This paper has two aims. First, it presents the development of a sign repetition test for novice/L2 signers. The test was originally developed and used within the project Teaching Swedish Sign Language (SSL) as a second language to interpreter students (UTL2) at Stockholm University, Sweden (Holmström 2018). Second, it provides a description of the signers' phonological acquisition from a longitudinal perspective through a qualitative examination of the test outcomes.

Studies on phonological acquisition of L2 signers confirm that phonology is a challenge to acquire among L2 signers (Bochner et al. 2011; Rosen 2004;). With this as a point of departure, in the project UTL2 we developed a sign repetition test, SignRepL2, targeted at L2 signers, with focus on sign structure, i.e., phonological features of signs. Several recent studies have shown that repetition tests are an efficient and reliable tool for measuring language proficiency for both L1 users and L2 learners (Gaillard & Tremblay 2016; Klem et al. 2015). And sign languages seem to provide no exception, as in recent years there has been a growing number of sign language repetition tests, e.g. American Sign Language, ASL-SRT (Hauser et al. 2008), and Swedish Sign Language, SSL-SRT (Schönström 2014).

The procedure in the SignRepL2 test is that the test-taker is instructed to repeat the sign or the short sentences provided in the stimuli as exactly as possible during video recording. In version one, 50 test items were used: 30 single-sign sentences, 10 two-sign sentences and 10 three-sign sentences. However, while the test worked well for the novice signers, a ceiling effect could be observed after one semester. As a consequence, version two of the SignRepL2 was developed by reducing the single-sign sentences from 30 to 10 and by adding 10 new four-sign sentences, now totaling 40 test items.

The scoring of results follows a five-point rating scale as inspired by Ortega (Ortega cited in Gaillard & Trembly 2016). Here, scores from 0 to 4 are used, depending on the degree of correctness of the test responses. If the whole sign or sentence is correctly produced, 4 points are given. If the manual signing is correct but with missing or wrong mouth action, 3 points are given. If at least half of the sign or sentence is correct, 2 points are given, and a correct rate less than half results in 1 point. If the whole sentence is missing or totally wrong, 0 points are given.

To date, The SignRepL2 has been tested on 37 SSL L2 students using a longitudinal approach. The students are tested five times under a period of two years during their SSL interpreting education. The first time was before their first ever SSL instruction, the second session took place after approximately 100 hours of instruction, the third after 200 hours, the fourth after 400 hours, and the fifth after 600 hours. The first three times, the primary version of SignRepL2 was used, and in the last two instances, the second version was used. The whole test procedure takes 10-12 minutes to administer and 30 minutes to score.

In this paper, we will present the test development including the item selection process, scoring and the test results, as well as provide a qualitative examination of the phonological features. In the first test session, it appears that the students primarily try to imitate the actor's manual signs without understanding the meaning of them, and thereby also exclude the mouth movements. In the later test sessions, there is a gradual change from solely an imitation of form to an imitation of the signs connected to their meaning, revealed, e.g., through the increased use of mouth movements and through the errors made when they replace signs that the actor uses with synonyms that they themselves have mastered. The tests also provide opportunities for a deep analysis of phonological features in the students' imitation of the signs, and different phonological errors can be revealed at the group level. For example, the primary results indicate that it is the type of movement that the students most often fail to produce correctly. The results from the five test sessions will be compared to each other, and detected differences between them will be discussed.

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Converging signs: Quantifying similarity and difference in emerging sign systems

Laura Horton & Jason Riggle

Friday, 2.08

It is a common intuition that human language depends on a stable collection of form-meaning mappings – whether spoken words or manual signs – that constitute 'consensus on a set of distinctions' (Hutchins & Hazelhurst 1995). In studies of young and emerging sign languages, we can ask how a shared, conventionalized set of signs develops between signers over time. Within some communities of deaf signers, a shared lexicon conventionalizes quite rapidly, even over a few age-cohorts or several decades – documented cases include young sign languages used in Nicaragua (NSL), Israel (ISL) and Kenya (KSL) (Richie et al., 2014; Israel & Sandler 2009; Morgan 2015, respectively). But rapid lexical convergence seems to be particularly characteristic of urban sign languages. In a comparison of an urban sign language (Israeli Sign Language, ISL) and a rural, village sign language (Al-Sayyid Bedouin Sign Language, ABSL), there was significantly more lexical variation in ABSL (Israel & Sandler, 2009). These findings suggest that the size, composition and character of the signing community have a significant interaction with rates of convergence on a shared set of signs.

In this study, we explore sign convergence for deaf individuals who have not learned a sign language – homesigners – from a town in the northwest highland of Guatemala. The homesigners in this study interact with each other within families or at a local school (Horton, 2018). The data for this study (N=5,892 signs), were elicited with a semi-structured description task completed by ten child homesigners (ages 8-16) and their communication partners. We use two different quantitative measures to compare the sets of signs that each participant produced. The first measure is a similarity measure for comparing sets, the jaccard index, that quantifies sign form convergence across participants. Convergence is understood to be the degree to which two signers produce the same sign forms to describe the same stimulus item (Richie et al., 2014; Hall et al., 2016). For a given stimulus item, we compare the set of signs that signer A produces to the set of signs that signer B produces (fig 1). We computed the jaccard similarity index for each stimuli item that a pair of participants described, then averaged the scores for each pair (N=1,238 pairs, range .06-.51, see fig 2). We find greater convergence between pairs of homesigners and their communication partners when they are in contact, within peer or family ecologies, compared to homesigners who have never interacted with each other $F(1, 1{,}214) = 240.6$, $p < .001$. Thus interaction between homesigners does support greater convergence of sign form. However, there are pairs of signers who are never in contact who have high rates of convergence.

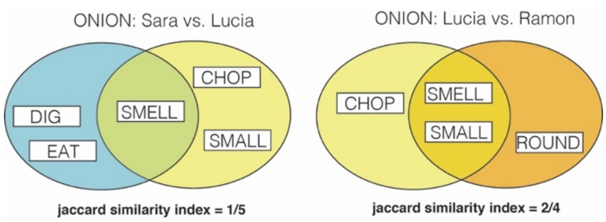

Figure 1. Sample Jaccard Index
Calculated by comparing the intersection of signs (produced by both signers to the union of all the signs that both signers produced

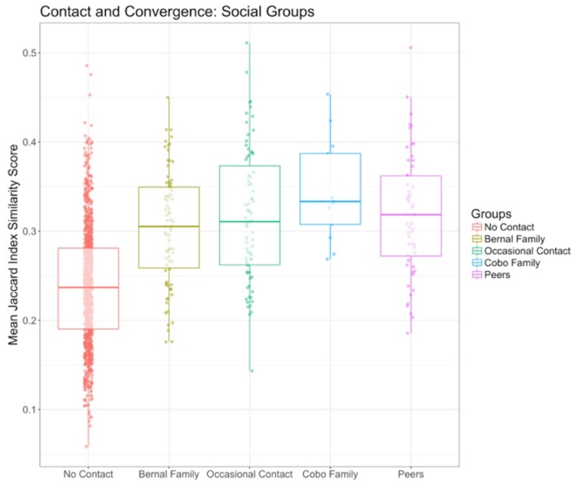

Figure 2. Jaccard Index Comparisons for all Pairs
Mean jaccard scores for: signers not in contact (red), signers in individual ecologies (gold), signers in family ecologies (blue, turquoise), signers in school ecology (purple)

The second quantitative measure that we use compares the proportion of forms that a signer produced for only one stimuli item in their elicitation session (the hapax legomenon) to the most common sign form produced across all of the stimuli items in a given session (fig 3). Each signer is plotted relative to these two measures in figure 4. We find that homesigners who interact with other homesigners at school are more likely to have a high proportion of signs that are produced to describe only one stimuli item (hapax legomenon signs), and are thus maximally informative but relatively infrequent. Homesigners who interact with other homesigners in their family at home are more likely to have an equal proportion of signs that are produced for only one stimulus item and signs that are common across multiple stimulus items. Thus we find that, in addition to different rates of convergence on the same sign forms for the same stimulus item, the distribution of maximally informative (but relatively infrequent) signs that homesigners produce is affected by the degree to which they interact with other signers, the context of those interactions, and the frequency of those interactions (fig 4). We find that rates of convergence vary based on the type of communicative ecology – family, school or individual, with higher convergence between signers who interact with each other at school. We also profile each signer's set of signs using a measure of lexical richness, and find that certain richness profiles are associated with particular ecologies. This work underscores the role of social networks in lexical convergence, as well as the value of using multiple measures of similarity to compare sets of signs.

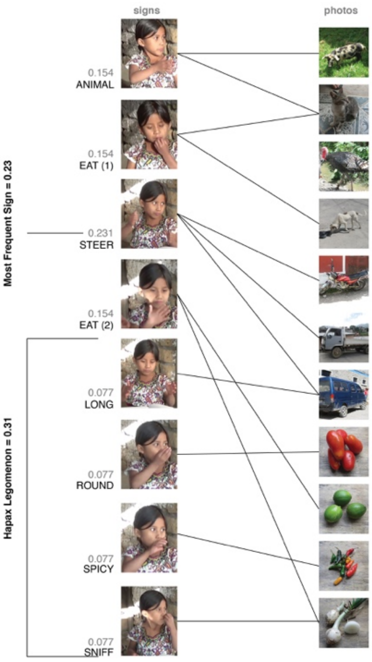

Figure 3. Sample Lexical Richness Scores

Scores based on the proportion of signs that are produced for only one stimulus item and the sign that is produced most frequently

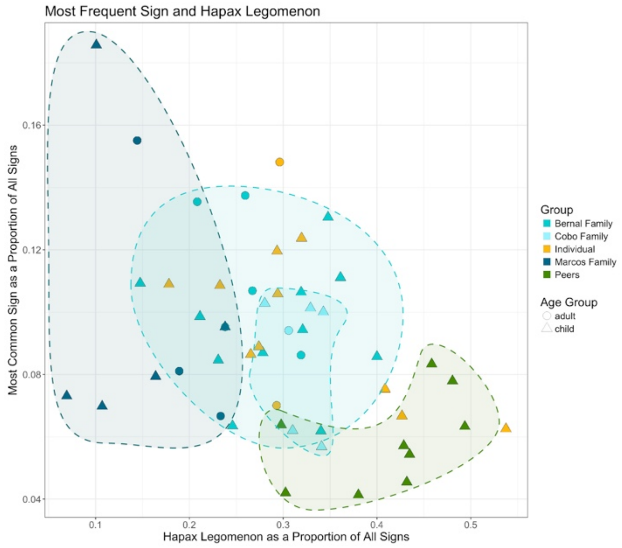

Figure 4. Lexical Richness Scores for all Participants

Participants from school (peer) ecology shown in green, Participants from family ecologies shown in turquoise and blue. Participants who are in individual ecologies in yellow.

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The life stories of deaf elderly people: How did deaf people, born between 1930 and 1950 and raised in Germany, find their work profession?

Jana Hosemann & Jens-Michael Cramer

Friday, 17:30-18:30 (SIGNopsis)

Background. A Deaf person, who was born between 1930 and 1950 in Germany, had to directly experience the consequences of the Milan Congress of 1880: In Schools, signing and teaching in German Sign Language (DGS) was prohibited and deaf children were educated orally by the “German method”. Hence, the focus in school education lay mainly on the articulation of spoken German. As an effect of this education method, deaf children at that time had major difficulties in communicating with and understanding their teachers, which led to a delay in their early knowledge acquisition. Their independence was not encouraged. Of course, this had consequences for their whole life. One of the consequences was that deaf young adults, raised after World War II had difficulties finding an apprenticeship or a professional education. Therefore, the education and the self-confidence of the deaf minority culture in Germany was thereby considerably impaired, something that still influences the Deaf German culture nowadays.

Aims. As part of the EU project "The Sign Hub", the life stories of 50 Deaf seniors aged 70 and older from all over Germany were collected in video interviews. In our SIGNopsis, we present the professional background biography of these Deaf seniors and show, how they found their profession in the earlier days, and what chances they had. What influenced their choice on an apprenticeship or a professional education after school? And did this educational choice lead to a personal satisfaction of the deaf seniors? Was this choice influenced by their families or peers? How many options did Deaf people have during the 1950ies and 1960ies in finding a profession? Was the profession accepted in their social environment? This is in particular interesting when comparing the situation of elderly Deaf people in their times and young Deaf people nowadays. Can be observe a fundamental change?

Methodology. The interviews of the Deaf seniors are annotated with ELAN and forms the basis to analyze the life stories according to the professional background biography of Deaf people of the postwar generation. 50 interviews with Deaf seniors over the age of 70 were evaluated in terms of content and statistics with regard to the question of their profession.

Discussion. Many Deaf seniors report that they did not find their professional background themselves. In many ways, the decision for the deaf people were taken by teacher, parents or others. We will give a short glimpse in the historic background of deaf seniors and show how their life has been 70 years ago. We also show what seems to have changed compared to present generations.

Looking at LOOK-AT collocations in American Sign Language

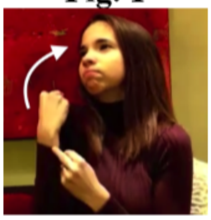
Lynn Hou

Friday, 2.09

Collocations, or sequential combination of linguistic units, are a severely understudied topic in sign languages, with the exception of Wilkinson (2016) for NOT collocations in American Sign Language (ASL). This talk advances our understanding of collocations in ASL from a discourse-functional lens, focusing on a high-frequency sign glossed as LOOK or LOOK-AT. The LOOK-AT collocations that mark subjectivity offer compelling evidence for the grammaticalization of the sign from a visual perception verb to a cognitive verb.

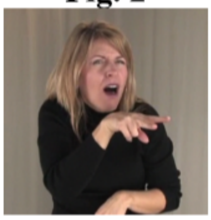
Analysis of the functions of a family of LOOK-AT words examined 844 tokens from 55 unique deaf signers in a dataset of 14h 30m of naturalistic Internet ASL (Hou, Lepic, & Anible, in prep.). We identified two broad functions of LOOK-AT: Vision and Reaction. *Vision* pertains to physical or metaphorical sight (Fig. 1). *Reaction* pertains to one's subjective experience of reacting at a visual stimulus (Fig. 2). The latter often exhibits formational change: phonetic reduction in the number of hands (from two to one) and path movement (from directional to little), along with more affective facial expressions.

Fig. 1



LOOK-AT as metaphorical vision (reminiscing)

Fig. 2



LOOK-AT as reaction

395 LOOK-AT tokens were analyzed for collocations in those two broad functions (Vision, $n = 291$; Reaction, $n = 71$, others were ambiguous). The collocations revealed distinct syntactic environments. When LOOK-AT encodes the vision function, it is followed by an object marking an external stimulus e.g. the flood as the object of watching in Fig. 3.

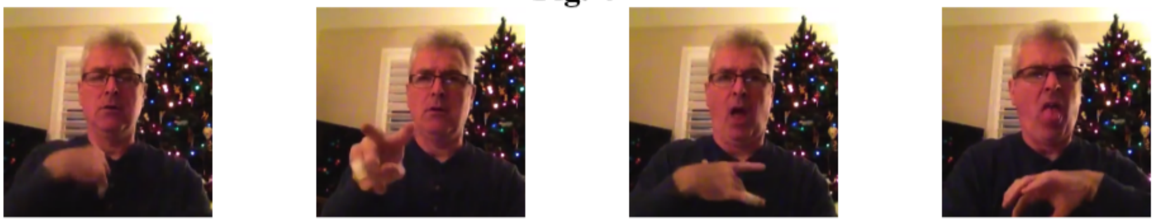
Fig. 3

MUST LOOK-AT FOR LOW FLOOD-LOW FLOOD-HIGH

Ex. 1: "(We) must <u>watch</u> out for the low floods rising rapidly…"
Source: https://tinyurl.com/y3hfzu3j, timestamp: 00:01:18

For reaction functions, look-at is followed by a complement clause or a predicate that marks the subjectivity, representing the narrator's thoughts or feelings about the external stimulus, e.g. the signer's reaction to a video in Fig. 4 and to another person in Fig. 5. The complement clause functions as a quotative construction, analogous to subordinating *BE-like* ["and I was like…"] in colloquial English, and tends to have an overly explicit cognitive verb such as feel, wonder, or know. The predicate is also cognitive in nature e.g. be-puzzled.

Fig. 4



ME LOOK-AT FEEL STOMACH-TURN

Ex. 2: "I looked at (the video), felt my stomach turned…"
Source: https://www.youtube.com/watch?v=qr2lFaJEh_I, timestamp: 00:00:36

Out of 71 collocations, 60 contain the string X+LOOK-AT+Y. The X is instantiated by a first-person pronoun, a non-first person pronoun, or a noun designating a human entity. The Y is instantiated by a cognitive predicate, a cognitive verb, a quotative construction, or a combination of these two elements in the same clause. The most frequent collocation is (PRO)NOUN+LOOK+OIC (OIC "oh I see") (*n* = 12), which is a more fixed expression of X+LOOK-AT+Y. Fig. 5 shows ME+LOOK-AT+OIC. This type of collocation gets their meaning from the discourse, and moreover demonstrates that signers process this collocation as a chunking unit.

Such LOOK-AT collocations corroborate the phenomenon of high-frequency words undergoing phonetic reduction and semantic bleaching in certain syntactic environments (Bybee 2001). The ASL sign LOOK-AT is grammaticalizing from a visual perception verb marking an object to a cognitive verb that spotlights one's reaction to an external stimulus.

Fig. 5: ME+LOOK-AT+OIC as a conventionalized collocation

ME LOOK-AT OIC

Ex. 3: "<u>I realized</u> that she did not understand the severity of my situation…"
Source: https://www.youtube.com/watch?v=pDSNKRaOmo8, timestamp: 00:02:19

Selected references. Hou, Lepic, & Anible. In prep. *When looks count: the function and distribution of* LOOK-AT in American Sign Language. Manuscript. | **Bybee, Joan. 2001.** *Phonology and language use.* Cambridge, MA: CUP. | **Wilkinson, Erin. 2016.** Finding frequency effects in the usage of NOT collocations in American Sign Language. *Sign Language & Linguistics* 19:1. 82-123.

The trial caught in the middle. An analysis of the trial in DGS as a phenomenon between dual and paucal

Britta Illmer

Friday, 17:30-18:30 (SIGNopsis)

Background

Natural languages provide different possibilities to refer to subjects or objects. German and many other Indo-European pronouns are classified into different types, such as personal and possessive pronouns with inclusive and exclusive of narrator variants. Many Non-Indo-European languages exhibit, for instance, clitical personal pronouns or affixes.In spoken German, the personal pronoun \`wir\` (engl. \`we\`, first person plural) may exclude a third person, when adding a reinforcing \`beide\` (engl. \`both\`) (cf. Kordić 1999). Sign languages broadly differentiate the number singular, the two different forms of the collective and the distributive plural, as well as the number *dual* (SignGram Blueprint 2017, Part of speech 3.7.2.2). Very little is known about the possible occurrence of further pronominal number categories beyond singular and plural. Studies by McBurney (2002, 2004) and Cormier (2002) discuss whether the 3-, 4-, and 5-hand forms belong to the grammatical number category or, according to Cormier, are a cardinal-specific number inAmerican Sign Language.

Study

Due to the visual-gestural modality that realizes personal pronouns using the index hand, and the fact that the human anatomy usually provides ten fingers, this study is particularly interested in how and when these options are used by native signers when it comes to referring to an exact number of fewer than eleven entities. The focus of this study is on a frequently observed phenomenon in German Sign Language (DGS) namely the reference to three, four, or five people, employing an indexical 3-, 4- or 5-handshape. This work is based so far on a qualitative data analysis. The elicitation of the data was a guided interview of three native signers of DGS including a picture-based production task using images of entities with the same or a different appearance or behavior.

Results

The preliminary results indicate that the indexical 3-, 4-, and 5- handshapes are used when referring to a group of the respective number of entities and only if the entities show the same appearance or behavior. Furthermore, the data reveal that they can be produced in an exclusive and inclusive way. Moreover, the investigation shows that there is no variation between the dual and the three other handshapes in the phonological parameters movement (optional lateral or circling motion) and orientation (immediate indexical; no combined form like 3-MONTH). There is a distinction indicated by the mouthing, \`beide\` for two but \`drei\` for three, \`vier\` for four and \`fünf\` for five entities. However, in German \`beide\` (both) means the same as \`zwei\` (two) in German (Kaltschmidt, 1839). The data also demonstrate constraints on the implementation of a pronominal reference for a certain number of entities from six ascending. This shows, that there is a boundary between the 5- and the 6-handshape, possibly due to economical reasons (bimanual movement restriction; two different handshapes but one movement). I argue that the forms of the dual and the indexical 3-, 4- and 5 handshape constitute their own grammatical categories of number in DGS. In this case, it would also have implications for the plural, which would only begin with reference to six entities. In addition, it would be necessary to examine whether a paucal is applicable between the quintal and the plural (cf. Corbett 2000). However, no reliable statistical conclusions can yet be drawn. Consequently these results will be examined and evaluated by a corpus study.

Sentence segmentation in spontaneously produced DGS utterances with varying text formats

Elena Jahn

Friday, 2.10

This corpus study investigates well-known, but still urgent questions regarding the identification of sentences in spontaneously produced utterances of German Sign Language (DGS). Due to the difficulties in building sign language corpora (see: [1], [2], [3], and [10]), there is no comparable set of data investigated yet. By means of an online task, in which participants are asked to mark sentence endings, a data set of German Sign Language will be examined. This data-set, namely the Public DGS-corpus (see: [8]), provides around 50 hours of different signed text formats, such as conversations, narrations, discussions, retellings and other formats. Informants in this corpus are balanced between sex, three different age groups and regions of origin. With the study described here I aim to enrich an existing set of natural DGS-data, from the Public DGS-corpus, with sentence boundary segmentations by native deaf DGS-signers.

Background: A translation into sentences is a common and important practice for both signed and spoken corpora. Still, it remains unclear what a spoken or signed sentence exactly is. Although there is a long tradition of attempting at a definition, an agreement has not been found yet (see: [9]). With the definition of sentences in spoken languages being problematic, an attempt to define sentences in sign languages is even more challenging. Instead, translations of signed texts into spoken or written texts are commonly based on the assumption that signed sentences correspond to the sentences of the surrounding language. On the other hand, sign languages are also characterized as being independent of the surrounding language. Thus the correspondence of sentences in a sign language and in the surrounding spoken language is not yet proven.

Goal of the study: With my study I pursue a different approach, namely relying on the intuition of native signers and their ability to identify a sentence in their native language. On that basis, a frequency-based description of DGS-sentences will be provided. The task chosen is inspired by Fenlon et al., 2007 [4], who test native signers of two different sign languages as well as non-signers. Participants were asked to press a button when they would see a sentence end. The stimuli used were prepared, well-known narrations. The study shows that both signers and non-signers can identify sentence endings with high precision. With the study reported on here, I aim at showing that signers can identify sentence endings in different text formats and within spontaneously produced, natural signing. However, I expect to find differences between the precision rates depending on the text formats. In the following, I will report on a first study, designed to select the most appropriate test method, and it’s results.

Methodology: The study was performed with 4 deaf, native DGS signers. Files were presented in ELAN segmentation mode. The procedure of the study, the setting of the original film studio (see: [6]) and the task were explained. After a practice stimulus, four stimuli were presented. In a 4x4 design, the region of origin (Stuttgart, Münster) and the text format (process description, experiences as a deaf person) were varied. Also, methods were varied for each stimulus: participants were allowed / not allowed to watch the film as a whole before starting the segmentation and allowed / not allowed to adjust their segmentations afterwards.

Methodological results: Participants consider it important to be able to watch the respective film before starting the task. In general, participants agreed that the task is challenging, but manageable after having internalized it, thus adjustments afterwards are rarely necessary. All participants reported that the personal signing style of the informant as well as the speed of signing have an impact on the perception of sentence boundaries. The influence of signing speed on prosodic boundaries has also been shown by e.g. Grosjean, 1979 and Wilbur, 2009 [5], [13]. The impact of signing rate on sentence perception is an interesting new topic to investigate.

Analysis: Following Fenlon et al. (2007) [4], for the analysis of segmentation agreement a time window of 1,5 seconds was set. A 'hit' was counted when the time between two segmentations was below 1,5 seconds with one or two additional segmentations within this frame (thus, boundaries agreed upon by two out of four participants were not counted). The analysis showed that a time window of 1,5 seconds is a dispensable length, since the mean durations of segmentation agreement time windows in all four stimuli was 608,63 milliseconds. Thus, the time window for further tests will be reduced to one second.

Results: In general, both a manual analysis and the feedback of the participants suggested that whether a sentence boundary is perceived as such is highly depending on the signing style of the informant. Firstly, participants reported a need to "get into" the signing of the unknown informant, before sentence boundaries were perceived consistently. Secondly, the informants differ with respect to what is used as sentence boundary marker. While one informant uses a palm-up gesture with high consistency to mark sentence endings, another informant uses the sign for "finish" more often and tends to drop her hands to her lab when finished a sentence. Further behaviour that led to higher consistency in sentence segmentation was holding a sign longer than usual and changing the orientation of the body from forward to backward or from one side to the other (as already described in literature, see: [7], [11], [12]).

Participants differ with respect to what is understood as a sentence. Especially interesting are two participants, which are highly consistent in their sentence segmentations, except for the fact that one participant segmented main sentences from sub sentences, while the other segmented whole sentences. See for example:

Translation: I didn't want to do it in the beginning because I can't fingerspell.

Signs: | BEGIN I TO-WANT NO | REASON ALPHABET I CAN(neg) |

Participant 1: | |

Participant 2: |

While Participant 1 marks main sentences and sub-sentences, participant 2 marks whole sentences. This shows that both participants have a similar idea of where a DGS-sentence ends, however the task needs to be more precisely formulated.
So far, no influence of text type on the frequency of sentence boundaries was found. However, more participants as well as more text formats must be tested to clarify the picture. Further participants will be investigated adapting the methodology according to the results.

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The more you move, the more action you construct – A motion capture study on head and upper-torso movements in constructed action in Finnish Sign Language narratives

Tommi Jantunen, Danny De Weerdt, Birgitta Burger & Anna Puupponen

Saturday, 14:30-15:00

In this presentation we use motion capture (MoCap) technology to investigate the characteristics of head and upper-torso movements in constructed action (CA) and regular narration (RN) in Finnish Sign Language. We define CA as depictive gestural enactment in which signers use their hands and other parts of the body to show the actions, feelings, thoughts and sayings of characters they are referring to in the discourse (e.g. Cormier et al. 2015; Ferrara & Hodge 2018). In corpus-based work, CA has been argued to form a continuum with RN, so that the articulatory border between the two is fuzzy and never clear cut (e.g. Cormier et al. 2015; Jantunen 2017). On the basis of the number of enacting articulators, it has also been argued that CA can be divided into three prototypes, which have been labeled overt, reduced and subtle CA (e.g. Cormier et al. 2015). In the presentation we focus on these two arguments and evaluate their validity from a kinematic perspective.

Our work is based on a collection of synchronized MoCap and video data that has been annotated in ELAN for the three CA types and RN, according to the guidelines presented in Cormier et al. (2015). In the recording sessions, signers wore a set of 25 reflective markers whose locations were tracked with an eight-camera optical MoCap system. The task of the signers was to re-tell the content of textless cartoon strips to an addressee standing in front of them. For the present work we used data from five signers, who each participated in three tasks. First, on the basis of ELAN annotations, we extracted a total sample of 137 durationally commensurable tokens belonging to the four types of overt (n=28), reduced (n=34) and subtle (n=19) CA as well as RN (n=56). We then processed the MoCap data of these tokens in Matlab, using the MoCap Toolbox (Burger & Toiviainen 2013), so that we ended up with type-specific means across six parameters that measured the horizontal movement area as well as the speed and acceleration of the head and upper torso. In order to find out the relation between each type within each parameter, we imported all the data into SPSS for statistical analysis and also investigated the data qualitatively on the basis of graphic descriptors.

Figure 1 summarizes the main results, showing the four parameters that included significant differences ($p<.05$) between the types found by running the Independent-Samples Kruskal-Wallis test with pairwise comparisons. In general, the statistical test indicates that significant differences are found only between the “extremes”, that is, between RN and reduced/overt CA, or subtle CA and overt CA. In other words, in terms of the investigated parameters, subtle CA is not significantly different from RN, nor is reduced CA significantly different from overt and subtle CA. Qualitatively, the results also indicate that the size of the movement area of the head and the upper torso, as well as the speed and acceleration of the head, tend to correlate positively with the amount of CA: the more CA there is, the larger tends to be the horizontal area on which the head and the torso move, and the faster and more rapid are the head movements.

The results speak in favor of a continuum-like relationship between CA and RN and, because of the definition of CA, also provide additional evidence for the view that gestural features – e.g. gradience and unconventionality – are an inseparable part of language (e.g. Kendon 2004; Enfield 2009). However, because reduced CA is not distinguished from subtle and overt CA, the results do not fully support the present three-part typology of CA, but instead suggest that CA is divided internally into only two subtypes (e.g. strong CA and weak CA). In our presentation, we will present the results and discuss the conclusions in more detail.

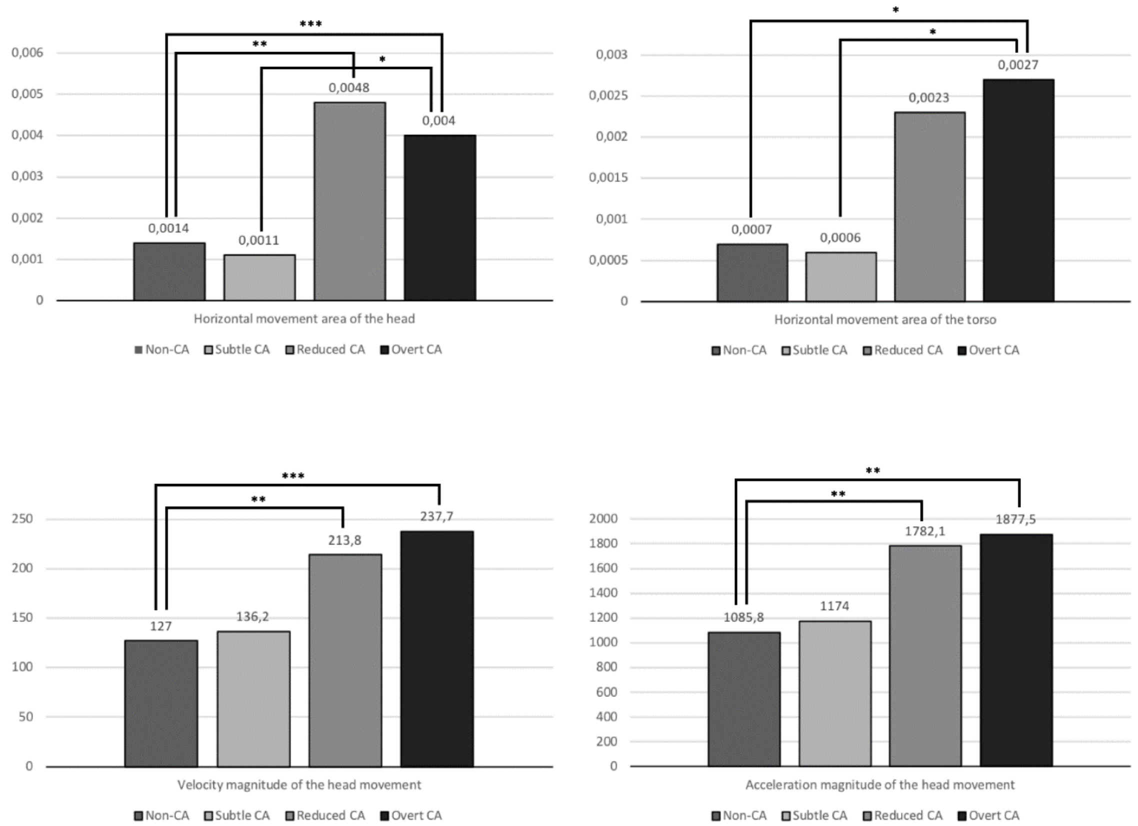

Figure 1. Summary of the significant (p<.05) results of the Independent-Samples Kruskal-Wallis test. In the legends, regular narration (RN) is labelled non-CA.

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Language contact situation between Israeli Sign Language and Kfar Qassem Sign Language: A case of code-switching or borrowing?

Marah Jaraisy & Rose Stamp

Friday, 2.11

Contact between multiple sign languages is an increasing phenomenon nowadays, as a result of globalization, increased mobility and changes in communication styles (e.g., social media). Despite the increase in contact situations, few studies have documented the impact of language contact on language change in sign languages (e.g. Lucas & Valli, 1992; Quinto-Pozos, 2007; Yoel, 2007; Adam, 2012). Similar to spoken languages, sign languages contact results in various language contact phenomena. One of these outcomes is code-switching, in which bilinguals switch from one language to another within the same discourse (Haspelmath, 2009). This has been investigated from several different aspects. As shown by Quinto-Pozos (2007) and Adam (2012), in situations where two sign languages come into constant contact, code-switching is common among bilingual signers. Also, Nonaka (2004) describes a situation of code-switching from Ban Khor Sign Language (BKSL) to Thai Sign Language (two sign languages from Thailand) in which a sign for the colour purple, for instance, is not found in BKSL, motivating the signer to code-switch.

In some cases, code-switching leads to lexical borrowing, in which the loaned lexical item goes through a process of linguistic adaptation and becomes a permanent part of the recipient language (Hoffer, 2002). For this reason, some linguists describe code-switching and borrowing as existing on a continuum (Heath 1989; Romaine 1989; Myers-Scotton 1992).

When looking at a bilingual speaker or signer, the difficulty is in deciding whether the use of a foreign lexical item in a speaker or signer's repertoire is an example of code-switching or borrowing. Often speakers change the pronunciation of a lexical item to fit the template of their native language. However, it is difficult to determine whether an instance is an example of code-switching or borrowing in sign languages, especially in a single-sign switch (Quinto-Pozos, 2007; Haspelmath, 2009). Besides, in an example of lexical borrowing in sign languages, what does it mean to change the pronunciation of a sign to fit the native language? The main research question in this study is "how can we tell the difference between code-switching or borrowing in a sign language?"

In this study, we look at the unique situation of language contact in Israel, where the younger generation of deaf signers living in a town in the north of Israel, Kfar Qassem, are exposed to two sign languages: the local sign language, Kfar Qassem Sign Language (KQSL) and the sign language used by the majority of signers across Israel, Israeli Sign Language (ISL). KQSL emerged in an Arab town in the Triangle area of Northern Israel around 90 years ago, when a high number of deaf children were born into the community and there was a need to communicate using a visual modality. This developed into a full language and is now used by around 100 deaf people in a community of roughly 20,000 (Kastner et al., 2014). The first generations of KQSL signers did not attend school and so the language remained uninfluenced by the surrounding spoken or signed language used in Israel. Thereby, the first generation is considered monolingual. However, nowadays the younger signers in Kfar Qassem attend school, and interact with the wider Israeli Deaf community whose first language is ISL (a sign language used by approximately 10,000 deaf people across Israel (Meir & Sandler, 2008)). KQSL younger generation community is also fully integrated with social media as all young people these days. With this change, the younger generation is considered bilingual.

In this study, we investigate the sign-language contact situation taking place in KQSL community among both, the older generation who are considered monolinguals, and the younger one who are considered bilingual.

In a preliminary study we recruited 12 deaf bilingual signers, fluent in KQSL as their native sign language and ISL as their second language. We elicited semi-spontaneous narrative data in which signers were asked to re-tell the events that occurred in a video story to a partner of the same age. Signers were divided into two age groups, younger signers (20-29 years old) and older signers (30+ years). The results revealed that roughly 10% of signs produced were examples of switches into ISL. Switches were mostly single signs and most often occurred for nouns (e.g. 'man'), followed by verbs (e.g. 'run') and finally other parts of speech such as adjectives, adverbs and prepositions. To our surprise, there was no age effect on the frequency of switching, despite the fact that language contact has increased for the youngest generation. These results taken together seem to suggest that the switching observed may be examples of lexical borrowing, influencing all ages of the language as well as monolinguals. In order to investigate whether what we see here is code-switching or lexical borrowing, we compare this bilingual group with a monolingual group of KQSL signers, whose exposure to ISL is minimal.

In our presentation, we will compare our preliminary results from 12 bilingual signers to the signing productions of 12 monolingual KQSL signers (aged 39-70), performing the same task. We will give a thorough account of the type of switching, the distribution in terms of parts-of speech and the consistency of the switching in our discussion. Our study will be one of the first to tease apart the differences between code-switching and borrowing in a bilingual sign language community and we will offer insights into what this means for the future of smaller communities like KQSL.

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Constructed sign sentences in Swedish Sign Language dictionary

Nikolaus Riemer Kankkonen, Joel Bäckström & Magnus Ryttervik

Friday, 2.12

Video abstract:

https://ling33.ling.su.se/Videos/Tsp/NK/KANKKONEN_BACKSTROM_RYTTERVIK_lexical_setences.mp4

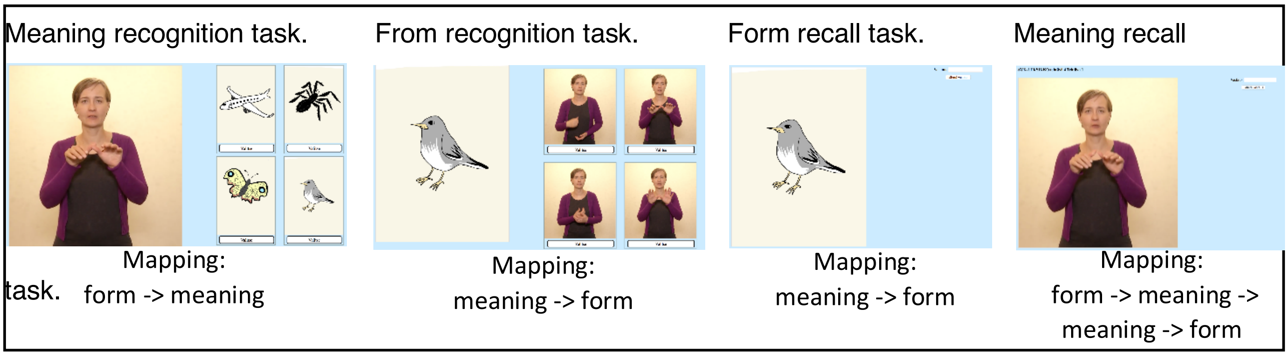
A pilot investigation of mappings between phonological form and meaning in Finnish Sign Language signs among deaf and hearing native signers aged 4-15 years

Laura Kanto & Wolfgang Mann

Friday, 2.13

When building more complex and organized semantic network in their growing vocabulary, children create an initial mapping between phonological form and meaning of new lexical items acquired (Clark, 2009). The phonological form of a lexical item gives the child access to its meaning and, at the same time, meaning provides access to the phonological form. The British Sign Language Vocabulary Test (BSL-VT, Mann, 2009) was developed to examine variation in deaf children’s understanding of four different mappings between phonological form and meaning in single BSL signs (Mann & Marshall, 2012), namely *meaning recognition (matching a sign to four pictures)*, *form recognition (matching a picture to four signs)*, *form recall (picture naming)*, and *meaning recall (repeated sign association).* It draws on a model from second language acquisition which proposes that the relationship between word form and word meaning can be expressed in four degrees of strength (Laufer, Elder, Hill & Congdon, 2004).

In the presented study we explored this variation in understanding in Finnish children acquiring Finnish Sign Language (FinSL) signs. To do this we adapted the BSL-VT for FinSL following the steps outlined by Enns & Herman (2011) and Mann, Roy & Morgan, (2016). In addition we investigated whether mappings we observe in FinSL form the same hierarchy of the degrees of strength as previously reported for BSL (Mann & Marshall, 2012) and ASL (Mann, Roy, & Morgan, 2016).



***Picture 1**: FinSL-VT task.*

Method

Participants: 24 children (seven deaf and 12 CODAs) (Mean age 9;9 years, SD 3;5 years) participated in the study. All children had at least one deaf parent and acquired FinSL since birth.

Materials: Participants completed a biographical questionnaire and the four FinSL vocabulary tasks (two receptive + two expressive). Each of the four tasks contained 120 items. These items were the same across tasks (see picture 1).

Procedures: The test was presented on a laptop computer by a team of deaf and hearing administers all of whom were native or near native signers. The responses to both receptive vocabulary tasks were automatically saved onto an Excel datasheet on the Web server. For the production tasks, responses were typed as glosses into a text box on the screen by the test administer. All responses were videorecorded, as well. To minimise learning effect, the tasks were administered in the following order: Form recall, form recognition, meaning recall, meaning recognition.

Results

The results showed a clear hierarchy of the degrees of difficulty in four different form-meaning mapping tasks (see table 1). The meaning recognition task showed to be the easiest, followed by the form recognition tasks and the two recall tasks were the most difficult.

Table 1: *Raw scores for the vocabulary tasks*

Task	Mean	SD	Minimum-Maximum
Meaning recognition	104,08	15,35	67–120
Form recognition	93,45	18,80	64–112
Form recall	86,83	15,22	52–113
Meaning recall	63,43	63,44	17–271

Meaning recognition, Form recognition and Form recall tasks has a maximum score of 120, Meaning recall task has a maximum score of 360.

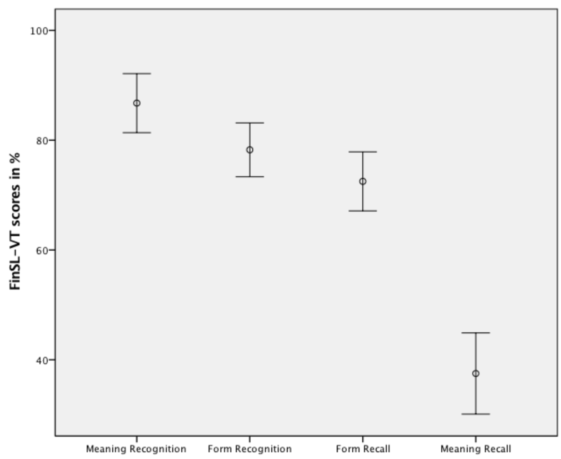


Figure 1: *FinSL-VT mean scores in percentages by task. Error bars denote 95% confidence intervals.*

A series of paired sample t-tests was carried out to compare performance across the four tasks (alpha level reduced to .008 to compensate for multiple (k=6) comparisons). Performance between all tasks was significantly different ($p<.01$). Children's performance on all four tasks showed positive, strong correlations with chronological age (see Table 2). Even with age partialled out half of the six correlations remained significant at $p<.01$ These findings indicate that knowledge of form-meaning mappings improves with age and also that all tasks tap into children's knowledge of vocabulary. They are similar to previous findings on deaf children's understanding of different mappings in BSL and in ASL (Mann, & Marshall 2012; Mann, et al. 2016).

Table 2: *Correlation between age and FinSL-VT raw scores.*

Variable	Meaning recognition	Form recognition	Form recall	Meaning recall
Age	0.80** (.66-.91)	0.77** (.60-.89)	0.78** (.65-.87)	0.76** (.59-.89)

**p<.01, BCa bootstrap 95% CIs reported in parenthesis.

Discussion

The presented findings strengthen previous claims that children's knowledge between form and meaning is not an all-or-nothing phenomenon but depends on what they need to do with that knowledge. As is the case with BSL and ASL vocabulary acquisition in FinSL proceeds incrementally with the strength of the mapping between form and meaning increasing over time. The findings add strength to the validity of the form-meaning mapping model for use with signed languages. This work makes an important contribution to the field by enabling cross-linguistic comparisons of deaf children's vocabulary across different signed languages, including lesser-researched signed languages. In our poster presentation we will highlight some of the similarities and differences between the findings for FinSL and those for ASL and BSL.

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Counterfactual imperatives across modalities

Hadil Karawani & Josep Quer

Friday, 2.14

Counterfactual imperatives (CFIs) expressing reproaches or reprimands, are constructed as imperatives in some of the languages that feature them: in order to convey the meaning of the English *You should have done that!*, for example, Spoken Arabic resorts to a past auxiliary combined with the morphological imperative (Cowell 1964, van Olmen 2018), as in (1); other languages like Dutch (2) employ past perfect morphology (Proeme 1984, Mastop 2005), and Spanish resorts to a perfect infinitival (so-called retrospective imperatives in Bosque 1980, Vicente 2010, Biezma 2010), exemplified in (3).

(1) kent kol lamma kent fe-l-bet.
you.were eat.IMP when you.were in-the-house
'You should have eaten when you were home!' (Arabic, Cowell 1964)

(2) Had die appel dan ook opgegeten!
had that apple PRT PRT up-eat.PTC
'You should have eaten that apple!' (Dutch, Mastop 2005)

(3) Haber venido ayer!
have. INF come.PTC yesterday
'You should have come yesterday!' (Spanish, Bosque 1980)

(4) Haber comprado la tarta mañana!
have.INF buy.PTC the cake tomorrow
'You should have bought the cake tomorrow!'

We discuss this phenomenon by incorporating fresh evidence from Catalan Sign Language (LSC) that shows that, although not all languages have a dedicated expression realizing reproachatives, this sign language realizes it as an imperative with the additional sign for BEFORE, as in (5).

_____furrowed eyebrows
(5) 2-WARN-1 BEFORE!
'You should have warned me earlier!' (LSC)

Reproaches can also be uttered in LSC as deontic modal statements with the modal sign BETTER; however, they do not show the properties of imperatives but rather of regular declaratives. To our knowledge, this is the first description of reproachatives in a sign language. As in spoken languages, we do not expect sign languages to have a dedicated form to express this meaning, but this first description highlights the fact that, when present, they resort to the same set of grammatical ingredients as the ones identified in spoken languages (van Olmen 2018). Also, CFIs in LSC show the same semantic properties as imperatives: lack of truth value, non- embeddability, only with a second person addressee, restrictions on overt subject.

By bringing sign language data into the analysis of CFIs, we achieve two main goals. (i) We contribute to the literature on imperatives by identifying the grammatical ingredients (in the visual-gestural modality) that are necessary for expressing these special imperatives, especially given the fact that imperatives as a sentence type are scarcely documented in sign languages (Donati et al 2017, Brentari et al 2018). (ii) We shed light on the interactive relation between imperatives as a semantic category and counterfactuality — in particular we answer the question as to how the imperative "path" to a "better world" is, in fact, blocked. Van Olmen (2018) defines CFIs as the expression of "an after the fact reprimand to a second person", and Vicente (2013) argues that CFIs encode that "from the speaker's perspective, the addressee had a reasonably good opportunity to have taken an alternative course of action that would have led to a better world."

The non-trivial link of imperatives to a counterfactual past raises interesting questions. Is the past tense in CFIs a real past the addressee has to imagine going back to and choosing a different path from? And is the modal base epistemic in the sense that the common ground between speaker and hearer necessarily includes only worlds in which the "better path" was not taken? (cf. Kaufmann (2012) on imperatives, Ippolito (2002) on counterfactual conditionals, a.o.). We argue that the past tense is not real, but fake (in the sense of Iatridou 2000), i.e., it lexicalizes an exclusion feature that is able to range over times and worlds. It is this exclusion feature that is responsible for the inference that the imperative path can no longer be taken by the addressee, resulting in a reproach or reprimand. Hence, on our account, CFIs are a straightforward combination of past tense semantics and imperative semantics. We can, thus, also explain examples of future oriented CFIs, such as (4).

CFIs in LSC are shown to display the formal properties of both imperatives and counterfactuals: 1. Non-manual marking with *furrowed* eyebrows and 'tense and short' movement (as in regular command imperatives); 2. Manual signs BEFORE (as in counterfactuals), FIRST, BETTER (as in commands); 3. No past or perfect morphology; 4. Combinable with future indexicals. Furthermore, CFIs in LSC can also be shown not to be related to elliptical conditionals (*contra* Biezma 2010 for Spanish). They are different from conditionals and optatives in that conditionals include *raised* eyebrows, and feature no 'tense and short' movement, while optatives exhibit overt manual marking with I-WISH. The only element shared with conditionals is the fact that BEFORE occurs in CF conditionals. Counterfactuality is not encoded with past or perfect morphology, but rather with lexical temporal adverbs like BEFORE, while the reprimand is encoded via MAN! / YOU-SEE!, hence establishing the "after the fact" semantics. We conclude that irrespective of the adequate semantic analysis of imperatives, the data discussed reinforce the empirical link between reproachatives and imperatives. Imperative semantics contributes (i) the possibility presupposition that the hearer has to know that a better choice is/was available ($\Diamond p$) and (ii) the pragmatic presupposition that the result of carrying out the imperative is good/rewarding (Veltman 2009). The counterfactual presupposition contributes that it has to be common ground that this better choice was not taken, i.e., it is incompatible with what one takes to be knowledge.

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Author recognition is a significant predictor of reading fluency in deaf college-aged students

Geo Kartheiser

Friday, 2.15

Many Deaf individuals who use a sign language – soundless, natural languages that don't directly map to written languages, are nonetheless able to learn to read written text. The performance of Deaf readers, however is variable, and there is significant interest in identifying the factors that contribute to a Deaf individual's ability to read in a fluent manner. It has been shown in previous studies that factors such as age of ASL exposure, ASL fluency, and fingerspelling skill significantly predict Deaf individuals' reading fluencies (e.g. Andrew, Hoshooley, & Joanisse, 2014; Mayberry, del Giudice, & Lieberman, 2011; Stone, Kartheiser, Hauser, Petitto, & Allen, 2015). What other possible factors beyond those variables could contribute to their reading fluency?

The Author Recognition Test (ART) is a list of author and non-author names that is given to participants with the instruction to scan the list and pick-out names that they recognize to be authors. It has been shown in past studies to be a good and reliable predictor of reading-related variables such as spelling ability, word recognition, reading volume, and cultural literacy (Mol & Bus, 2011, Moore & Gordon, 2011, Stanovich & West, 1989, West, Stanovich, & Mitchell, 1993) in hearing adult and children readers. Here, we ask whether performance on the ART predicts reading fluency above and beyond age, non-verbal IQ, and age of sign language exposure in a sample of Deaf college students.

We collected data from 35 deaf college-aged participants using a Case History Form (self-reported age of exposure to sign language), the K-BIT 2 matrices subtest (non-verbal IQ), the latest version of the ART (knowledge of authors), and the Test of Silent Contextual Reading Fluency. A three-stage hierarchical multiple regression was run to determine whether the addition of age of sign language exposure and then ART score improved the prediction of the Test of Silent Contextual Reading Fluency (TOSCRF) score over and above age and non-verbal IQ score alone. There was independence of residuals, as assessed by a Durbin-Watson statistic of 2.049. See Table 1 for full details on each regression model. The full model used age, KBIT, age of sign language exposure, and ART score to predict TOSCRF score and was statistically significant, $R^2 = .611$, $F(4, 27) = 10.597$, $p < .001$, adjusted $R^2 = .553$. Entering age and non-verbal IQ first, and then adding age of sign language exposure to the prediction of TOSCRF scores (Model 2) led to a statistically significant increase in R^2 of .255, $F(1, 28) = 10.034$, $p < .001$. The addition of ART scores to the prediction of TOSCRF score (Model 3) led to a statistically significant increase in R^2 of .323, $F(1, 27) = 22.420$, $p < .001$.

Table 1
Hierarchical Multiple Regression Predicting

	Test of Silent Contextual Reading Fluency (TOSCRF)					
	Model 1		Model 2		Model 3	
Variable	B	β	B	β	B	β
Constant	109.087**		120.761**		102.456**	
Age	-.960	-.169	-.912	-.160	-.860	-.151
K-BIT	-.005	-.074	-.017	-.233	-.013	-.178
Age_Sign			-.1.293*	-.530	-.910*	-.373
ART					1.332**	.588
R^2	.033		.288		.611	
F	.487		3.771*		10.597**	
ΔR^2	.033		.255		.323	
ΔF	.487		10.034*		22.420**	

*Note. N=32. * p <.05, ** p <.001.*

In summary, findings here show that age and non-verbal IQ don't significantly contribute to a model predicting reading fluency (as measured by TOSCRF) in a sample of college-aged deaf adults. However, the addition of age of sign language exposure and author knowledge improved the model predicting TOSCRF beyond age and non-verbal IQ alone. This supports previous findings showing that ASL knowledge is a positive predictor of reading fluency, and also shows that the predictive power of the ART generalizes to samples of deaf adults who use a sign language. Identifying which factors lead to the strong relationship between ART and reading fluency has significant translational implication and may help identify educational interventions that serve to boost reading fluency in deaf children at-risk of weak literacy outcomes.

Causative-inchoative alternations in Turkish Sign Language

Demet Kayabaşı & Kadir Gökgöz

Friday, 2.16

The causative-inchoative alternation refers to verbs that can be used both transitively and intransitively, where the transitive alternate has a causer and a theme, and the intransitive alternate has a single theme argument (Kegl, 1990; Levin, 1993; Engberg-Pedersen 2010). In this study we describe the lexical and morphosyntactic expressions, as well as implications on the relation between argument and event structure, of causative-inchoative alternations in Turkish Sign Language (*henceforth* TİD).

A labile lexical verb can express both a causative predicate and its inchoative counterpart as can be seen in (1). This is known as conversion, morphosyntactic alternation without an overt morpheme.

(1) a. Labile Lexical Verb in Intransitive Sentence

H1	WOOD	EXTCL	SELF	IX$_{3G.POSS}$	BREAK
H2	WOOD	EXTCL	STICK-$_{HDCL}$		BREAK

"The wooden stick broke on its own."

b. Labile Lexical Verb in Transitive Sentence

H1	WOOD	EXTCL	HANDS	BREAK
H2	WOOD	EXTCL	HANDS	BREAK

"(Someone) broke the stick."

The labile verb BREAK in (1) has been lexicalized from an original form of a handling classifier (3). Nonetheless, it is used in both the transitive and the intransitive alternates. This shows that once lexicalized the classifier handshape in such cases does not affect argument structure anymore (Engberg-Pedersen 2010). Indeed, such forms can also be extended in meaning so that the manipulation or contact component is lost all together as the following example shows:

(2) Metaphorical use of a labile verb

H1	X$_{1SG}$	MALE	PERSON	MUCH	TRUST	END	$_{3SG}$TRICK$_{1SG}$	LOOK$_{3SG}$	IX3$_{SG}$	IX$_{1SG}$	HEART	BREAK
H2					TRUST							BREAK

"I trusted him but in the end he tricked me and I saw that he broke my heart."
(http://www.tidsozluk.net/tr/Kırmak?d=1172)

The causative-inchoative alternation can also be marked by a handling-whole entity classifier pair. Handling comes in two ways, grabbing as in (3a) and contact, which we propose to be a sub-kind as in (4a). The causer is animate in (3a) and (4a).

(3)	a. Transitive clause with handling-grabbing classifier					b. Inchoative clause with whole entity classifier				
H1	DOOR	IX$_{3SG}$	SELF	PERSON	OPEN$_{HDCL}$ NOT	DOORA	SELF	IXA	OPEN$_{WECL}$	CLOSE$_{WECL}$
H2					NOT	DOORA				
	"It's not the case that a person opened the door."					"The door opened and closed by itself."				

(4)	a. Transitive clause with handing-contact classifier			b. Inchoative clause with whole entity classifier			
H1	MALE	KID	BOUNCE-BALL$_{CCL}$	BALLA			BOUNCE$_{WECL}$
H2			HAND-UP$_{BPCL}$	BALLA	IXA.$_{POSS}$	SELF	BOUNCE$_{WECL}$
	"The boy bounces a ball (with his hand up in the air)."			"The ball bounces by itself."			

When the causer is inanimate, a whole entity classifier, which we otherwise observe in inchoatives, appears accompanied by both the theme and a lexically signed causer as in (5):

(5)	Inanimate causer combined with a seemingly inchoative clause			
H1	PALM TREE	STAND$_{DISTR}$	WIND	TREE-BEND$_{WECL}$
H2	PALM TREE	FOUR	WIND	TREE-BEND$_{WECL}$
	"The wind is bending four palm trees. / Four palm trees bend because of the wind."			

The labile forms seem to have lost the relation between handshape and argument structure and neutralized parallel to what is suggested by (Benedicto & Brentari 2004: 773). The rest of the data above also supports Benedicto & Brentari's (2004) account. The animate and agentive causer is licensed by the grabbing (3a) and contact (4a) handling classifiers which are argued to include a higher functional projection labelled as f_1 as well as the theme of the clause introduced by the lower counterpart f_2 as proposed by Benedicto & Brentari (2004). However, a causative with an inanimate and consequently non-agentive causer (5) seems to have combined its verbal root with a whole entity classifier which shows that the higher functional projection, thus a handling classifier handshape, is only valid when the clause includes an agent but not any kind of causer. This shows that the proposed functional head does not directly determine transitivity but only license the thematic roles of arguments.

Moreover, overtly signed resultant states in both inchoative (6a) and causative (6b) structures imply that the expressed *event* is complex (i.e. more than one sub-event) regardless of the valency of the predicate.

(6)	a. Inchoative clause with resultant state				b. Transitive clause with resultant state				
H1	OTHER	MUG	BREAK	FRACTURE$_{WECL}$	EGG	HANDS	HAND$_{BPCL}$	SMUSH$_{HDCL}$	SPREAD
H2			BREAK	FRACTURE$_{WECL}$	EGG	HANDS			SPREAD
	"The other coffee mug broke fractured"				"(Someone) smushed the egg in their hand (and it) spread (all over)."				

Also note that (6b) displays a counter point to Tang & Yang's (2007) account where they argue that telic causatives which are realized through handling classifiers cannot be followed by a predicate denoting a resultant state since the causation verb with a handling classifier already encodes the change of state component.

Overall, we show that both argument/thematic structure and the event structure affect the expression of transitive-inchoative marking. Although we support Benedicto & Brentari's (2004) proposal, we suggest that the transitivity of a sentence be treated separately than licensing theta roles of arguments. When a causative/transitive sentence lacks an agentive causer, the functional projection which licenses the animate causer is not present and thus the predication is not realized through a handling classifier. Also, we show that an intransitive and a transitive verb can be equally complex with respect to showing an end state.

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Relative clauses in Russian Sign Language: Where do they come from?

Evgeniia Khristoforova & Vadim Kimmelman

Thursday, 1.38

Relative clauses are probably the most well studied constructions involving subordination in sign languages (SLs) [1]–[3]. They are theoretically interesting for a variety of reasons, including the issue of emergence of subordination and grammaticalization of syntactic structures [4], [5]. However, for many SLs, including Russian SL (RSL), relative clauses have not been studied. The current study thus has two goals: to describe the basic properties of relativization constructions in RSL and to discuss the possible emergence scenarios for them.

Methods: We used two data types: (i) we searched the on-line corpus of RSL (http://rsl.nstu.ru/) for sentences containing relative clauses; (ii) we conducted a production task with 6 native RSL signers. The production task was similar to tasks commonly used in other studies on relativization: the signers were presented with pairs of similar pictures and asked a question (in RSL) that would elicit a restrictive relative clause,[1] as sketched in (1).

(1) Pictures: 1. A sitting girl strokes a cat. 2. A standing girl strokes a dog. Question: which of the girls is standing? Target answer: The girl that is stroking a cat is standing.

The stimuli consisted of 12 pictures targeting different syntactic roles of the head noun in the relative clause (subject/object/adjunct) and in the main clause (subject/object). We found 16 tokens produced by different signers in the corpus, and 55 tokens in the elicited data.

Results: There are two main relativization strategies in RSL: one involving a relative pronoun WHICH (2), and one lacking a relative sign. The sign WHICH in the context of relativization is accompanied with the mouthing of the Russian relative pronoun *kotoryj* 'which'. While the relative pronoun might originate in Russian, it is borrowing, not code-switching, because WHICH, unlike *kotoryj,* can occur in the final position in the relative clause.

```
      __________brow raise  ______________________head lean  blink
(2)   INDEXa THIS WOMAN     WHICH ASK AT POSS1 MOTHER INDEXa        COME VISIT1
```
'This woman, who asked my mother about it, came to visit us.' (video)

The second strategy does not involve a dedicated relative sign (3), although a pointing sign referring to the head noun might optionally occur in the relative clause (4). At the moment the function of such pronominal signs is not clear.

[1] Thus all elicited examples are of restrictive relative clauses; some corpus examples might contain non-restrictive relative clauses, but it is not always possible to clearly distinguish the two in natural discourse. We did not specifically investigate possible differences in marking between restrictive and non-restrictive clauses.

head turn
(3) FRIEND PAST GOOD WORSEN
‘My friends, who used to be good in the past, became spoiled.’ (video)

blink head lean
(4) INDEX1 LIKE HOUSE GIRL BUILD INDEXa
‘I like the house which a girl is building.’ (elicited)

In both strategies, the relative clause can be marked by non-manuals, as summarized in following table. Note that while no single marker seems obligatory, some non-manual marking is almost always present: we only found three unmarked examples, all of which might not in fact be relative clauses.

marker	corpus	elicited	total (% of all cases)
sideward head tilt/turn	9 out of 16	28 out of 55	37 (52%)
eye blink at clause boundary	8 out of 16	22 out of 55	30 (42%)
eyes squinted	6 out of 16	3 out of 55	9 (13%)

In almost all instances of both constructions the head noun is external to the relative clause, judging by non-manual markers and sign order (see examples above). However, both structures also allow the head noun to occur within the relative clause (5), as well as in both clauses (6). At this stage it seems that a correlative analysis should be possible, as crucially the head can occur as a full NP in both clauses [6]; however, more research is needed.

squint+head turn blink+nod
(5) CLIMB PIPE SAME CL(human)-CLIMB PAST NOW CLIMB
‘[The cat] climbs on the same drainpipe through which he had climbed before.’ (video)

head turn blink
(6) AIRPLANE LIKE MORE AIRPLANE CL(airplane)-TAKE.OFF
‘I like the airplane that takes off.’ (elicited)

In almost all cases where the relative clause is head-external, it follows the head. This means that, when a subject or a pre-verbal object is modified, the relative clause is fully embedded in the main clause, e.g. (2), (3). We consider this, in addition to the obligatory presence of some non-manuals to be strong evidence of subordination.

Relative clauses are often fully embedded (at least on the surface level) in yet another way: in 21 of the sentences, the main clause contains doubling of either the verb or (less often) the head noun, with one copy occurring before and one after the relative clause, as in (5).

Discussion: The basic properties of the two relativization strategies allow us to formulate some hypotheses concerning their origin and development. We suspect that the relative sign WHICH and probably the whole strategy has been borrowed from

Russian, via Signed Russian, as evidenced by the general structural similarity between the RSL and Russian constructions. However, the second strategy is not at all similar to relativization in Russian. We hypothesize that this is a result of syntacticization of a discourse-level strategy.

Specifically, the need to use a relative clause arises in discourse when the signer wants to additionally characterize or provide information necessary to identify a referent who participates in the main event chain. This new information is thus a divergence from the main story line, a parenthetical. The divergence from the story line can be marked by prosody (non-manuals), and the return to the story line is often marked by doubling – that is, by repetition of the verb from the main story line. Doubling creates clear center-embedding of the potential relative clause albeit on discourse level. This doubling construction in general has been shown to grammaticalize into the syntactic domain [7]. Similarly, discourse-level strategy of the proto-relative clause is further grammaticalized due to frequent use, which leads to regularization of non-manual marking and to the possibility of full embedding in another clause, even in the absence of doubling.

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What has COME become? A corpus-based study into its grammatical functions in Sign Language of the Netherlands

Ulrika Klomp

Friday, 2.17

Introduction: The verb sign COME (see Figure 1) is multifunctional in Sign Language of the Netherlands (NGT). The general lexical meaning associated with this sign is ‘to come’, i.e. change of location. In this study, however, we will focus on the grammatical functions that COME has acquired: a marker of future tense (FT) and of change-of-state (CoS). These functions and the underlying grammaticalization path(s) have not yet been described for NGT – or, as far as we are aware, for any other sign language. This asks for more systematic research into the functions and forms of COME. The current study looks into this with the use of corpus data.

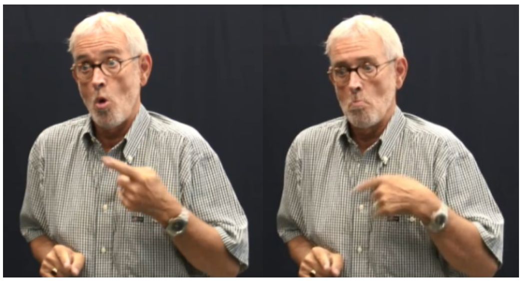

Figure 1: the NGT sign COME

Grammaticalization: Grammaticalization is a process in which a lexical item loses its semantic meaning (“semantic bleaching”), undergoes phonetic reduction, loses its lexical function and the morphosyntactic properties related to that, and gains a grammatical function (Heine & Kuteva 2002). In spoken languages, the grammaticalization of the verb *come* into a FT marker or a CoS marker is quite frequent. An example of the former from Koyo, belonging to the Niger-Congo language family, is shown below. In 1.a, the verb *yì* is used as a lexical verb; in 1.b., it is used as an auxiliary, marking future tense:

Koyo (Marchese 1986: 75 in: Heine & Kuteva 2002: 76)

1.a	Abi	yì	du.	
	Abi	come.FACT	town	
	‘Abi came home.’			
1.b	Abi	yi	du	mo.
	Abi	AUX	town	go
	‘Abi will go to town.’			

As for sign languages, Pfau & Steinbach (2011) have shown that grammaticalization processes are generally very similar to the ones described for spoken languages. To take the case of FT markers, French Sign Language and American Sign Language indeed have followed a grammaticalization process from an old gesture for *go* via the lexical verb GO into a FT marker FUTURE (Janzen 2012). Regarding NGT, Bos (1994) has argued that the agreement auxiliary ACT-ON has probably grammaticalized from the lexical verb GO-TO. More recently, Couvee & Pfau (2018) have suggested, based on corpus data, that GO-TO additionally developed into a FT marker.

Goal & Methodology: In this study, we contribute to the growing work on grammaticalization in sign languages by describing 1. the grammaticalized functions of COME; 2. the sentence position(s) of the grammatical markers COME; as well as 3. the phonological form(s) (including nonmanual signals) of these grammatical markers. We used the Corpus NGT (Crasborn, Zwitserlood & Ros 2008) to search for the gloss COME. This yielded 379 results for the most frequent phonological variant – although other forms will be analyzed for function as well. We checked the glosses preceding and following the sign COME to scan for relevant cases and found 15 clear instances so far of the grammatical marker COME produced by different signers and in different contexts.

Results: Preliminary results show that COME indeed has grammaticalized into a future tense marker (COME.FUT) and a change-of-state marker (COME.COS). Two examples are shown below:

2.a COME.FUT SPREAD *(NGT corpus clip 723, signer 34)*
‘It will spread.’
2.b COME.COS DARK *(NGT corpus clip 94, signer 1)*
‘It became dark.’

In the majority of the examples, the predicate follows the grammatical marker COME. However, we also found a few examples in which COME.FUT and COME.COS appeared clause-finally. As for the phonological forms, both grammatical markers can be produced with one or two hands, and have a specific short movement that always goes in the direction of the signer. So far, there is no evidence for phonological erosion. Additionally, there seem to be no specific nonmanual markers related to COME.COS or COME.FUT.

Discussion: It has been argued that the NGT movement verb GO-TO has grammaticalized into an agreement auxiliary (Bos 1994) and additionally into a FT marker (Couvee & Pfau 2018). The current results on COME.FUT and COME.COS add yet other grammaticalization processes to the picture, namely, resulting from the movement verb COME. The grammaticalization of COME has not yet been described in the sign language literature – yet it aligns with processes that are common across spoken languages. It would be interesting to investigate the relationship between the different movement verbs and their grammatical functions, as we do not exclude the possibility that we are dealing with several grammaticalizations of a single underlying sign. We hope to shed light on this with the analysis of more examples.

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Cognitive advantage in sign-spoken bilinguals

Justyna Kotowicz, Darek Asanowicz, Zofia Wodniecka & Klaudia Tondos

Friday, 2.18

Background: In recent years, cognitive control benefits of bilingualism have been revealed in a bulk of research results (e.g. Bialystok, 2015). However, some studies showed that bilinguals did not outperform monolinguals in cognitive control tasks, concluding that bilingualism does not influence cognitive system (Paap & Greenberg, 2013). Also, strong doubts have been cast upon the scientific proofs of cognitive advantage in bilinguals (Paap, Johnson, & Sawi, 2015). Whether the bilingualism enhances cognitive control is still a subject of intense debate. Some of the contradictory findings might be caused by lack of common inclusive/exclusive criteria for bilingualism and by problems with describing the complex language experience of bilingual individuals (Anderson, Mak, Keyvani Chahi, & Bialystok, 2018). The context of languages use might be important for the cognitive consequence of bilingualism. In the 'adaptive control hypothesis' (Green & Abutalebi, 2013), the bilingual effect on the cognition depends on contexts in which the languages are used: the contexts differ in demands to monitor, select and switch between languages. To date, the lack of cognitive advantage in sign-spoken bilinguals was explained by the sign-spoken bilingual context that did not require the high level of monitoring, switching, inhibition and selection of languages (Emmorey, Luk, Pyers, & Bialystok, 2008; Olulade et al., 2016).

Purpose: We aimed to establish if sign-spoken bilingualism enhances cognitive control compared to spoken bilingualism and monolingualism.

Hypothesis: Sign-spoken bilinguals are supposed to have enhanced cognitive control in comparison with monolinguals because sign-spoken bilinguals experienced different languages use contexts, including also the dual language context when they are supposed to control, monitor, inhibit and switch between languages with different interlocutors (e.g. translation for deaf signing parents when contacting the hearing individuals). Sing-spoken bilingualism is not limited to the dense code-switching (code-blending) context that might be less cognitive control demanding.

Method: Three groups of participants, matched on age and gender, took part in the study: hearing native signing adults who had acquired sign language from their Deaf parents (N=30, age: M= 32, SD=8;7, ♂=5 ,♀=25), hearing spoken bilinguals (Polish-English bilinguals with dominant Polish language))(N=30; age: M=31; SD=8;6, ♂=5 ,♀=25) and hearing monolinguals (Polish speakers)(N=30; age: M=32; SD=8;6, ♂=5 ,♀=25).

Cognitive control skills were analysed using the flanker task. Error rate and reaction time (RT) were measured.

Results

Error rate in the flanker task: In the flanker task, the mix ANOVA revealed the between group differences in error rate (F (2,83) = 16.690, $p < .0001$ $\eta 2 = .287$). Sign-spoken bilinguals had lower error rate than spoken bilinguals (F (1,57) = 9,492887, p = .003 $\eta 2 = .143$) and lower than monolinguals (F (1,54) = 31,769709 , $p < .0001$ $\eta 2 = .370$). Spoken bilingual individuals were still better than monolinguals (F (1,55) = 8,777203 , p = .004 $\eta 2 = .138$).

Reaction times in flanker task: When we analyzed the RT, the mix ANOVA showed that the groups differed (F (2,83) = 5,070, p = .008 $\eta 2 = .109$). Sign-spoken bilinguals did not differ on RT from spoken bilinguals (F (1,57) = 2,918499 , $p > .05$ $\eta 2 = .049$). Sign-spoken bilinguals were better than monolinguals F (1,54) = 8,983191 , p = .004 $\eta 2 = .143$). Spoken Bilinguals were as fast as the monolinguals F (1,55) = 2,733346; $p > .05$ $\eta 2 = .047$).

Conclusions: The present outcomes showed that sign-spoken bilingualism has cognitive consequences on attentional and inhibition processes in hearing native signers. Hearing native signers outperformed monolingual individuals and, surprisingly, they had better scores than spoken bilinguals. The findings are in accordance with the 'adaptive control hypothesis' (Green & Abutalebi, 2013): spoken bilinguals were restrained to bilingualism in single context: all participants used English at work and Polish in private life and this kind of bilingualism is supposed to be less cognitive control demanding. Whereas, sign-spoken bilinguals were reported to have large experience with dual language use when they were supposed to control, inhibit and switch between languages.

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Executive function in deaf native signing children

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Saturday, 3.09

Background: Children go through many changes in their ability to manage thinking, emotions and actions. As they grow up, their behaviours become more organised and strategic thanks to a set of skills called executive function (EF) (Hughes, Graham, & Grayson, 2004). EF includes high-level cognitive processes necessary to obtain a chosen goal or to overcome new, unexpected challenges. Studies based on experimental tasks (Figueras, Edwards, & Langdon, 2008) and a behavioural inventory (Hintermair, 2013) have revealed that deaf children experience difficulties in EF. Are deaf children also put at risk of EF deficits because of deafness *per se*? The recent debate has been focused on the influence of hearing loss on EF; however, researchers haven't come to a single conclusion.

Two contradictory views have emerged from recent studies on EF in deaf individuals: the auditory deprivation hypothesis and the early language deprivation hypothesis. According to the first hypothesis, the lack of auditory input itself causes high-level cognitive skills deficits, inter alia EF problems (Conway, Pisoni, & Kronenberger, 2009). In contrast, according to the early language deprivation hypothesis, EF impairment in deaf children is connected with language delay and not with deafness *per se* (Hall, Eigsti, Bortfeld, & Lillo-Martin, 2017).

Purpose: We aimed to establish if deafness itself causes EF deficits, using experimental tasks to assess the EF level of deaf native signing children in comparison to hearing children.

Method: Two groups of children, matched on age and gender, participated in the study: deaf native signing children who had acquired sign language from their Deaf parents (N=20, age: M= 9;11, SD=1;11, ♂=4 ,♀=16) and hearing children (N=20; age: M=9;11; SD=1,11, ♂=4 ,♀=16).

Non-verbal intelligence was controlled for (Raven's Progressive Matrices, intergroup comparison: Mann-Whitney U = 150, p = .164). The five components of executive function were analysed using the following assessment tools: 1) cognitive flexibility – Wisconsin Card Sorting task (WCST); 2) interference suppression – Simon task; 3) response inhibition – Go/No-go task; 4) working memory (WM) – Corsi block; and 5) planning – Tower of London (ToL).

Results: After controlling for age, the ANCOVA did not reveal significant intergroup differences on three EF variables: cognitive flexibility (F(1,37) = .613, p = .439, $\eta 2$ = .016), working memory (F(1,33) = 1.836, p = .185, $\eta 2$ = .053) and planning (F(1,37) = 1.166, p = .287, $\eta 2$ = .031).

In the Go/No-go task the deaf children performed significantly worse than their hearing peers ($t(30) = 2.716$, $p = .011$, *Cohen's d* = .182). After dividing the two groups into younger (age < 10;00) and older groups (age ≥ 10;00), no significant differences were found between the hearing and deaf older groups ($t(19) = -.424$, $p = .677$, *Cohen's d* = 0.086) but there were significant differences between the two younger groups ($t(15) = -4.474$, $p = .000$, *Cohen's d* = 1.847).

In the Simon task, the one-way ANCOVA revealed that deaf children were less accurate in the incongruent condition than hearing peers ($F(1,37) = 5.312$, $p = .027$, $\eta 2 = .126$) when age was entered as a covariate. For the subgroup of younger children, one-way ANCOVA revealed that deaf younger children had lower accuracy than the hearing young group ($F(1,15) = 15.744$, $p = .001$, $\eta 2 = .512$) when age was entered as a covariate. For the older group, there were no significant differences in accuracy in the incongruent condition ($F(1,19) = .561$, $p = .463$, $\eta 2 = .029$).

Conclusions: The findings presented here provide counter-evidence to the auditory deprivation hypothesis; deafness *per se* did not degrade EF skills in deaf children, who obtained similar scores to their hearing peers on a variety of performance-based EF tasks.

Deafness did not cause EF problems in the group of deaf children who did not have delays in language acquisition. Deaf native signing children with early exposure to sign language perform similarly to hearing peers on 3 performance based measures designed to assess high cognitive functioning: cognitive flexibility, planning and WM.

Inhibition skills (interference suppression and response inhibition) depended on child age: older deaf children scored similarly to hearing children. A different pattern was found in the younger deaf group: they had weaker inhibition and attention responses than hearing peers. Younger deaf children may still be learning how to deal with attention tasks and how to suppress responses. Similarly, Dye and Hauser (2014) found that younger deaf children show more problems with cognitive control in a continuous performance test. The possible reasons of this problems will be discussed in the presentation/poster.

The present study and previous investigations (Hall, Eigsti, Bortfeld, & Lillo-Martin, 2017, 2018) allow the conclusion that deaf parenting, assuring early sign language access, is a protective factor against EF difficulties in deaf children. Early immersion in natural sign language is likely to support higher cognitive functioning in deaf children, but other characteristics of deaf families might also be important for deaf children's high-level functioning.

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A few arguments for isomorphic sluicing in ASL

Helen Koulidobrova & Leyla Zidani-Eroglu

Friday, 2.19

Recent literature has seen resurgence of interest in sluicing constructions (Ross 1969, Merchant 2001)–on interpretive grounds, their syntax is once again being questioned (Barros 2012, 2014; Merchant & Simpson 2012). Here, we contribute to the discussion of such constructions by examining relevant structures in American Sign Language (ASL), (1), which have been used as convenient diagnostics for other structures (Koulidobrova 2012, Gokgoz 2012) but not examined carefully in their own right. One of the goals here is to fill in this gap in the literature.

                                                                                    ________________br
(1) a. TRUE-BIZ SOMEONE PAY FOOD WHO/WHY NOT-KNOW.
Lit. *Really someone paid for food who/why I don't know*
                                                                                    (________________br)
b. TRUE-BIZ SOMEONE PAY FOOD NOT-KNOW WHO/WHY
Lit. *Really someone paid for food but I don't know who/why*

Two observations can be made about (1): both arguments and adjuncts serve as remnants, and at least on the surface (1a) does not resemble the traditional sluicing construction (with the remnant having moved above the predicate), opening a number of other options for analysis. Spurred by the literature, and armed with previous research on wh-movement and TP-ellipsis in ASL (Lillo- Martin & Petronio 1997, Nunes & Quadros 2005), we examine cases like (1) and offer an Occam's Razor argument that ASL (1) involves typical Ross-Merchant style sluicing, which places ASL in the class of languages where the E-site is isomorphic with the antecedent and the remnant is further dislocated for independent reasons. We argue against alternatives: (A) various copular constructions, (B) a 'stand-alone' matrix question, and (C) stripping.

A. Not a copular construction:

i. If, instead of a sluice, (1) contained a cleft pronoun (2), then the sluice portion as a sentence would be expected to be possible out of the blue – cleft pronouns are 'deep-anaphoric' (Gribanova 2013).

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(2) *Showing someone a mysterious* object

a. Nima-lig-i-ni bil-ma-y-man. what-comp-3sg.poss-acc know-neg-prs-1sg
'I don't know what (that is).' [Uzbek] (Gribanova 2013)

b. i. * (1IX) NOT-KNOW WHAT [ASL]
ii. * WHAT (1IX) NOT-KNOW

One other option for the sluice-like construction in (1) is a pseudo-cleft (Wilbur 2005, 2013) or Question Answer Construction (QAC, Caponigro & Davidson (C&D) 2011). However, a QAC/pseudo-cleft is a declarative. One argument for this comes from (3) in C&D (2011) – embedding of QAC under ASK/WONDER is impossible. The other difference between (1) and QAC comes from (4): multiple remnants are impossible with QAC but fine with sluicing. Finally, QACs are allowed with non-referential items (5). The opposite is true with a sluice.

____________________br

(3) a. THOSE GIRLS HOPE /*ASK [THEIR FATHER BUY WHAT, CAR].
'Those girls hoped/ asked that what their father bought was a car.'
= *QAC* (C&D 2011 [42])

b. MARY KNOW SOMEONE PAY FOOD 1IX {WONDER / *HOPE / KNOW} WHO. = sluicing
'Mary knows someone paid for food; I {wonder / *hope / know} who.'

(4) a. *GIRLS HOPE FATHER BUY WHAT WHERE CAR DEALERSHIP = *QAC* (adp C&D 2011)
'The girls hoped their father would buy them a car at a dealership'

b. JOHN OUT WHERE disj-shift WHY 1IX NOT-KNOW = sluicing

(5) a. JOHN GO WHERE, (HE GO) EVERYWHERE.
'John went everywhere.' = *QAC* (C&D 2011)

b. *JOHN OUT disj-shift NOT-KNOW EVERYWHERE = sluicing
'**John went out but I don't know everywhere'*

B. Not a stand-alone sentence (a matrix wh-question) ➔ an embedded interrogative.

i. Non-manual marking associated with matrix wh-questions is furrowed eye-brows (—bf, (6)). With slucing —bf is disallowed and brows are raised instead (7a), as observed in embedded QACs (3).

ii. Wh-questions in ASL can be doubled; this doubling is a matrix phenomenon (6) and is also disallowed with sluicing (7b).

______________________________bf/*br

(6) a. **WHAT** JOHN BUY YESTERDAY **WHAT** *'What did John buy yesterday?*

______________{*bf/br}

(7) a. JOHN BUY SOMETHING $_1$IX NOT-KNOW WHAT

'John bought something but I don't know what'

b. ***WHAT** JOHN BUY SOMETHING $_1$IX **(WHAT)** DON'T-KNOW **WHAT**

iii. We introduce a novel diagnostic for embedded interrogatives: PALM-UP – an indefiniteness marker (Conlin et al. 2003)- and WIGGLE, both of which occur at the end of interrogatives (9). However, only PALM-UP is found in embedded cases (9b) and only with interrogatives (8).

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(8) a. JOHN EAT WHAT, PASTA *PALM-UP. ➔ QAC

'What John ate was pasta.' (adp. C&D 2011 [12])

b. LEAVE MY SHOES WHERE, KITCHEN *PALM-UP.

'The place where I left my shoes was the kitchen.' (adp. Wilbur 1994 [4])

____________________{bf/*br}

(9) a. SOMEONE PAID FOOD NOT-KNOW WHO **WIGGLE**. ➔ matrix interrog.

approx. 'Do you know who this person is that paid for food because I don't?'

____{**bf/*br**}

b. SOMEONE PAID FOOD NOT-KNOW WHO **PALM-UP** ➔ embed. interrog.

Someone paid for food but I don't know who'

C. Not a case of sluice stripping/embedded stripping.

Stripping targets a non-constituent (Hankammer 1979) (10a). ASL allows argument drop in every position robustly (Lillo-Martin 1989, Bahan 2002, Koulidobrova 2017) and therefore (1) could masquerade as stripping (like (10a), e.g.). This, however, is doubtful for two reasons.

i. ASL arguments are allowed to remain overt, yet the ASL parallel of (10a) impossible (10b).

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(10) a. Lou will ask Doris about syntax, but I can't imagine whoLou will ask about phonology. (Nevins 2008)

b. CAN ASK1 (ABOUT) SYNTAX BUT NOT-KNOW WHO {*~~CAN ASK~~/ okCAN ASK} (ABOUT) PHONOLOGY

'You can ask me about syntax but I don't know who you can ask about phonology'

ii. Given the data in **A.-B.,** this would be the case of embedded stripping. Wurmbrand (2017) shows that embedded stripping targets not a CP but, rather, FocP below (as evidenced by ungrammaticality of the complementizer in (11)).

(11) First, they thought it would be done last year, then they thought (*that) THIS year. (Wurmbrand 2017)

However, we have shown the construction of interest is an embedded question – wh-movement to SpecForceP, i.e. CP on typical accounts (Rizzi 1997, Haegemann 2000a, a.o). Therefore, embedded stripping is excluded independently.

We have not argued for the wh-movement + TP-ellipsis in (1) explicitly, having assumed independent existence of both wh-movement (Lillo-Martin & Petronio 1997, i.a.) and TP ellipsis (Nunes & Quadros 2005). Instead, we take **A.-C.** above as an Occam's Razor argument that (1) is better analyzed as a case of the Ross-Merchant-style sluicing. This view leaves the difference between (1a-b) as an additional movement when required, evidenced by the obligatoriness of non-manuals on (1a) but not in (1b). The view is compatible with focused XP at sentence periphery proposed elsewhere (Wilbur 1994,1995, 2013).

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Two models of sign phonology in SignL2 by Deaf learners: Sonority wins

Helen Koulidobrova & Tatiana Luchkina

Saturday, 3.08

Background: Research shows that phonological and visual learning problems are solved in similar ways [1] and with the use of the same cognitive processes. This ‘unification account’ makes two predictions: (i) that both native and hearing L2 signers, as well as non-signers are responsive to articulatory features of sign languages (SLs) and that (ii) both spoken and sign languages deliver perceptual cues used by learners similarly. Spoken language literature has shown that acoustic cues exhibit various degrees of perceptual validity in categorization, leading listeners to have perceptual biases when integrating multiple acoustic dimensions [2]. The latter suggests that we should also expect differential perceptual validity for dynamic gestural units produced by manual articulators in sign languages. Hildebrandt and Corina [3] demonstrate (i) to be true for HANDSHAPE, MOVEMENT, ORIENTATION, and LOCATION. In turn, in line with (ii), the responsiveness of both signers and non-signers to these articulatory features must be more readily available for the perceptually salient features.

Predictions: We test two models of Sign Phonology: the Sonority Hierarchy [4] and Prosodic Model [5]. According to [4], larger scale articulators (shoulder >> elbow >> wrist joints) deliver more perceptually salient phonemic contrasts than smaller scale articulators (e.g. finger joints). This means that contrasts in HANDSHAPE and ORIENTATION of the sign will disambiguate between the expert and non-expert/naïve signers better than location or movement. In contrast, [5] predicts movement to be the more salient because movement is suprasegmental. The aforementioned is expected to hold irrespective whether the Deaf signers are proficient users of the language under examination.

Study: In this study, we evaluate perceptual saliency of the gestural components of signs in American Sign Language (ASL) for naïve signers vis-à-vis deaf L2 learners of ASL with limited previous exposure to another sign language. Perceptual saliency estimate for articulatory sign features reveals which of these features relay phonemic contrasts perceptible for even naïve signers and which are likely to present areas of maximal difficulty in non-native acquisition of sign language.

Participants: 25 deaf L2 learners of ASL (age(µ):19;03; length of (non-ASL)SL exposure(µ):193.8m., length of ASL exposure(µ):15.2m) and 28 hearing English speakers with no experience in any SL(naïve signers, 21 females, age(µ):27;09).

Method: In a closed-set Sentence Discrimination Task [4] (48 test trials), relative perceptual salience of articulatory features was proxied by the rate of successful discrimination of ASL sentence pairs which differed in terms of one aspect of the visuo-spatial configuration: HANDSHAPE, ORIENTATION, MOVEMENT, and LOCATION (Fig.1). Participants were presented with video recordings of sentence pairs in which the difference between the sentences, when present, was lexical (e.g, *MOTHER/FATHER*) or morphological (e.g., *1-MONTH/6-MONTHS*). Each test trial contained a test sentence presented by a model native signer and reproduced, sequentially, by two different native signers. Participants judged each sentence pair as same or different, thus making 2 judgments per trial. Responses ("same","different") were modeled using a mixed-effects binary logistic regression (Table1).

Findings: The difference in accuracy (ΔACCURACY, Fig.2) between deaf L2 learners and naïve signers, except when localized to HANDSHAPE, fell within a narrow range 9-17%. For both groups, ORIENTATION and LOCATION, in that order, were the most salient contrastive features and substantiated robust categorical discriminators. Results revealed a dissociation in the perceptual saliency of HANDSHAPE, which facilitated discrimination for deaf L2 learners (as well as native deaf signers [6]) but not for naïve signers. MOVEMENT was not a contrastive feature.

Conclusion: Results support that regardless of modality, phonological language processing is anchored in the relative perceptual saliency of the features marking phonemic contrasts [2] and provide empirical validation of the Sonority Hierarchy in sign languages [3]. In ASL, phonemic contrasts based on HANDSHAPE, configurationally complex but spatially compressed, and therefore low in sonority, present a likely area of maximal difficulty in non-native acquisition, unlike contrasts based on LOCATION and ORIENTATION, involving larger-scale articulators, high in sonority, and perceptible for first-time signers. This finding is in line with previous research on the difficulty of HANDSHAPE perception/acquisition but offers a new explanation: deaf signers relied on HANDSHAPE to increase their performance while the HANDSHAPE contrasts made the performance of naïve signers' worse overall. Finally, the findings suggest that ORIENTATION is something other than a 'secondary parameter' – L2 deaf signers rely on it for contrast.

Figure 1a: "mother" (ASL)

Figure 1b: "father" (ASL)

Phonemically contrastive feature: LOCATION of the sign relative to the signer's body.

Figure 2: *Percent accuracy on sentence discrimination categories for experienced ASL signers and English speakers with no experience in a sign language.*

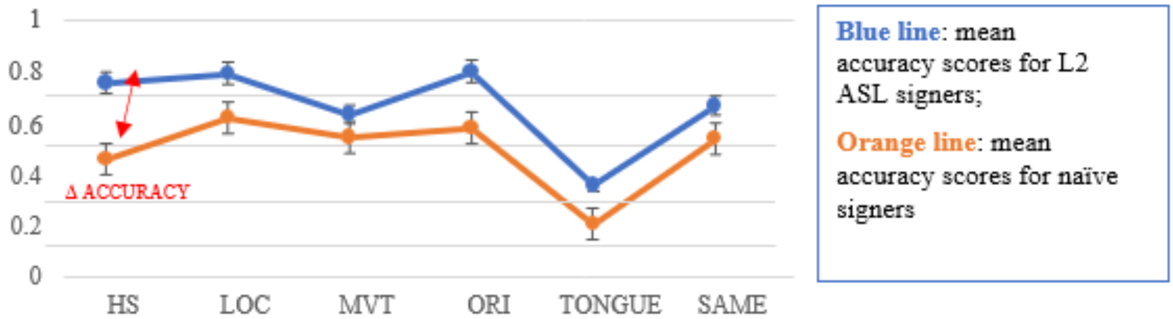

Table 1. *Results of the mixed-effects logistic regression (fixed effects) modeling responses of the sentence discrimination task. Dependent variable: log likelihood of correctly identifying a sentence pair as SAME or DIFFERENT.* Fixed effects: ARTICULATORY FEATURES and CONTRAST TYPE(lexical/morphological); random effects: PARTICIPANT and TEST ITEM.

	Coefficient		**Standard error**		***z***		***p***	
Fixed effects	**Naïve**	**Deaf L2**	**Naïve**	**Deaf L2**	**Naïve**	**Deaf L2**	**Naïve**	**Deaf L2**
Handshape	-.38	1.36	.12	.41	-3.06	3.33	.002	.001
Location	.34	1.92	.13	.43	2.59	4.48	.01	.001
Movement	.05	.517	.13	.38	.004	1.54	.97	.125
Orientation	.19	2.01	.13	.44	1.44	4.54	.1	.001
Contrast type (morphological)	.26	-.67	.2	.24	1.36	-2.85	.175	.004

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Event visibility in sign language motion: Evidence from ÖGS

Julia Krebs, Ronnie Wilbur, Evie Malaia, Gerda Strutzenberger, Hermann Schwameder & Dietmar Roehm

Friday, 2.20

A key question underlying understanding of human linguistic ability is that of existence and etiology of universally accessible features across multiple languages. Sign languages provide a privileged perspective on existence of such features in the visual modality. Previous work has shown that semantic verb classes in unrelated sign languages are characterized by distinctive movement profiles (Strickland et al. 2015; Malaia & Wilbur 2012). For American Sign Language (ASL) lexical verbs can be analyzed as having an endpoint (telics, e.g. arrive) and verbs lacking an endpoint (atelics, e.g. analyse) based on their phonological form (Wilbur 2003). The end-states can be marked by 1) change of handshape aperture (open/closed, closed/open), 2) change of hand orientation, and 3) abrupt stop at a location in space or contact with a body part; thus, telic and atelic verbs differ in both their phonological features and in their syllable structure (Malaia & Wilbur 2012). The mapping between phonological form and semantic verb class was described by the Event Visibility Hypothesis (EVH; Wilbur 2008). Empirical evidence for the EVH has, so far, come from motion capture data in American and Croatian sign languages, showing systematic kinematic distinctions between telic and atelic predicates (Malaia et al. 2013), and behavioral data from non-signers, who were able to semantically categorize unknown signs based only on the visual forms (Strickland et al. 2015). For Austrian Sign Language (ÖGS), so far only qualitative differences of end-state and non-manual markings for distinguishing event types have been identified based on observational data (Schalber 2006).

This study extends the investigation into event structure representation in ÖGS verbs by experimental quantification of production differences using a motion capture approach. A Deaf signer who acquired ÖGS early in life, uses ÖGS in her daily life and is a member of the deaf community was asked to produce isolated telic and atelic verbs (n = 10 per category; for examples see Figure 1). For each sign, the three dimensional (3D) position of a reflective marker attached to the right wrist was collected using an 8-camera infrared motion capture system with 200 Hz sampling (Miqus, Qualisys, Gothenbourg, Sweden). Based on prior observations, we hypothesized that the movement pattern of telic and atelic verbs in ÖGS would show differences in velocity and acceleration (deceleration) across linguistic contexts.

The results confirm this hypothesis by showing a significantly faster deceleration of the right wrist marker in telics in contrast to atelics in anterior-posterior and medio-lateral directions (max. deceleration (in m/s^2), anterior-posterior: atelics = *mean*: 3.22 ± 0.55; telics = *mean*: 2.38 ± 0.73; $t(16.63) = 2.93$, $p < 0.01$; medio-lateral: atelics = *mean*: -3.02 ± 1.20; telics = *mean*: -7.26 ± 4.91; $t(10.07) = 2.65$, $p < 0.05$)[1]. The speed to the last peak maximum (speed in m/s: atelics = *mean*: 3.07 ± 0.55; telics = *mean*:

[1] For statistical analysis unpaired t-tests were calculated.

2.31 ± 0.76; $t(16.42) = 2.546$, $p < 0.05$) and the speed to the local peak minimum (speed in m/s: atelics = *mean*: 3.35 ± 0.52; telics = *mean*: 2.60 ± 0.70; $t(16.61) = 2.72$, $p < 0.05$) was observed to be higher in atelics in contrast to telics. Furthermore, telics reached their peak velocity in less time (35% of elapsed time) than atelics (65%). Additionally. sign duration of atelic verbs was 1.4 times longer than for telics, despite the fact that telics contained 2.5 times longer hold phases in their duration than atelics did.

These findings confirm prior qualitative observations on the telic-atelic distinction in ÖGS (Schalber 2006), and characterizes differences in the movement pattern between telic and atelic signs. Consistent with findings from American and Croatian sign languages, the motion capture data support the notion that signers use universal means to denote event structure via mapping between sign semantics and dynamic visual form (motion).

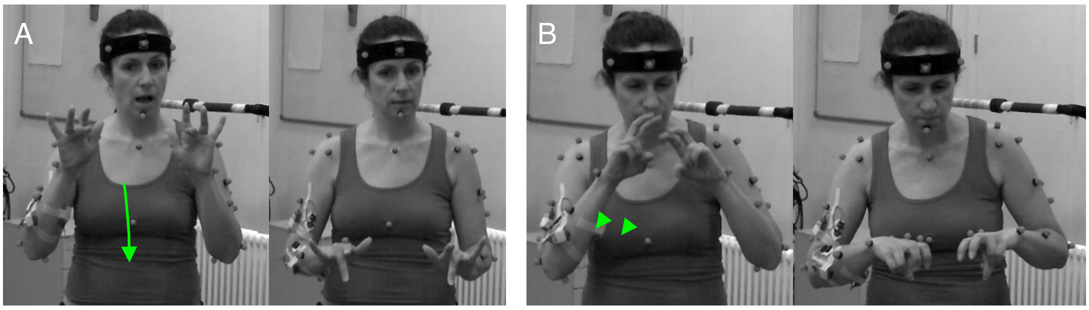

Figure 1. Examples of telic and atelic verbs investigated in our study. In A the telic verb “arrive“ is presented showing a single downward path movement (i.e. movement is not repeated) reflecting endpoint marking. In B the atelic verb “analyse“ shows repeated downward movement lacking endpoint marking.

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Sociolinguistic factors affecting lexical variation in signs for months in Finnish Sign Language

Antti Kronqvist

Friday, 2.21

This study investigates lexical variation in signs for months in Finnish Sign Language (FinSL). Previous studies have shown that there is a relationship between lexical variation and signers' social factors such as age, region, gender, and socioeconomic background (Schembri & Johnston 2012). Mckee et al. (2011), for example, found a relationship between lexical variation in number signs and the signer's social characteristics, especially age. Lemaster et al. (1991) found that gender has an effect on lexical variation in Irish Sign Language. This study is the first investigation on lexical variation in FinSL and seeks to determine what relationships there are between lexical variants for signs for months and the social factors of FinSL signers.

The data were collected from 50 deaf signers between the ages of 18 and 89 (*M*: 47.640 *SD*: 17.232) in seven cities in Finland using an elicitation task performed by a deaf researcher. Signers were asked to produce all the signs for months that they know. The signers' answers were video recorded and annotated using ELAN. The dataset consisted of a total of 816 lexical tokens. The signs for a certain month were categorized as a lexical variant when at least three phonological parameters were different between the signs produced by the informants. A total of 31 distinct lexical variants for signs of months were identified. The information on signers' backgrounds were collected using a questionnaire. The relations between lexical variants and various social factors were statistically analysed. These included age group (18–35, 36–55 and 56+), gender (female, male), region (divided into seven areas) and the deaf school the signer attended (eight deaf schools).

Every month sign was found to have at least one lexical variant. Table 1 presents a cross-tabulation for six different months that included significant differences ($p < .05$). It shows that the signs for months and age group were correlated. The mean averages of the signs for months from each age group (18–35, 36–55 and 56+) were compared using the Kruskall–Wallis test with pairwise comparisons, as shown in Figure 1. This comparison demonstrates that the 36–55 age group produced more lexical variants in signs for months than the other age groups did. The comparisons between the 18–35 and 36–55 age groups also showed a significant difference ($p = 0.022$).

Sign for Month	Frequency in used sign variation by age group			*p* value
	18–35	36–55	55+	
APRIL (B)	5	10	16	*df = 2; X2(2) = 10.83; p = 0.004***
APRIL (Y)	15	17	11	*df = 2; X2(2) = 14.47; p = 0.001****
MAY (G)	4	11	12	*df = 2; X2(2) = 6.46; p = 0.040**
JULY (B)	0	7	6	*df = 2; X2(2) = 7.81; p = 0.021**
AUGUST (AxAx)	1	10	14	*df = 2; X2(2) = 17.32; p = 0.001****
DECEMBER (GG)	0	8	8	*df = 2; X2(2) = 9.46; p = 0.009***

Table 1. Summary of the significant ($p < .05$) results of the cross-tabulation of signs for month and age group

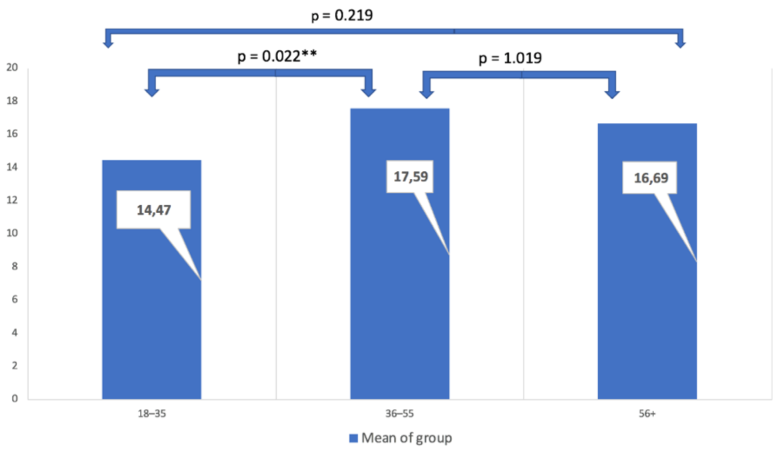

Figure 1. Results from the Kruskall–Wallis test showing the average of the produced sign for months compared between the age groups.

This study shows similarities with the results found in other lexical variation studies on sign languages from around the world, such as BSL and NZSL, in that there was a clear relationship between age and lexical variation (e.g. Mckee et al. 2011; Stamp et al. 2014). The results also indicate that some of the signs for months can be considered as either new and old: new signs were used among all the signers regardless of their social factors but old signs were used by the 36–55 and 56+ age groups only. It is possible that the use of these old signs will decrease in the future. In the presentation, I will present the results of this study and address some of the problematic issues with applying certain social factors in sociolinguistic variation studies.

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Iconic biases on quantification in sign language

Jeremy Kuhn

Saturday, 3.10

Overview Typologically, spoken languages vary in how they express universal quantification and negative quantification. Sign languages, too, show semantic variation, but, surprisingly, this variation populates only a small corner of the full typological landscape. Sign languages systematically have distributive concord but tend to not have canonical negative concord. Here, I explain these typological facts as the reflection of an abstract, iconic bias. I argue that both concord phenomena can be explained in relation to the discourse reference. Discourse reference is also uniquely important to the iconic use of space in sign languages. The quirky sign language typology is thus explained based on what is easy and hard to represent in space.

The typology of quantification In English, quantificational meanings (*some*, *all*, *none*) are typically expressed using generalized quantifiers, as in (1).

(1) a. Everybody read a book. $\forall x$ [P x] b. Nobody read a book. $\neg\exists x$ [P x]

The English system, however, is not the only strategy of quantification that is attested in human language. In patterns of concord, the quantificational force of a DP is morphologically spread out over the entire sentence. Hungarian, for example, has distributive concord and negative concord. In (2a), the distributive numeral *egy-egy* appears in the scope of the distributive quantifier *each*; in (2b), the negative indefinite pronoun *semmit* ('nothing') appears in the scope of sentential negation. Only a single distributive or negative meaning is interpreted.

(2) a. Minden gyerek hozott egy-egy könyvet.
Every child brought one-DIST book.
'Every child brought one book'

b. Mari nem látott semmit.
Mary not saw nothing.
'Mary didn't see anything.'

Spoken languages vary with respect to whether they have distributive concord and negative concord or not. English has neither; Hungarian has both. Italian has negative concord but not distributive concord; Kaqchikel Mayan has distributive concord but not negative concord. According to the online *WALS*, concord is preferred for spoken languages: 189 languages have distributive concord vs. 62 that don't; 170 languages have negative concord vs. 11 that don't.

In sign languages, we can play the same typological game. Kuhn (2017) shows that American SL has distributive concord; distributive arc-movement on numerals may be redundant with distributive quantifiers like EACH, as in (3). Similar phenomena have been reported for French SL (Kuhn and Aristodemo 2017), Russian SL (Kimmelman 2017), and Czech SL (Docˇekal et al. 2018), as well as investigated informally for German SL and Italian SL.

(3) EACH-a PROFESSOR NOMINATE ONE-arc-a STUDENT. (ASL; Kuhn 2017)
'Each professor nominated one(-DIST) student.'

With respect to negation, a different situation holds. Across many sign languages, it has been observed that negative *non-manuals* can appear alongside manual signs of negation, thus displaying a case of negative concord (Pfau, 2016). With respect to *manual* signs, one occasionally finds cases of syntactic 'doubling,' in which multiple negative morphemes are semantically associated with the same variable, perhaps with an emphatic interpretation. What seems to be vanishingly rare in sign languages, however, are negative indefinites (words like *nobody*, *nothing*, and *never*) that are obligatorily restricted to negative (or antiveridical) environments.
For example, French is a negative concord language, but French SL is not, as seen in (4).

(4) a. Personne ne fait rien. (French)
'Nobody does anything.'

b. * NOBODY OFFER NOTHING. (LSF)
Intended: Nobody gave me anything.

Similar results hold for Italian SL, American SL, and German SL. The question is thus the following: 'Why do sign languages tend to have distributive concord but not negative concord?'

Dynamic semantics Recent work pursues the hypothesis that concord is fundamentally linked to the introduction and retrieval of discourse referents (DRs). Notably, the introduction of a DR may interact with other operators in the sentence, resulting in semantic effects on the discourse referents that they introduce. In (5), e.g., the singular indefinite introduces an atomic individual, but the plural pronoun retrieves a plurality, due to interaction with the quantifier *each*.

(5) Each professor nominated <u>a student</u>. Any of <u>them</u> could now win a $100 prize.

Henderson (2014) argues that this interaction provides the key to distributive concord; distributive numerals are licensed in exactly those environments that generate a plural discourse referent in this manner. In (2a), the distributive numeral *egy-egy* introduces a discourse referent, and flags the fact that, later in evaluation, the discourse referent will be a plurality.

Similarly, there are operators that *block* the introduction of discourse referents. In (6), it is impossible to use a pronoun to refer to the students that I saw in the room, since the sentence entails that there is no such student. Kuhn (2018) argues that negative concord is licensed in exactly those environments that block the introduction of discourse referents. In (2b), the negative indefinite *semmit* introduces a discourse referent, and flags the fact that, later in evaluation, the discourse referent will have an empty extension.

(6) I didn't see <u>a student</u> in the room. ?? <u>He</u> was studying hard.

The use of concord items signals how quantification affects discourse referents in its scope.

Sign language Cross-linguistically, sign languages have been shown to have a robust tendency to represent discourse referents in a visible, iconic manner, through the use of space. Singular individuals can be indexed at points in space (Lillo-Martin and Klima, 1990, *i.a.*); pluralities—i.e., sets of individuals—are indexed over areas of space—i.e., sets of points.

With respect to distributivity, sign languages are in fact typologically similar not only in the fact that they *have* distributive concord, but also in the morphological manner in which it is expressed. Kuhn (2017) shows that, in ASL, distributive numerals are generated by adding plural inflection to a numeral, moving it over an area of space associated with a plural licensor. Sentence (3) becomes ungrammatical if ONE-arc moves over locus 'b.' Why is this precise morphological strategy so common across sign languages? We claim that these representations, like the representations of singular and plurals, are fundamentally iconically motivated. The plural movement of ONE iconically represents the discourse plurality that will be available. Its spatial association iconically represents the *functional* representation of the two pluralities.

Parallel iconic pressures explain the typological tendencies of sign language when it comes to negative concord. On the analysis above, negative concord items signal the fact that the set of discourse referents is empty. Iconic, pictorial representations are fundamentally unable to express this kind of negative proposition; one cannot demonstrate the non-existence of an entity by pointing at something (Sober, 1976). The impulse to interpret space iconically is thus at odds with the use conditions of negative concord items, which are only grammatical in environments that ensure that no discourse referents are introduced. On the other hand, non-manual signs do not use space, so have no such iconic pressures, and freely participate in negative concord. Biases on sign language typology are explained by what is easy and hard to represent in space.

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Boundaries in space and time: Iconic biases across modalities

Jeremy Kuhn, Carlo Geraci, Philippe Schlenker & Brent Strickland

Friday, 11:30-12:00

Goals. The idea that the form of a word may re/lect information about its meaning is an idea that has its roots in Platonic philosophy, and has been experimentally investigated for concrete sensory properties since the start of the 20th century. In this work, we provide experimental evidence for an abstract, semantic property of 'boundedness' that introduces a systematic, iconic bias on the phonological expectations of a novel lexicon.

Background. In both spoken and sign language, one of the pressures that may lead to nonarbitrary mappings is that of *iconicity*: that is, resemblance between properties of a linguistic form and properties of its meaning. A large literature has examined iconic biases, including experimental results on interpretation and production as well as the ways that natural language grammatically incorporates iconic information (Westermann 1927, Dingemanse 2012, Cuxac 2001, Liddell 2003). To date, these studies have typically focused on mappings between phonological space and qualitative properties that are immediately available in perception, perhaps re1lecting the fact that spoken languages use iconic language most commonly to re/lect properties of sound, and, less frequently, visual properties (Dingamanse 2012). Nevertheless, some recent work has examined the iconic properties of logical semantic categories that are linguistically relevant elsewhere in language. Most notably, the phonological properties of verbs, including length and reduplication, have shown to have interpretive effects relating to verbal aspect, such as duration and iterativity (Dingamanse 2015, Kuhn and Aristodemo 2017). In the present work, we focus on the abstract notion of *boundedness*. Like the work on semantic aspect, this area involves linguistically-relevant logical properties. Additionally, these abstract representations have counterparts in non-linguistic cognition that span multiple cognitive domains.

Methodology. The method is the same as in Strickland et al. (2015). The experimental design is that of an association task (video-word for SL and audio-word for spoken language) on a forced-choice task. Methodology is described here once for all experiments.

<u>Participants</u>. Around 100 participants per experiment participants were recruited on MTurk. All participants are native speakers of English with no previous experience to any sign language.

<u>Materials and Procedure</u>. Each participant was asked to guess the meaning of 18 signs from a pair of meanings. Signs were videos of verbs in LIS. Of these 18 forms, nine were telic verbs (displaying a gestural stop) and nine were atelic (without a gestural stop). Subjects were instructed to view each video as many times as needed. Stimuli were presented one at a time and in a randomized order. Meaning choices consisted of nine pairs of English verbs, roughly matched for word length. To illustrate, in Experiment 1a, meaning choices were verbs denoting physical events; each pair

consisted of one telic and one atelic verb. In Experiment 1b, meaning choices were nouns denoting physical objects; each pair consisted of one count and one mass verb. Neither of the meaning choices corresponded to the actual meaning of the verb (in the case of signs). Each of these nine pairs of meanings was presented once for a stop-stimulus and once for a non-stop-stimulus.

Results. We used logit mixed-effects models to analyze the data. Participants, stimuli, and meaning choices were included as random factors; predictor variables (e.g., presence or absence of boundary; category of meaning choices) were added incrementally. Only statistically significant results are reported here.

Experiment 1. Previous works established that telic meanings are associated with sign language signs that have a gestural boundary. We tested the generality of this motivated mapping with respect to meaning. In particular, we tested whether the effect seen for events in the verbal domain extends similarly to the nominal domain. We found that in both the verbal and nominal domain, participants provided more telic/count responses for stopstimuli than for non-stop-stimuli.

Experiment 2. We tested whether the boundedness of a meaning can be inferred from the phonological properties of a written form. We used the contrast between plosives vs. fricatives (*bip vs. biffiff*) to acoustically achieve presence vs. absence of a boundary in nonce words. Results show a main effect with respect to the presence of a boundary in the stimuli. The effect is significant but smaller than the one found for signs.

Experiments 3-4. We tested whether the association extends to domains where the conceptual representation does not forces iconic mappings, e.g., the contrast between physics vs. psychological domain. Results show that iconic mappings extends to the psychological domain for verbs but not for nouns in both sign and spoken modalities.
Experiments 5-6. We controlled for the language factor using nonce signs (exp.5) and modality of presentation using audio stimuli for nonce words (exp.6). Results are mostly inline with Exp. 1 and 2.

Discussion. In Experiments 1 and 5, we show that subjects are systematically more likely to associate signs in sign language that end with a gestural boundary with telic verbs (denoting events that have a natural endpoint, e.g., *die*, *arrive*) and to count nouns (denoting entities that have physical boundaries, e.g., *ball, coin*). In Experiments 2 and 6, we show that similar effects can be found in the auditory modality for nonce words that end in a phonological stop (e.g. /t/, /p/, /k/), though the effects are systematically weaker. In Experiments 3 and 4 we show that these results do not carry over to psychological nouns (e.g. *idea* vs. *knowledge*), despite the fact that these nouns are still syntactically encoded as either count or mass. We attribute this difference to a representational distinction between physical count nouns and psychological count nouns: the former have referents that are bound in space while the latter do not.

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Negative concord in Russian Sign Language (RSL)

Jeremy Kuhn & Lena Pasalskaya

Friday, 2.22

In natural language, *negative concord* (NC) describes a pattern in which a negative marking appears on multiple morphological items but a single negation is interpreted. In (1), the NC item *nichego*, 'nothing,' is only grammatical with sentential negation *ne*, 'not.'

(1) Marija ne videla nichego. (Russian)
'Mary didn't see anything.'

For sign languages, Pfau (2016) argues that negative non-manuals can be seen as instances of negative concord; in RSL, for example, headshake can only appear in negative sentences. Nevertheless, *manual* signs that participate in concord seem to be surprisingly rare in sign languages. For example, Geraci (2006) shows that in Italian Sign Language, negative indefinites do not take sentential negation, unlike spoken Italian.

(2) a. NOBODY CONTRACT SIGN (LIS)
'Nobody signed the contract.'
b. * NOBODY CONTRACT SIGN NOT

Here, we provide the first definite example of NC involving manual signs, appearing in RSL. Interestingly, like spoken Italian (and unlike spoken Russian), RSL is a *non-strict* concord language, in which some uses of NC items may appear without a licensor. These NC items appear on the right edge of the sentence, unlike Italian, where they appear on the left edge.

Methods. Kimmelman (2017) reports examples of negative indefinites in corpus data, but these are too rare to make strong generalizations. The present study is based on elicited data with one native signer. The generalizations here perfectly coincide with existing corpus data.

Data I. NC items are identified by several distributional properties. First, they are restricted to negative (or anti-veridical) environments. This is the case for negative indefinites in RSL, as seen in (3) and (4). In (5), we see that irregular negative verbs may also licence NC items.

(3) a. NOBODY 3-CALL-1 NOT
'Nobody called.'
b. * NOBODY 3-CALL-1

(4) a. IX-1 NOTHING BUY NOT (RSL)
'I bought nothing.'
b. * IX-1 NOTHING BUY

(5) MOTHER NOTHING WANT.NOT
'Mother doesn't want anything.'

Second, multiple NC items can appear in the same sentence, with a single negative meaning; this is the case for negative indefinites in RSL, as seen in (6).

(6) NOBODY NOTHING GIVE-1 NOT (RSL)
'Nobody gave me anything.'

Data II. NC languages can be classified as having *strict* or *non-strict* concord (e.g., Zeijlstra 2004). In strict concord languages like Russian, NC items always require sentential negation. In non-strict concord languages, there are some syntactic positions in which NC items appear to carry negative force themselves, without an overt negation. In Italian, for example, NC items in preverbal position carry negative force themselves, with no overt licensor, as in (7a).

(7) a. Nessuno ha telefonato. b. * (Non) ha telefonato nessuno. (Italian)
'Nobody called.' 'Nobody called.'

For RSL, *sentence final* NC items appear without a licensor, as shown in (8) and (9).

(8) a. 3-CALL-1 NOBODY (RSL)
b. NOBODY 3-CALL-1 *(NOT)
'Nobody called me.'

(9) a. IX-1 ENGLISH UNDERSTAND NEVER (RSL)
b. IX-1 NEVER ENGLISH UNDERSTAND *(NEVER)
'I never (ever) understand English.'

Sentence-final NC items may license further NC items in their scope, as in (11), and yields a double-negative meaning if sentential negation appears in their scope, as in (12).

(10) Nessuno ha visto niente. (Italian)
'Nobody saw anything.'

(11) NOBODY CAR GIVE-1 NEVER (RSL)
'Never has anyone given me a car.'

(12) IX-1 ENGLISH UNDERSTAND.NOT NEVER (RSL)
'I always understand English.' (lit. 'I never don't understand English.')

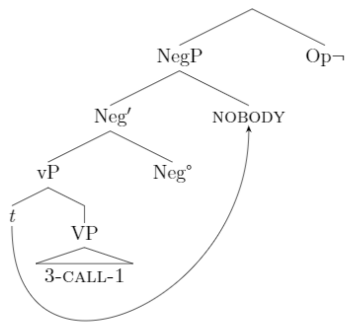
Analysis. We assume a standard analysis of negative concord following Zeijlstra (2004). NC items carry an uninterpreted Neg feature [uNeg] that must appear below an interpreted Neg feature [iNeg], carried by sentential negation.

The licensor-free uses of NC items are derived from hierarchical structure. Although RSL is S-V-O, Pasalskaya (2018) shows that negation induces an S-O-V-Neg word order.

(13) a. MOTHER BUY BOOK 'Mother bought a book.'   b. MOTHER BOOK BUY NOT 'Mother didn't buy a book.' (RSL)

The fact that negation induces word-order changes is evidence that the Neg head is not base- generated in the final position, but that it moves there, taking the verb with it. We assume that this movement is motivated by the need to have a negative item in the Specifier of the NegP, on the right periphery. This may be sentential negation, as in (13b) or a NC item, as in (8a).

Critically, when a NC item moves to the Specifier of NegP, it ends up in a position *too high* to be licensed by sentential negation: there is no higher position at which overt sentential negation can appear. These configurations trigger the availability of a 'last-resort' mechanism to save the grammaticality of the sentence. Following Zeijlstra (2004), this is assumed to be a covert negative operator (OP¬) that takes scope over the full sentence. This covert negative operator will license further NC items, as in (11), and will yield double negation in the presence of a lower, interpreted Neg feature, as in (12). A tree for (8a) is provided below.



Discussion. We have established RSL as a non-strict negative concord language. A straightforward analysis is possible by adopting independently-motivated mechanisms. RSL is interesting to the typology of negative concord on several fronts. First, NC with manual signs is typologically rare in sign languages. This is particularly surprising, given that spoken languages have a strong tendency to have negative concord with negative indefinites. Any comparison of the two modalities would need to take into account the RSL patterns.

Second, canonical cases of non-strict concord languages allow licensor-free NC items in preverbal positions, like Italian. For these languages, there is a confound: is non-strict concord licensed because the NC item appears *structurally above* the verb, or because it appears *linearly before* the verb? Combining Italian and RSL data provides evidence that the relevant configuration is a question of structural hierarchy, not linear order.

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Linear order: A minimal syntactic tool expressing the modifier and the modified

Leyla Kürşat, Rabia Ergin, Ethan Hartzell & Ray Jackendoff

Friday, 2.23

Central Taurus Sign Language (CTSL) is a village sign language that emerged spontaneously in the absence of a conventionalized language model and it currently has 36 deaf signers. It is a vantage point into observing the structure, or lack thereof, of a language in its infancy (Ergin, 2017; Ergin et al., 2018). This study investigates the emergence of word order patterns in CTSL by exploring the use of concatenation as a minimal syntactic tool to express modification (Jackendoff & Wittenberg, 2017). Previous research in emergent signed systems and homesign systems provide evidence for early conventionalization of linear sequencing of the modifier and the modified (Sandler et al., 2005). 12 deaf CTSL signers participated in this study. We used a controlled elicitation task with video clips designed to reveal how participants distinguish between members of the same semantic category. These clips involved either objects that differ by size or location, or characters that differ by their appearance. In our responses we coded the order of the modifier relative to its head and, identified four different configurations:

***Simple modification (SM)*:** Single modifier is used. **CTSL:** TWO WOMAN SIT / WOMAN HAT THROW-BALL
***Conjoined modifiers (CM)*:** Multiple modifiers modify the same head. **CTSL:** MAN BEARD GLASSES / MAN BOOK GO
***Semantic embedding (SE)*:** A second modifier modifies the first modifier. **CTSL:** MAN SHIRT RED / MAN THROW-BALL
***Conjoined modifiers combined with embedding (CE)*:** Multiple modifiers modify the same head, and one of

A total of 134 instances of modification were observed. 72.06% of all instances used head-modifier order, we take this to be the dominant order. A logistic regression revealed that when signers used multiple modifiers to modify a single element, they followed the dominant word order more strictly than they did in simple modification constructions ($\beta=-.98$, $SE=.50$, $p<.05$). We see therefore that with increasing complexity, there is significant conventionalization and less variation in the use of the dominant word order. Briefly our results suggest that purely semantically based principles can determine the linear order of constituents. The principle here is that a semantic modifier must follow what it modifies as closely as possible, even when the pragmatics are clear. For instance, MAN BEARD SHIRT RED can only be interpreted as 'man with the beard and red shirt' and not the anomalous 'red man with the bearded shirt', and this would be the case regardless of the order of the elements. Yet the head-modifier order appears to have conventionalized anyway. We see that a dominant word order pattern is present even in the initial stages of an emerging signed system, and greater semantic complexity calls more strongly for conventional order.

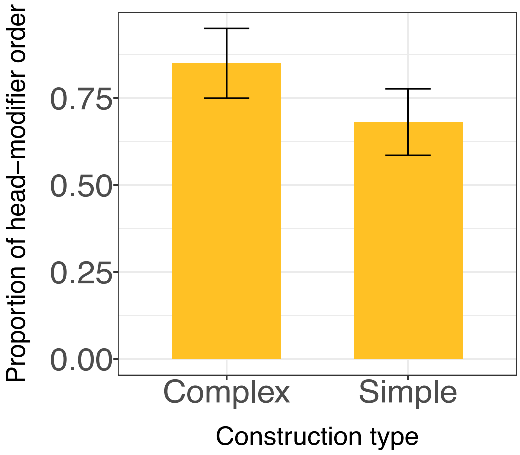

Table 1
Summary of all modification cases

	SM	SE	CM	CE
Number of cases	94	15	12	13
%head-modifier word order	68.08%	93.33%	75%	84.62%

Figure 1. Proportion of head-modifier order for complex and simple modification constructions

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An analysis of constructed action in American Sign Language narratives: Comparing native signers and second language learners

Kim Kurz

Friday, 2.24

Constructed action is a linguistic feature commonly used in American Sign Language (ASL) as a discourse strategy in which the signer uses his/her face, head, body, hands, and/or other non-manual cues to represent a referent's actions, utterances, thoughts, feelings and/or attitudes. Comparing three deaf and native ASL signers and three hearing students who took ASL I class as their second language (L2) course - it is generally assumed that the L2 students struggle more with the use of constructed action especially from the character perspective. The current study tests those assumptions by examining the framing of constructed action within ASL narratives using a Tweety cartoon as stimulus. We found that the native signers used all roles including the narrator, Sylvester the Cat and Tweety the Bird in all narratives. The L2 signers used character perspective 1.3% of the time during their narratives compared to the native signers group at 59%. However, the L2 signers group used the observer perspective 96% of the time compared to the native signers group at 39%. We suggest that constructed action is a complex linguistic skill that is not easily acquired by L2 students who are learning ASL as their second language.

On the semantic organisation of size and shape specifiers: The role of the non-manual component

Maria Kyuseva

Friday, 2.25

Size and shape specifiers (SASSes) are widely used in sign languages of the world to describe visual characteristics of objects (see Supalla 1978 for the first morphological account). Figure 1 shows some examples from Russian Sign Language (RSL):

(a) ‘rectangular’ (chin-up bar) (b) ‘tall’ (vase) (c) ‘long’ (wall)
Figure 1. Size and shape specifiers in RSL

These signs belong to the non-core lexicon (Johnston & Schembri 2007) and exhibit some features of this group: they combine categorical and gradual properties (Emmorey & Herzig 2003; Liddell 2003); compose the meaning of the whole out of the meanings of parts (Supalla 1986); denote different characteristics of the object simultaneously (such as location, orientation, length, width, overall shape; Ferrara 2012). Despite their extensive use, SASSes received surprisingly little attention, especially compared with other non-core signs. Thus, a number of questions about their structure and usage remains unanswered, one of which is: how exactly each of the SASS structural elements contributes to the meaning of the whole sign?

This talk aims to answer this question, using the material of RSL. The focus of the talk is on the role of the non-manual component in the interpretation of the sign. The method of the study entailed a series of psycholinguistic experiments in which participants performed a range of communicative games (“matching task type” scenario). Overall, 16 native signers participated in the experiments. The resulting sample consists of 625 SASS tokens used in different contexts and describing different objects. For each sign, a detailed phonetic transcription in ELAN is provided.

The one-by-one analysis of structural elements in these signs shows that two components behave in categorical manner (in line with Emmorey & Herzig 2003): handshape and mouth articulation. While handshape in SASSes denotes a topological class of the object (such as ‘stripes’, ‘cylinders’, ‘spheres’, ‘lines’, etc.), mouth articulation can contribute to the interpretation of the sign in a number of ways depending on the function it performs (according to the classification given in Crasborn et al. 2008).

The use of mouthings versus mouth gestures in these signs helps to distinguish between more lexicalized and more productive forms: mouthing almost exclusively accompanies more conventionalized noun-like SASS forms in my data, whereas mouth gestures are much more frequent with productive descriptive signs acting as predicate adjectives. Furthermore, the use of different mouth gestures in productive SASSes can highlight different aspects of the form of the referent. Consider the example in Fig 2. The signer uses the same manual sign twice to describe the same object (a small path). This manual sign provides a multifaceted description of the object: it is long, wide, wiggly, located in the conceptual space in front of the signer.

(a) ‘wide wiggly path’ (MG: /af/) (b) ‘wide wiggly path’ (MG: /th/)

Figure 2. The use of different mouth gestures with the same manual SASS

The mouth gesture in these usages shows what feature the signer is focusing on in the moment of the sign production. The SASS in (2a) is accompanied by the adverbial mouth gesture /af/ meaning ‘large’; while the SASS in (2b) is produced simultaneously with the echo-phonological mouth gesture /th/ (protruded tongue) which usually accompanies wiggly hand movements in RSL. I argue that the first time the signer stresses the fact that the small path is wide, whereas the second time she focuses on its waviness. This is further supported by the context these signs are used in:

(1) Signer A (Fig.2a): *Next to a narrow path, I have a **wide** wiggly small path on my picture (MG: /af/)*
Signer B: *On my picture, the path is straight/*
Signer A (Fig 2b): *Oh, my small path is **wiggly**. (MG: /th/)*

The talk will illustrate different ways mouth articulation interacts with the meaning of the manual SASS and provide evidence for a crucial role this component plays in the semantics of these signs.

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Deaf annotators' associations with 'head forward' in Austrian Sign Language

Andrea Lackner, Nikolaus Riemer Kankkonen, Christian Stalzer, Christian Hausch, Isabel Graf, Laura Theuermann & Elisabeth Scharfetter

Thursday, 1.58

We present the Deaf annotators' (function/meaning) associations with the nonmanual element 'head forward' (hf) in signed texts of Austrian Sign Language (ÖGS). The actual study is based on corpus data, annotated by Deaf natives focusing on clause-like-units (CLUs)[1] and nonmanuals. The analysis includes the position(s) and variation of hf in CLUs, its co-occurrence with other nonmanuals and its varying use by several Deaf individuals.

Investigations on various sign languages show that the nonmanual 'head forward' can be the marker or a part of the nonmanual configuration in polar questions (cf., among others, Dubuisson & Miller 1992 on Quebec Sign Language (LSQ) or Šarac Kuhn & Wilbur 2006 on Croatian Sign Language (HZJ)), in the if-clause of conditionals (cf., among others, Dachkovsky 2008 on Israeli Sign Language (ISL)) and in other constructions. In ÖGS 'head forward' also has been observed in interrogative and conditional constructions (Lackner 20017).

In order to identify the Deaf annotators' associations with nonmanual behavior[2], the following approach has been implemented: Signed video data is collected by creating a corpus of different regional varieties of ÖGS[3]. Afterwards three Deaf informants of each variety (in total 18 individuals) annotate a choice of selected videos of their regional variety[4] by following three steps. Firstly, they are asked to determine clause like units (CLUs) within the given signed texts. Secondly, they annotate propositional-semantic information related to each identified CLU: They are asked to select one or more possible functions associated with each identified CLU along a template of selected functions. This template follows Lehmann's list of functions[5] grouped into functional domains: contrast, illocution, modality, complex propositions, information structure, temporality/aspectuality/modification, reference, and interactive function (cf. Lehmann & Maslova 2004). Thirdly, the Deaf annotators determine nonmanuals by selecting them from given set of parameters (cf. Lackner 2017: xxi-xxiv).

The analysis of these annotations reveals that Deaf annotators associate 'hf' with (embedded) polar and content interrogativity, conditionality, exclamation and other functions. Hf's co-occurrence with other manual and nonmanual elements and its syntactic co-occurrence varies according to the associated functions, and among

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[1] We follow Hodge's (2013) and Johnston's (2014) methodical implementation on determining CLUs.
[2] With 'association' an informed evaluation on nonmanuals done by Deaf annotators is meant, that is, the approach follows an emic view on language in the sense of Pike (1967).
[3] This are in total seven regional varieties comprising 46 individuals.
[4] All this annotation tasks have been done using ELAN, a tool for creating multiple annotations.
[5] The list of functions to be chosen can be extended due to the annotators' feedback. Also individual comments, specifications and additions can be added in a child tier.

individuals/varieties. The comparison between all CLUs being associated with a particular function such as (embedded) polar interrogativity and the co-occurrence of 'hf' is analyzed, resulting in various reasons for the co-occurrence or absence of 'hf'. This will be discussed. In addition, the various functions associated with 'hf' are interrelated and their semantic contiguity will shown.

Based on our findings, we will follow Lackner's (2017) proposed model for the Functional interpretation and syntactic analysis of nonmanuals: We suggest that 'hf' possesses broader semantic meaning or multiple meanings. This/these meaning(s) is/are specified by the discourse context, pragmatics, the co-occurrence with other manual/nonmanual elements and within the clause itself, as well as social/individual facts. A model for each clause construction or clause type – including possible slots of 'hf' – will be shown.

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Mutual gaze in sign language interpreting in mobile transitions

Minttu Laine

Friday, 2.26

This study addresses managing mutual gaze in interpreter-mediated interaction during mobile transitions i.e. while participants move about in space and transit from one activity phase to another. Mutual gaze, a reciprocal gaze directed on the face of the interlocutor (Knapp & Hall 2010), often referred to as eye contact, is a fundament sign language interaction. Establishing and sustaining mutual gaze can be done by various manual linguistic and gestural means (e.g. Baker 1977; McIlvenny 1995) as well as by the positioning of the participants and changes in the body posture (e.g. Mather 1989; Keating & Mirus 2012).

In the context of sign language interpreting in stationary settings, the interpreters have been documented to use a number of the linguistic and embodied gaze managing means used in informal sign language conversation (Metzger 1999; Van Herreweghe 2002; Napier 2007; Berge & Thomassen 2016). However, the questions of how mutual gaze is managed, and how sign language interaction is constructed at large in mobile settings have gained little attention so far. This study concerning mobile transitions aims to answer a) in what ways does the interpreter attempt to get the deaf parent's attention, and b) how do the signing participants work together to establish and maintain mutual gaze.

The multimodality turn has confirmed the means of interaction to include the use of objects and the environment in addition to language, gesture and body posture also in sign language research (e.g. Kusters & al. 2017). The method of this study is multimodal interaction analysis that examines how the interaction is constructed sequentially between participants i.e. how the understanding of and the reaction to a previous turn is manifested in the linguistic and embodied action of the participants (Haddington & al. 2011). For this study, a 12-minute compilation of interaction was extracted from a video recording made at an authentic checkup visit of a deaf parent with a preschooler and a baby in a Finnish child health clinic. The data consists of mobile transitions when the participants are engaged in activities such as examining and taking care of the baby. The data was annotated in ELAN for the contextually prominent multimodal interactional means.

The results show that the focal visual attention of the deaf parent was divided between the activities, objects, the hearing interlocutors and the interpreter, and breakdowns of mutual gaze were frequent. Establishing and sustaining mutual gaze required interactional effort from both signing participants. In the closer analysis on the interpreter's means to cater for the deaf parent's access to the interpretation, a multimodal variety was found: modifying and suspending signing, modifying body posture, and moving to another position in the space. Considering the deaf parent, active shifting of the gaze direction indicated also by turning of the head away from current activity, and changes in body posture were seen as some of the main means to obtain sight-line with the interlocutors.

Even though mutual gaze, or eye contact instead, has been a prominent concept in addressing sign language interaction in informal and in interpreted encounters, the embodied and multimodal nature of interaction calls for a "whole-body approach" to sign language interaction. This may be achieved by combining insights from interaction studies, deaf studies, and perception studies.

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The DGS-Korpus approach to including frequent sign combinations in a corpus-based electronic sign language dictionary

Gabriele Langer, Anke Müller, Sabrina Wähl & Thomas Hanke

Friday, 2.27

Using corpora for compiling dictionary entries is a given standard in the lexicography of well-studied written languages (cf. Atkins & Rundell 2008:96). For sign languages (SL) on the other hand, corpus-based lexicography is just beginning to emerge. With the availability of corpus data new kinds of information on sign use can be found and made available in dictionary entries, such as different types of typical sign combinations (in the following called patterns) including phrasal units, loan compounds, collocational patterns and even patterns of semantic preference (cf. Sinclair 2007).

For the compilation of the corpus-based DGS-German dictionary we use the DGS-Korpus collected between 2010 and 2012. With annotation still ongoing, the preparation of dictionary entries has already started. Entries are compiled in a preliminary format and are published as work in progress step by step to encourage early feedback processes from different user groups (e.g. native signers, teachers and learners of sign language, interpreters) and an exchange of ideas with the scientific community.

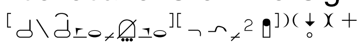
Frequent sign combinations are extracted from the DGS-Korpus in order to include information on typical patterns into the dictionary entries. The dictionary is designed as bilingual and bidirectional, but with a clear focus on the description of the DGS signs and their uses. Thus it displays properties of a genuine monolingual dictionary with entries including information on senses, usage, grammar, form variants, regional and age variation, synonyms and antonyms, relevant collocations and other patterns. Entries also include authentic DGS usage examples directly taken from the original corpus recordings (cf. Langer et al. 2018). German is used as a metalanguage for sense descriptions, comments, labels and navigational elements. German translational equivalents for each sense and German translations for authentic examples as well as corresponding indices contribute to the bilingual perspective.

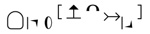
In this paper we focus on patterns of sign combinations and how to integrate them into a complex entry structure. Information types that are genuine elements or stretches of the object language have to be represented in the entry in a directly accessible way. This raises the question of how to present single signs, combinations of signs as well as longer stretches of signing in the dictionary. This issue touches the core of SL lexicography: Object language elements that fulfil the function of being relevant information in themselves (i.e. that function as examples in the broader sense cf. Svensén 2009:281) need to be present first hand and cannot be substituted.

As entries of SL dictionaries become more and more complex and include a wider variety of information types such as SL examples, the issue of sign representation becomes more pressing. In dictionary structures with only few information kinds drawings, stills or movie clips to represent the lemma signs are feasible solutions. However, while movie clips are a very helpful representation of form, they lack the mnemonic function and orientation support necessary in a complex entry containing several different information units in the object language. Resorting to a not yet widely established writing system like SignWriting or even to a more scientifically oriented notation system like HamNoSys is not an option either as they do not provide a low-threshold access. This would require the user to learn a new representational system just to be able to occasionally use the dictionary. Glosses are a practical way to represent signs and their sequence in a permanent way and can be used as unique labels for cross-referencing. However, glosses are not a representation of the actual object language form but only a substitute and involves well-known risks, especially of false inferences from the gloss word to the sign (cf. e.g. Stokoe et al. 1976/2000:255, Slobin 2008:121-123).

Instead, we experiment with moving icons (called micons) combined with unique entry numbers within the microstructural text of the entry. A micon is an animated image indicating the form by a still and an animation on mouse-over activation, backed up by a full-size video clip only one click away. Obviously, this is a solution solely working within the electronic medium and difficult to represent in print.

The patterns listed in the entries are of different levels of complexity:

1. Simple collocations of two signs, the lemma sign and a frequent neighbour (e.g.   ‘need time’), represented by two micons side by side.

2. Complex patterns where the place of the neighbour is shared by a cluster of a limited number of lexical variants: The sign for ‘visit’  frequently occurs in combination with two different lexical variants for ‘sleep‘  and  as a right neighbour in the corpus, with the meaning ‘staying overnight at a friend’s or relative’s place’. The pattern is represented by a dendrogram with the micons as nodes.

3. Complex patterns where the neighbour can be any member of a grammatical class or a semantic group (colligation and semantic preference cf. Sinclair 2007). Here the class or group can be large or even open e.g. number signs. The members of the neighbouring group are not lexical variants but differ in meaning. In our pattern representation, we include prominent members as examples as well as some categorical information on the group or class.

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Pronounceability effects during sentence reading by deaf and hearing readers

Brittany Lee, Jonathan Mirault, Nathalie Bélanger & Karen Emmorey

Friday, 2.28

The Lexical Quality (LQ) hypothesis states that fluent readers integrate semantics, phonology, and orthography (Perfetti & Hart, 2002). One way to study the interplay between these systems is to investigate how transposed letter (TL) non-words disrupt the orthographic and phonological representations of target words during reading. When typical hearing readers are asked to make lexical decisions to briefly presented TL non-words, they more often mistake these non-words for real words when they form unpronounceable letter strings (e.g., BRVAE from *brave*) than pronounceable letter strings (e.g., BARVE from *brave*) (Frankish and Turner, 2007). This pronounceability effect could be explained by readers' sensitivity to orthotactic and/or phonological constraints in English. The unpronounceable TLs could be repaired and perceived as real words, while the pronounceable TLs may generate a phonological representation that clearly conflicts with the target word. A follow-up experiment with hearing dyslexic readers who had weak phonological decoding skills found no effect of pronounceability (Frankish and Turner, 2007). Thus, typical hearing readers appear to rely on phonological information to classify TL non-words.

Deaf readers present a unique opportunity to further explore how this pronounceability effect captures the role of phonology and orthography in stabilizing orthographic representations. Like hearing dyslexic readers, deaf readers are known to have less developed phonological representations compared to hearing readers. However, deafness is not a reading disorder. Even without automatic access to phonological representations, deaf readers are sensitive to orthotactic constraints and can achieve reading proficiency comparable to that of hearing readers. If deaf readers pattern like hearing readers and exhibit a pronounceability effect, it would suggest an orthotactic rather than a phonological basis for the effect. If deaf readers pattern more like dyslexic readers and fail to show an effect of pronounceability, phonological input may play a critical role in stabilizing orthographic representations.

The current study used eye tracking to further test the TL pronounceability effect in 40 deaf readers (native and early signers of American Sign Language) and 40 hearing readers. This methodology lends itself to sentence reading, which is more naturalistic than single word reading used in lexical decision experiments. Using the gaze-contingent display-change invisible boundary paradigm, a target word (e.g., *brave)* was embedded in a sentence (e.g., *The little girl acted* <u>*brave*</u> *when she fell down*). When the sentence was presented to the participant, a preview word took the place of the target word until the reader's gaze crossed an invisible boundary before the preview. In this case, the previews are either pronounceable or unpronounceable TL non-words (e.g., *barve* or *brvae* from *brave).* Crossing the boundary triggers a display change so that the target word (*brave*) replaces the preview during a saccade and the change is not perceived by the reader. Since the reader pre-processed the preview while it was presented in the parafovea and then fixated on the target, the preview serves as a prime and its effect on the target word is reflected in the fixation duration. The procedure for the experiment included a 3-point calibration and 12 practice items prior to the experimental trials. For the experimental trials, they silently read 184 single-line sentences while their eye movements were recorded with an Eyelink 1000+. To ensure that participants were reading for comprehension, they answered Yes/No questions after 20% of trials using a gamepad. Data were also collected on the following assessments in order to match the deaf and hearing groups and run correlational analyses: Kaufman Brief Intelligence Test (KBIT-2) (Kaufman & Kaufman, 2004) for nonverbal intelligence, Woodcock Johnson Passage Comprehension (WJ) (Woodcock et al., 2001) for reading ability, phonological awareness tests (Hirshorn et al., 2015), and a spelling recognition test (Andrews & Hersch, 2010).

Results showed that hearing readers had longer gaze durations for pronounceable previews (*barve*) than for unpronounceable previews(*brvae*), while deaf readers showed no difference between the two non-word types. Deaf readers refixated targets words more often when primed by unpronounceable previews (*brvae*) compared to pronounceable previews (*barve*), while hearing readers showed the opposite pattern (i.e., more re-fixations when primed with pronounceable previews). This pattern suggests that deaf readers rely more on orthotactics, and that their refixations are due to sensitivity to illegal bigrams in the unpronounceable previews. Consistent with Frankish and Turner's interpretation of the pronounceability effect, these results suggest that hearing readers are more sensitive to phonology; their refixation pattern and increased gaze durations on targets with pronounceable previews suggest a mismatch between the phonological representations of the preview and the target that impacts hearing but not deaf readers.

These findings highlight differences in how deaf and hearing readers perceive and process words when reading. Research with deaf readers stands to inform models of reading and educational approaches to literacy that are traditionally based on phonology.

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Development of a corpus-based Korean Sign Language dictionary

Hyunhwa Lee & Sung-Eun Hong

Friday, 2.29 **– CANCELLED**

The Korean Sign Language (KSL) is the sign language of the deaf people in South Korea. In 2016 the Korean Sign Language Act was enacted and KSL has gained legal recognition and is the official language of deaf people in South Korea (Hong et al., in press). Based on the Korean Sign Language Act the National Institute of Korean Language (NIKL) has created a new division for the promotion of Korean Sign Language, which is in charge of a variety of KSL-related research projects such as the KSL Dictionary Project.

The KSL Dictionary Project is a long-term research project which is carried out directly by the NIKL. The KSL Dictionary Project is developing a new web-based Korean Sign Language Dictionary. The NIKL had already compiled a Korean Language Dictionary (print version) with more than 6.000 entries in 2005. In 2015 the Korean Sign Language Dictionary was expanded with numerous specialized fields and put online (web version). But the NIKL KSL Dictionary as well as other Sign Language Dictionaries in Korea have got structural problems. Just to name an example these dictionaries contain artificial created signs in order to have equivalent expressions to spoken words. Furthermore the information given in an entry refers to the spoken word and not to the corresponding sign.

The new corpus-based Korean Sign Language Dictionary has two directions that means there is a KSL-Korean dictionary and a Korean-KSL dictionary. The KSL-Korean dictionary relies as much as possible on the KSL Corpus which has been built for the area of Seoul in 2015 and will continuously add sign language data from other areas (Hong et al. 2018). The KSL Dictionary uses SignWriting for the headwords in order to overcome the problems which arise when glosses are used for sign language headwords. And of course signs can be searched by handforms. The KSL entry contains variation forms, information about mouth gestures, equivalents into Korean and the meaning (word senses) of the sign described in Korean. Besides each word sense is provided with a KSL sample sentence if possible from the KSL Corpus (cf. Langer et al. 2018). The KSL sample is shown in form of a video as well as in SignWriting.

The entry in the Korean-KSL dictionary contains equivalents in KSL, definition and sample sentences in Korean taken from the Korean Basic Dictionary and KSL definitions of the headword which are not translations from Korean. The KSL definition differs from a typical Korean definition in that for example a sample sentence of the headword is always included in the KSL definition because that is how deaf people usually explain words or signs to each other.

In the presentation we will show entries of the pilot dictionary in both directions (KSL-Korean and Korean-KSL) and we will discuss the challenges that occurred in the dictionary making process. There will be a special focus on the KSL definitions, since this phenomenon is rather rare within sign language dictionaries (there are exceptions such as the Corpus-based DGS Dictionary for Technical Terms in Social Works (Konrad et al. 2003)).

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Novel sign learning in young deaf children: The role of referential cues and visual attention

Amy Lieberman & Arielle Borovsky

Friday, 2.30

The social and referential cues that accompany early language input are key to helping young children map new words to their referents (e.g. Baldwin, 1993; Booth, McGregor, & Rohlfing, 2008). For hearing children, the association between language and its referents is made through simultaneous and multi-modal perception; language input is perceived through the auditory mode, while objects and referential cues are typically perceived through the visual mode. In contrast, deaf children acquiring a sign language such as American Sign Language (ASL) perceive both linguistic and non-linguistic information through the visual mode. Thus, in order to integrate language input with attention to objects in their environment, deaf children must learn how to optimally alternate visual attention between their conversational partners and the surrounding visual world. Currently, little is known about the referential cues that support word learning in deaf children under these unique perceptual conditions.

We conducted two experiments using an eye-tracking paradigm to investigate how young deaf children use social and referential cues to learn novel signed words. In Experiment 1, deaf children ages 18 to 60 months (n=32) were taught six novel signs during an initial exposure phase (Figure 1a). We varied the timing of referential cues (simultaneous gaze shifts and points) with respect to the signed label. Specifically, participants saw novel signs and novel objects along with a referential cue that occurred either before (Point-Sign) or after (Sign-Point) the signed label, or not at all (No Cue). We subsequently assessed novel sign recognition in test trials where we presented two of the novel objects on the screen and labeled one of them. Novel object trials were interleaved with familiar object trials. During the exposure phase, children primarily looked towards the signed video, with looks to the target object peaking during sentence breaks. During the test phase, children looked significantly more to the target than the distractor picture for both familiar and novel objects, indicating that they had successfully mapped the novel labels onto the novel objects (Figure 2). Exposure condition was not a significant predictor of target looking during test; age was a significant predictor of target looking during the test phase ($t = 3.2$, $p < .01$).

One explanation for the findings that children mapped novel labels to objects in Experiment 1 is that only one object was presented with each label, thus making the referential cue somewhat extraneous. To account for this, in Experiment 2, we presented an identical paradigm, except that during the exposure phase, two novel objects were presented on the screen while only one was labelled (Figure 1b). This manipulation allowed us to increase the importance of the referential cues, since children had to attend to the cue in order to determine which of the two objects was being labelled. A different group of deaf children ages 18 to 60 months (n = 32) participated. During the exposure phase, children once again primarily looked to the signed video. Critically, during the exposure phase, when children did shift away from the video they looked more to the target than the distractor picture ($p < .001$), indicating that children attended to and followed the referential cues directing their gaze to the target picture. During the test phase, children successfully mapped the novel sign onto the target object regardless of exposure cue condition. Age did not significantly predict target looking at test. Together, these findings suggest that children are able to allocate visual attention such that they can attend to referential cues that occur either before or after signs to successfully map novel labels onto novel objects. This study is a first step in exploring deaf children's ability to use referential cues to guide looking behavior and learn new words when all input occurs in the visual modality.

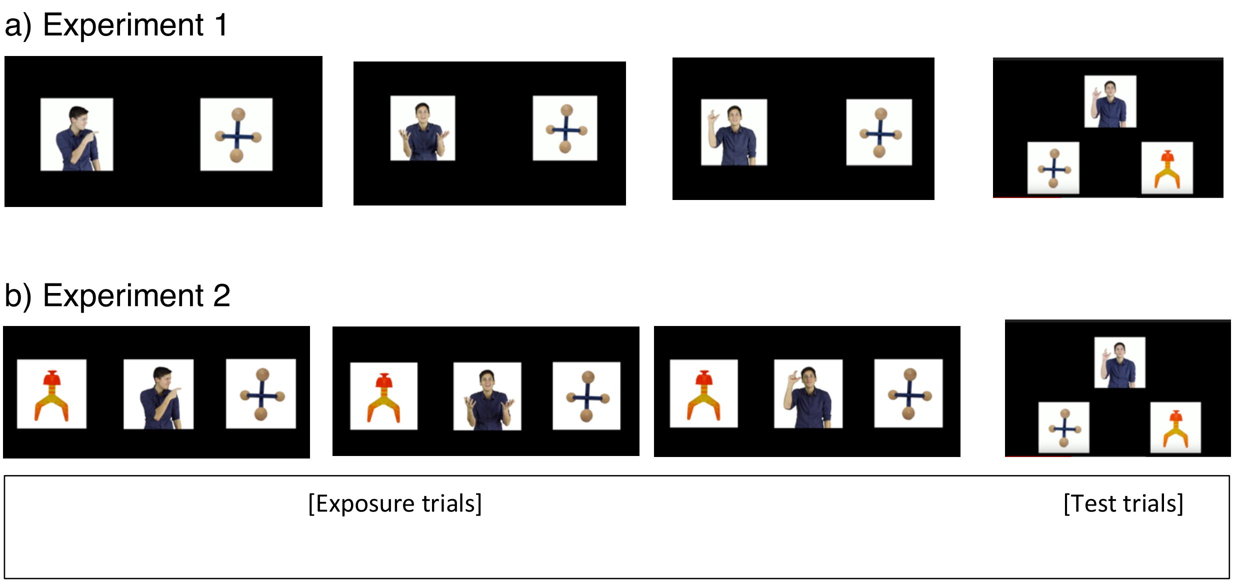

Figure 1: Schematic of exposure and test trials in a) Experiment 1 and b) Experiment 2.

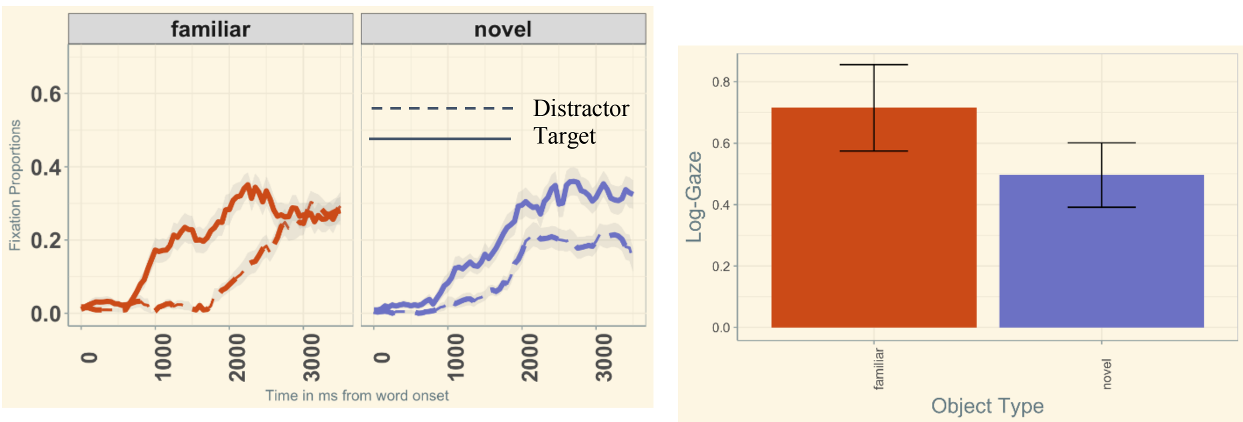

Figure 2: Left: Time course of looks to the target and distractor picture by word type (familiar vs novel) in Experiment 1. Right: Log-transformed looks to target in familiar and novel signs from 600-3400ms post sign onset

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ASL pronoun acquisition: Implications for pronominal theory

Diane Lillo-Martin & Deborah Chen Pichler

Friday, 2.31

It is well-known that the pronominal function is generally carried out in sign languages by the use of pointing signs (IX, for index). While contrasts between pointing signs and the pointing used in co-speech gestures have been debated (Cormier et al. 2013), questions remain about the appropriate analysis of such signs. Here we take a new approach by considering a possible featural analysis of pronouns proposed by Harley & Ritter (2002) [HR], and examine their predictions for acquisition. We find that an extensive set of ASL acquisition data corroborates their predicted acquisition course, and propose a version of the HR feature hierarchy for ASL.

HR propose a morphological feature hierarchy to capture facts about cross-linguistic patterns of pronominal systems. They argue that their feature hierarchy accurately accounts for previously observed patterns of language acquisition across 6 languages (in ten studies), including ASL (Petitto 1987). However, Petitto's study, while influential, was based on a limited set of data from only two children. Furthermore, some of her assumptions about co-speech pointing can now be questioned (Lillo-Martin & Chen Pichler 2018). Our project seeks to analyze ASL pronoun acquisition in a much larger data set, and using the results of this study, consider whether it is possible to apply HR's feature hierarchy to account for ASL pronouns.

The acquisition data we analyzed come from a longitudinal study of four deaf children with deaf, signing parents (Lillo-Martin & Chen Pichler 2008). The children were recorded on a regular basis (weekly to monthly) in spontaneous play sessions interacting with their parents and/or a signing experimenter (deaf or hearing). Utterances were annotated using ELAN (Crasborn and Sloetjes 2008) following standardized lab procedures (Chen Pichler et al. 2010); 'IX_1' represents points to self, and IX all other points. All instances of IX_1 and IX were extracted from the database, and IX referents were hand searched to determine points to addressee, non-addressed person, or object/location. To assess acquisition order, the First of Repeated Uses (FRU) was determined on the basis of data binned into age groups by month; an instance of production was counted as FRU if additional instances were found in the subsequent monthly age group. First appearance (not FRU) is reported for plural IXarc, due to extremely low frequency of that form. To assess potential acquisitional sequences, the binomial test was used following Snyder (2007). Results are shown in Table 1; forms that were acquired by a particular child at different ages, but for which those differences are not statistically significant, are indicated by grey shading.

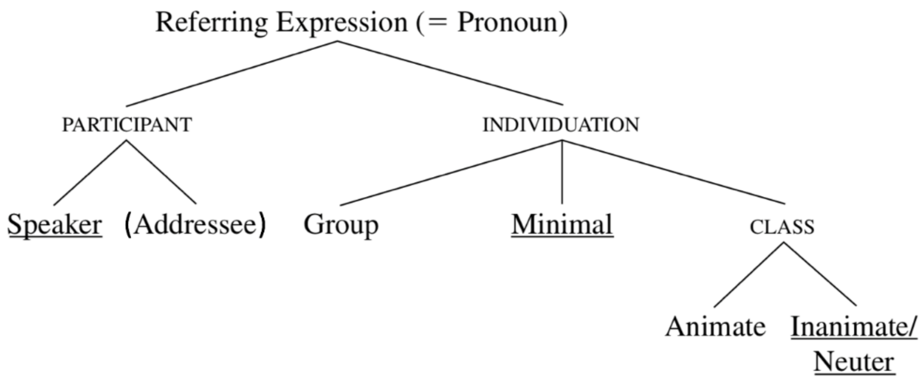
HR predict the following acquisitional patterns based on their feature hierarchy: (i) 1st person singular or 3rd singular inanimate is acquired first; (ii) 2nd person is acquired after 1st person, but no specific ordering is predicted for 2nd vs. 3rd animate; (iii) singular is acquired before plural. Our ASL acquisition data follow this prediction: the first uses of IX are inanimate (objects/ locations); for two children, 1st person is significantly later, and points to addressee significantly later still; points to non-addressed persons are either significantly later than points to addressee or come in at the same time, but they are very low in frequency, so these orders should be taken as preliminary; plural forms come in much later than singular forms.

In light of compatibility between the acquisition patterns we observed and the model by HR, we propose a possible ASL version of their model in Figure 1. Two important implications of the model follow. (1) The HR model assumes a universal distinction between 2nd and 3rd person. It has been argued that ASL does not mark a grammatical distinction between 2nd and 3rd person (Meier 1990), using the same lexical item (IX) for both, although of course signers can refer to both addressees and non-addressees using this form. If the form is truly non-distinct, it could be claimed that there is simply massive syncretism in the system; alternatively, the Addressee node might not be activated in ASL, as indicated in the figure by enclosing it in parenthesis. Along with this, a possible approach would be to maintain the 2nd/3rd person distinction at the level of the nominal Speech Act phrase (Wiltschko 2018), while omitting it from grammatical structure. (2) The feature system and acquisition timeline distinguish between animate and inanimate pronouns, although it has not been claimed in the literature that the animacy distinction is grammaticalized in ASL pronouns. The findings here suggest that searching for such possible grammatical distinctions would be a fruitful direction for future research.

Table 1. Summary of data and results from analysis of ASL pronoun acquisition (ages in parenthesis represent the first recording)

Participant	Age Range	# of Sessions	Total # IX	FRU IX	FRU IX_1	FRU IX(addr)	FRU IX(non-addr)	IX-plural
				inanimate------------	-*animate*------------			appears
ABY	1;05-3;00	30	2295	(1;05)	(1;05)	(1;05)	1;07	2;02
JIL	1;07-3;00	37	2447	(1;07)	1;10	1;09	1;11	2;01
NED	1;06-3;00	25	1620	(1;06)	2;00	2;04	2;04	2;04
SAL	1;07-2;10	18	2769	(1;07)	1;08	1;09	1;11	1;08

Figure 1. Proposed pronoun feature hierarchy for ASL



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The Tip-of-the-finger phenomenon in German Sign Language – A corpus-based analysis

Jana Löffler

Friday, 17:30-18:30 (SIGNopsis)

The Tip-of-the-finger phenomenon (TOF) is the sign language equivalent of the Tip-of-the-tongue phenomenon (TOT) in spoken language. During a TOF, signers are sure they know a sign but they are not able to retrieve it. Thus, signers have detailed semantic information but little or no access to the sign form. The analysis of TOFs can provide information on the process of speech production and the significance of the individual phonological parameters (hand shape, location, orientation, movement). To date, studies investigating the TOF phenomenon are rare, and there is no research in German Sign Language (Deutsche Gebärdensprache, DGS) available so far. Therefore, my work is based on a study by Thompson, Emmorey and Gollan (2005) on American Sign Language (ASL). In this study, the authors found that TOFs occur in fingerspelled words and lexemes. In the first category, the initial letter is more accessible than middle or latter letters. In a lexical sign, three of the four parameters can be retrieved, but the movement seems to be the most difficult.

My investigation focuses on whether these two categories and their results can be transferred to DGS. We predict that TOFs in DGS and ASL are conceptually identical – thus, the categories developed by Thompson et al. (2005) should also be found in DGS. Additionally, some language-specific differences between DGS and ASL give rise to further categories, for example the role of mouthing.

To address this question, my research relies on data of the DGS corpus project. 13 TOFs of 11 deaf signers (n=11, 7f, mean age: 51.45 years; range: 31-79 years; mean age of sign language acquisition: 4.45 years; range: 0-8 years) were included in the analysis and transcribed using the ELAN annotation tool. An initial analysis shows that the categories of Thompson et al. (2005) can be transferred to DGS. 5 out of 13 TOFs concern fingerspelled words and 6 can be attributed to the lexeme category. In addition to the categories suggested by Thompson et al. (2005), we identified another one, that concerns the interaction of manual sign and mouthing. Two TOFs of my data set fall into this category. This supports our hypothesis regarding an additional TOF category in DGS, which should be verified by further research.

Also, we analyzed to which extent the results from the ASL study regarding the retrieval of parameters and fingerspelled words can be replicated in DGS. It turns out that the initial letter of fingerspelled words always seems to be retrievable, while other letters can only be reached in the course of the finding process. In lexical signs, the phonological parameters location and orientation appear to be available, while the movement and the handshape seem to be more difficult to access. Further research could include a comparative linguistic analysis of DGS, ASL and other sign languages regarding TOFs, and the realization of a quantitative analysis.

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Taboo terms in German Sign Language (DGS): Exploring the influence of iconicity

Cornelia Loos, Jens-Michael Cramer & Donna Jo Napoli

Saturday, 3.11

Background. Taboo terms have much in common from language to language. In general, topics that readily yield taboo terms include bodily effluents, disease and death, religion, and sex (Montagu 1967; Andersson and Trudgill 1990; Hughes 1992). Further, taboo terms offer a playground for linguistic creativity in language after language, and sign languages form no exception (Mirus, Fisher, and Napoli 2012; Fisher, Mirus, and Napoli forthcoming). Addressing taboo in a holistic and exhaustive way is rare in sign language studies; Woodward (1979), while an entire tome on sex-related terms in sign languages, presents a visual glossary rather than a linguistic analysis of taboo terms. Other recent work has examined taboo terms with respect to what they can reveal about the grammar of sign languages in general. For example, the examination of taboo terms has shed light on morpho-phonological creativity (Mirus, Fisher, & Napoli 2012), and led to the recognition of new constraints operative in morphology and syntax (Napoli, Fisher, & Mirus 2013).

Aim. In the present paper, we look at taboo terms in DGS and examine the linguistic mechanisms that bring about or enhance offense. Specifically, we claim that source of metonymic anchoring, degree of iconicity, and embodiment converge to increase the offensiveness of a taboo sign. We further discuss Meir's (2010) Double Mapping Constraint on possible metaphorical extensions of iconic signs and show that it holds of at least one additional cognitive and/or linguistic process, namely generalization/semantic widening.

Method. Using the Think Aloud Protocol (TAP) developed by van Someren et al. (1994) to study problem-solving, we elicited offensive signs and dysphemisms from 9 DGS signers (4 male, 5 female) in their mid-30s to mid-40s from different regions of Germany. The signers were presented with open questions and pictures of taboo signs (Schinmeyer 2009) and encouraged to discuss their appropriate. We often went long periods without interrupting the flow of the discussion. When a comment was unclear to us, we took advantage of breaks in the conversation to ask pointed questions, such as: *What did you mean when you called that sign crude, not taboo?* If someone raised a particularly tantalizing example or sociological, political, or linguistic point, we again waited for a break in the conversation to ask for additional examples or clarification. We then double-checked the taboo nature of the signs included for analysis in this study against the intuitions of our participants on different occasions.

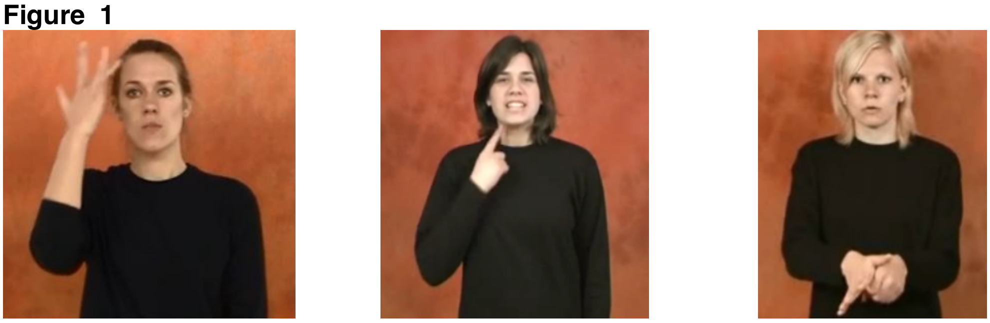
Results & Discussion. ***Source of metonymic anchoring influences offensiveness***. Iconic signs often depict only parts of the meaning of a sign and depending on which metonymic anchor is chosen to represent a given concept, offensiveness results. For instance, the concept 'male homosexual' is represented metonymically in the DGS sign SCHWUL through a mannerism stereotypically associated with gay people (see Fig. 1a). This variant is considered neutral in contrast to a sign representing homosexuality via a depiction of anal sex. The choice of metonymic anchor thus affects the degree of offensiveness.

Iconicity is a key factor in causing offense. In line with previous findings on Japanese SL, Jakarta SL, Sri Lanka SL and HKSL (Sze et al. 2017), we find that the more iconic a taboo term is in DGS, the greater its potential as a dysphemism. To illustrate, compare two signs for sexual relations in Figure 1. The (b) variant does not exhibit an iconic mapping between form and meaning and does not carry offensive potential. The (c) variant, on the other hand, has the palm slap against a non-dominant 6-handshape and is suggestive of colliding bodies. The sign is considered crass or offensive. Iconic signs that differ in the number of structural mappings between form and meaning also differ in offensiveness. Two DGS signs for ‘male homosexual’ that both depict anal sex differ only in whether the anus is explicitly represented in the form of the sign or not, where the explicit variant is more offensive.

Embodiment increases offensiveness. We define embodiment as a type of shape-for-shape iconicity (Taub 2001) in which the signer’s body represents parts of the human body. We find embodiment to increase the offensive potential of a taboo sign. For instance, DGS has two signs for ‘slut’ that iconically represent a female’s opened legs. In the more offensive variant, the signer’s torso and head represent the woman’s upper body, making the addressee feel as though they have an inappropriately intimate view of the scene.

Extension of the Double Mapping Constraint (DMC). Meir (2010) shows that there are restrictions on potential meaning extensions of iconic signs. According to the DMC, iconic signs cannot be extended metaphorically if the form of the sign highlights a different meaning component from the one profiled in the metaphorical mapping. We show that semantic widening is subject to a similar constraint; a taboo sign cannot be generalized if its iconic form highlights a meaning component not shared by all members of the larger referent group. The offensive variant of ‘slut’, for instance, cannot apply to males, since the form of the sign portrays the way a female’s legs may be spread during intercourse.

Figure 1



(a) SCHWUL ‘gay’ (b) SEX ‘(have) sex’ (c) FICK ‘to fuck’

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Affirming and rejecting negative assertions in German Sign Language (DGS)

Cornelia Loos, Marlijn Meijer & Sophie Repp

Friday, 2.32

RESPONSE PARTICLES like *yes* and *no* in principle fulfil two functions. They may affirm or reject a previous utterance, i.e. indicate its truth (*yes*-type particles affirms the truth (1bi/2bii); *no*-type answers reject it (1bii/2bi)), or they may indicate that the response to the previous utterance has positive or negative polarity (*yes*-type particles indicate positive polarity (1bi/2bi), *no*-type particles indicate negative polarity (1bii, 2bii)). As languages vary with respect to the number and the functions of response particles, early accounts of response particle systems proposed that languages choose between truth-based and polarity-based systems for *yes/no*-type particles [9,6], and that there may be dedicated particles like German *doch*, French *si* for specific discourse conditions. However, it has been shown that a clean partition into truth-based vs. polarity-based systems is rare, independently of the presence or absence of dedicated particles [10]. Preferences for particles often are gradient rather than categorical (see e.g. (1/2) for acceptability judgments on English). Therefore, more fine-grained analyses have been proposed, which analyse particles e.g. as anaphora [7, 11] or as remnants of ellipsis [5]. These proposals account for subtle preferences with pragmatic and/or syntactic restrictions. Experimental investigations on spoken languages [1, 10] have called some of these proposals into question because they showed that there is significant inter-individual variation, which is not well understood. Also, the impact of non-lexical marking strategies like intonation and gesture has not been investigated systematically. There are indications that these matter [2, 4]. When it comes to the visual-gestural modality, little is known about response particles in sign languages (but see [3] on ASL). Sign languages are of particular interest since they have multiple articulatory channels available which may simultaneously encode truth and polarity. ♦ **THE PRESENT STUDY** provides experimental data from a production experiment with 24 deaf native DGS signers, which explored responses to positive and negative assertions. The experiment had a 2x2 **design** with the factors ANTECEDENT POLARITY (positive/negative) and RESPONSE TYPE (affirm/reject), with 24 items per condition, resulting in 96 trials, distributed over 2 randomized lists. Each list contained 12 affirmations and 12 rejections of positive propositions, and 12 affirmations and 12 rejections of negative propositions. The lists were presented in regular or reversed order. Participants were presented with 48 short scenarios containing a dialogue between two interlocutors (Peter, Alex), see (3). Peter signed a positive or negative assertion. Participants were asked to take on Alex's role and complete the dialogue according to the knowledge provided in the scenario. In (3), they were expected to affirm Peter's assertion e.g. by using a bare response particle or a full response clause. All responses were video-recorded. The preliminary **results** for 20 of the 48 tested ***positive assertions*** show that *affirmations* were signaled predominantly by JA 'yes' (44%) and STIMMT 'that's right' (41%). A purely non-manual affirmation strategy was also attested but less frequently; we find head nod confirmations (6%) and two tokens of mouthing the German *ja* 'yes'. *Rejections* were signaled by NEIN 'no' (30%), STIMMT-

NICHT 'that's not true' (30%), and FALSCH 'false' (12%). Negative headshakes occurred, but were infrequent (14%). Comparing non-manual response strategies, we see that headshakes are more common than head nods, which may be linked to the function of headshake as sole sentential negator (Pfau 2008). The preliminary analysis of all 48 ***negative assertions*** reveals a preference for the truth- over the polarity-based response strategy, which was somewhat less pronounced in rejections than in affirmations. There also were 'mixed' truth-polarity responses. Concretely, *affirmations* were signaled by truth-based STIMMT 'that's right' (53%), JA 'yes' (29%), head nod (4%). Only two participants chose a polarity-based strategy some of the time (1.7%), using NEIN 'no' or NOCH-NICHT 'not-yet' accompanied by a headshake. 'Mixed' combinations sometimes were sequential: headshake (polarity-based) followed by the sign STIMMT 'that's right' (truth-based; 4.6%), or head nod (truth) followed by NEIN 'no' (polarity; 1 token). 'Mixed' combinations also were simultaneous: one participant signed NOCH-NICHT 'not yet' (polarity) with a head nod (truth); two signers produced STIMMT 'that's right' (truth) with a headshake (polarity). *Rejections of negative assertions* were signaled by truth-based STIMMT-NICHT (30%), NEIN (16%), FALSCH (13%), negative headshake (6%); or by polarity-based JA 'yes' (2%), head nod (12%). In contrast to the ambient spoken language German, we do not find a dedicated response particle for rejecting negative propositions. The sign DOCH occurs only once in the entire dataset and is used by a signer who mouths frequently. Borrowing in the form of mouthing DOCH occurs in 5% of responses, and two participants consistently used a combination of JA 'yes' while mouthing *doch* to reject a negative assertion. ♦ **DISCUSSION**. DGS favours a truth-based system. There is some inter-individual variation but to a much lesser extent than e.g. in spoken German, where speakers seem to fall into two groups for affirmations of negative assertions [1] or in Dutch [10]. DGS speakers also sometimes use 'mixed' responses to indicate both truth and polarity via different articulatory channels. In terms of current theorizing we may interpret this latter finding as an indication of a multi-response system where non-manual markers have very similar specifications to manual signs, i.e. there are more *yes*-type and *no*-type "particles" available. These can then be described e.g. in terms of semantic feature specifications for anaphora in a system like [11]. The advantage of such an interpretation is that the independent use of the communication channels to signal rejection / affirmation could be explained as well. An open question is whether or not the different channels are used systematically, which on the basis of the current database cannot yet be confirmed. If they are not used systematically, preferences for interpretation need to be investigated in a follow-up perception study in order to explore what pragmatic principles can account for such preferences.

(1) a. Anna smokes.	b. i. Yes (she does)	ii. No (she doesn't)
(2) a. Anna doesn't smoke.	b. i. Yes/?No (she does)	ii. ??Yes/No (she doesn't)

(3) *Scenario*: Peter and Alex are having their front yard redesigned. This morning, Alex talked to the gardener. The gardener told Alex that he wouldn't be able to sow the lawn for another few days because of bad weather. During lunch, Peter and Alex discuss the gardener and their new front yard.	*Peter*: br (GÄRTNER RASEN SÄEN) hs (NOCH-NICHT) GÄRTNER RASEN SÄEN NOCH-NICHT gardener lawn mow not-yet 'The gardener hasn't sown the lawn yet.' *Alex:* … (Response)

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Ditransitive constructions in Brazilian Sign Language

Guilherme Lourenço

Friday, 2.33

Ditransitive constructions in Brazilian Sign Language (Libras) are restricted to verbs of transfer. The object is usually a *goal* and the verb agrees with the subject and the goal object, but not with the theme. Constructions that introduce $object_{source}$ are not ditransitives. Neither are verbs of creation with benefactive objects. True ditransitives in Libras have transfer semantics and introduce an $object_{goal}$ and an $object_{theme}$. The following examples illustrate this kind of construction:

(1) IX_1 $_1GIVE_a$ [IX_a STUDENT] [BOOK].
I gave the book to the student.

(2) IX_a $_aTHROW_1$ [IX_1] [PROBLEM].
Lit. '(S)He throw me the problem' / '(S)He passed the buck to me.

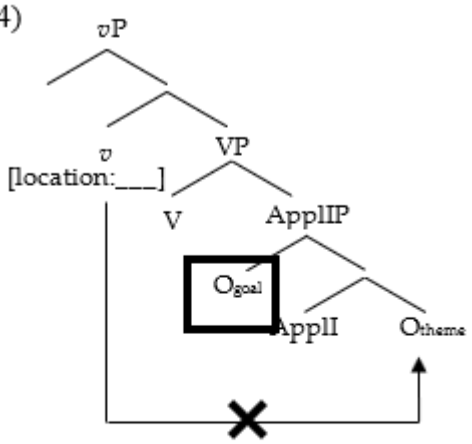
(3) $MARY_a$ $_aTEACH_b$ [IX_b SON] [MATH].
Mary teaches Math to her son.

The main descriptive facts about ditransitives in Libras are the following:

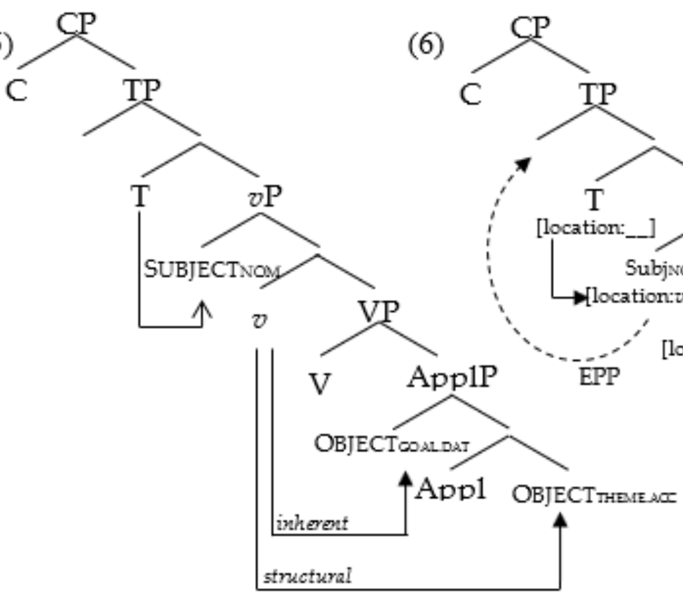
i. They constitute a closed class, in Malchukov et al. (2010)'s terms. That means that there is no canonical syntactic or morphological operation that productively generates ditransitive constructions in the language, e.g. dative case marking or applicative morphology.
ii. True ditransitives have a transfer semantic reading;
iii. $object_{goal}$ and $object_{theme}$ are introduced;
iv. S-V-O_{goal}-O_{theme} is the basic word order;
v. S-V-O_{theme}-O_{goal} is possible but it is a focalized construction;
vi. Object shift of a [+definite] O_{theme} is allowed, resulting in S- O_{theme}-V-O_{goal};
vii. Object shift of the O_{goal} is ungrammatical.

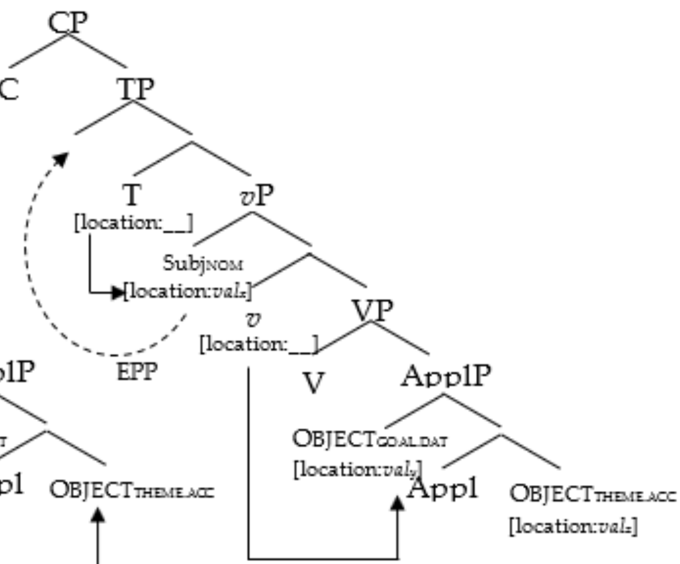
Libras shows a neutral alignment in ditransitive constructions, once there is no morphological marking that differentiates one object from the other. Assuming that this neutral alignment indicates that ditransitives in Libras are double object constructions, I will adopt applicative projections in my analysis (McGinnis, 2001; Pylkkänen, 2008). Pylkkänen (2008) proposes that, in double object constructions, an Applicative Phrase (ApplP) is projected and this functional head introduces the recipient/goal object. She also claims that there are two different types of applicative heads: "high applicatives. which denote a relation between an event and an individual, and low applicatives, which denote a relation between two individuals" (Pylkkänen, 2000). Additionally, low applicatives imply a transfer of possession (Pylkkänen, 2008). Based on the semantic differences between high and low applicatives, McGinnis (2001) call them E(vent)-applicatives, which projects an ApplEP, and I(ndividual)-applicatives, projecting an ApplIP, respectively. The differences between E-aplicatives and I-aplicatives are not only semantic but also structural. They are merged in different syntactic positions. Moreover, McGinnis claims that only the head of ApplE is a phasal head.

Assuming ApplI to be a phase comes with some corollaries to the syntactic structure and possible operations. McGinnis discusses some properties that are different between E- and I-applicatives, such as: A-movement, object agreement, phonological phrasing, quantifier scope and Wh-movement. The most relevant property for the discussion outlined here is clearly object agreement. In I-applicative constructions, the verb can only agree with the higher object, the $object_{goal}$ in Libras. This is so, because both objects are within the same phase and, therefore, in the same search domain of the [location:___] probe on *v* (Lourenço 2018). Because of locality constraints, the $object_{goal}$ intervenes, blocking agreement with the lower $object_{theme}$.

(4)


Let us now turn our attention to the Case assignment pattern in these constructions, considering the Case-agreement relation I have claimed to exist in Libras (Lourenço 2014, 2015). Assuming the inherent Case theory (Woolford, 2006), it is plausible to assume that the $object_{goal}$ receives inherent dative Case from *v*, whereas the $object_{theme}$ bears structural accusative Case also assigned by *v*. Another possibility would be to assume that *v* assigns multiple accusative Cases, similar to what happens

(5)


(6)


in Russian. Inherent dative Case seems to be a better option, especially because of the thematic role *goal* that matches Woolford's system. Still, both derivations would maintain the fact the close relation between Case and agreement, once in both scenarios Case is assigned/licensed by *v*.

One issue I will leave open for further investigation is the restriction on object raising (only the $object_{theme}$ can be shifted). However, assuming that the $object_{goal}$ receives non-structural inherent Case and the $object_{theme}$'s Case is assigned structurally may shed some light on this restriction.

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Adaptation of the dementia diagnostics *British Sign Language Cognitive Screening Test*: A cross-linguistic comparison of LSQ and DGS

Stéphanie Luna & Lisa Stockleben

Friday, 2.34

Aging is associated with gradual changes in cognitive functions. Older hearing adults may express with time a decrease in episodic memory, attention and visual-spatial abilities (e.g.: Salthouse, 1996) as well as manifestations of impaired language (e.g.: difficulties in expressing thoughts, difficulties in participating in conversations – Burke & Shafto, 2004; Yorkston *et al.*, 2010). Traditional neuropsychological screening tests such as the Mini Mental State Examination (MMSE) (Folstein *et al.*, 1975), DemTect (Kessler *et al.*, 2000) and Addenbrooke's Cognitive Examination Test Revised (Mioshi *et al.*, 2006) are used to screen for cognitive decline caused by mild cognitive impairment and dementia. Since no research has shown that age-related cognitive changes might be different between hearing and deaf people who use a sign language to communicate, we expect older deaf adults to express the same needs in terms of cognitive assessment in their later life.

However, it has already been discussed that using standardized tests such as the MMSE to assess cognition of deaf persons using sign language lacks validity due to the fact that norms used come from hearing individuals (Baker & Baker, 2011; Taylor, 2017). In addition, previous research reported the unreliability of using an interpreter for cognitive evaluation due to language and cultural differences between deaf signers and hearing oral speakers (Hill-Briggs *et al.*, 2007; Dean *et al.*, 2009). Until now, clinical assessment of dementia of deaf people using a sign language to communicate in Québec (French part of Canada) and Germany is provided in spoken language or with the use of an interpreter in the better case (Kaul *et al.*, 2009). According to Atkinson *et al.* (2015), the assessment tools to evaluate cognitive deficits of older adult deaf signers should be designed in sign language. Valid screening tools that are both sign language-based and adapted to cultural aspects of the specific deaf community are still rare in the field (Taylor, 2017; Woll, 2012). The *British Sign Language Cognitive Screening Test* (BSL-CST), developed by Atkinson *et al.* (2015), is the first dementia diagnostic assessment tool for deaf adults using sign language. This computer-based, validated and normed cognitive assessment tool is suitable for adaptation into other sign languages. We propose an adaptation of the BSL-CST into two unrelated sign languages, Quebec Sign Language (LSQ - used in Québec and part of Ontario) and German Sign Language (DGS), as well as the first cross-linguistic comparison of the test adaptations.

The aim of our research is to

i) present the process of adaptation of the BSL-CST into LSQ and DGS
ii) expose a cross-linguistic comparison of the adaptation process into these two languages.

We thus will present the cultural adaptation steps following the protocol of Beaton *et al.* (2000) with the considerations of Atkinson *et al.* (2015). The linguistic adaptation follows the steps of the World Health Organization's (2016) protocol of adaptation and translation of instruments. The cross-linguistic comparison will highlight the differences between the two adaptations based on regional variation, age of acquisition of the sign, frequency and iconicity of the stimuli, as well as historical and cultural factors.

These tools adapted for experimental purposes (LSQ version) and clinical purposes (DGS version) will both, when normed, represent valid assessment tools for cognitive deficits of deaf signers using LSQ and DGS.

Our study contributes to the conference by outlining both the importance and the challenges of adapting a diagnostic assessment tool of signed language.

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The mystery of child signing

Hannah Lutzenberger

Friday, 17:30-18:30 (SIGNopsis)

One of the biggest mysteries that we are yet to unravel is how children grow into proficient speakers of a language, even without explicit instruction. Needless to say, this is not a straightforward path. For example, young English learners may first say *lellow* instead of *yellow*. In English, *l* and *y* are two distinctive sounds and English-speaking children will learn to differentiate between these two sounds in order to distinguish words like *let* and *yet.* In sign languages, instead of sounds, such distinctions are made through different aspects of the configuration, movement or location of the hands. For example, the position of the thumb may distinguish a thumbs up handshape and a closed fist.

What we know about how children learn sign languages is largely based on research from Western countries, where the vast majority of deaf children are born to hearing parents who do not know how to sign. This situation is different however, in a village in Bali, Indonesia, where a relatively large number of deaf people have been born over the past ~150 years. Because of the enclosed and labour–intensive nature of this community, a sign language called Kata Kolok has emerged. Deaf and hearing community members use Kata Kolok in various social, religious, political and educational situations of daily life. Unlike deaf children in Western countries, deaf children in this village are exposed immediately and continuously to both indirect, i.e. passively overseeing the sign language, and direct language use, i.e. signing being addressed to the child.

Over the course of several years, we regularly recorded the daily routines of selected deaf and hearing children growing up in families where Kata Kolok is the primary language. Insights presented here on how children acquire Kata Kolok stem from working with these recordings.

When signing to babies, interlocutors frequently modify the form of their signs. This phenomenon, child-directed signing, is analogous to child-directed speech in which adults speak with higher pitch. In Kata Kolok, adult interlocutors or even peers of similar age frequently produce signs on the child's body. For example, for the sign EAT, Kata Kolok signers move a bunched hand towards the mouth while protruding the lips. In child-directed signing, the hand does not touch the signer's own mouth but reaches for the child's mouth instead.

Much like in the case of *lellow/yellow*, children acquiring Kata Kolok produce some signs differently from adults – yet, commonly understood by caregivers. For example, young children may replace the handshape of the sign EAT: instead of the bunched hand, they may point inside their open mouth with the index finger; or invert the movement in SWIM, bringing the hands together instead of moving them outwards to imitate the action.

By investigating how children acquire Kata Kolok, we can trace the trajectory of sign language acquisition in an environment that closely resembles the one of hearing babies; direct and indirect language input from various interlocutors in a variety of settings. In both speech and sign, young children produce language that differs in form from adults. As they grow older, they gradually become proficient speakers and signers.

B 1 fist 5 – A preliminary investigation of the phonological feature inventory in Kata Kolok, a rural sign language of Bali

Hannah Lutzenberger, Connie de Vos, Onno Crasborn & Paula Fikkert

Friday, 2.35

Phonology is a basic design feature, found at the heart of human language. It seems reasonable to expect that when a new language emerges, phonology arises early as a response to a growing signal space, i.e. with an increasing number of concepts to express, more and more fine-grained phonetic distinctions develop (Zuidema & Boer 2018). However, surprising evidence has arisen from ABSL, a young sign language used in the Negev desert in Israel that is currently used in its third generation. Sandler et al. (2011) have concluded that ABSL has not yet developed a full-blown phonological structure, based on the lack of minimal pairs, large degree of inter-signer variation, and violations of cross-linguistically highly frequent phonological constraints such as the Dominance and Symmetry Conditions (Battison 1978). Instead of phonological rules, ABSL signs - at least those elicited for limited set of picturable nouns - seem to be driven by iconic prototypes that are more or less shared between signers.

This study is concerned with the phonology of Kata Kolok (KK), a rural sign language of Indonesia that is considerably older than ABSL. KK has emerged at least 6 generations ago in a rural enclave in Bali (Marsaja 2008). It is used widely across the hearing and deaf villagers in various interactive settings. The KK Corpus contains substantial amounts of diachronic data from adult signers from generations III through V. While KK phonology has not yet been studied comprehensively, Marsaja (2008) reports “basic building blocks” of handshape primes, location, movement and nonmanual elements. The aim of the current study is two-fold: firstly, we aim to provide a first overview of the KK feature inventory based on a substantial number of signs; secondly, we would like to compare claims made for ABSL with a representative and diverse dataset of KK, an older rural sign language. Given its intergenerational time-depth, KK potentially bridges a gap between ABSL’s incipient phonology and phonological systems as described for urban sign languages such as NGT, ASL, etc.

Using the lexical database Global Signbank (Crasborn et al. 2018), we are compiling a dataset of KK lexicon from generations three through five, aiming to capture variation and regularities in the language. We coded approximately 1,200 entries from various kinds of data, including various spontaneous monologues, dialogues, multiparty interactions, as well as a range of elicitation using picture, video and sensory stimuli from the KK Corpus (de Vos 2016). These were coded for 16 different manual and non-manual features including handshape, contact type, location, and mouth gesture. While this steadily growing database is continuously being reviewed and expanded with new data, the current version will allow us to give us a first overview of the phonemic system of KK. Note that for some of the distinctions mentioned, it is not yet clear whether they are phonemic or allophonic. This will be investigated with perception/judgment experiments during a future fieldtrip.

While Kata Kolok, like ABSL exhibits considerable variation, it shows clear evidence of phonological structure as defined by language-specific regularities as well as intra- and inter-signer variation. For example, the handshapes B, 1, FIST, and 5 for the dominant and B for the weak hand are most common across the signs in the database, accounting for 55% of all entries. Most signs are produced in neutral space, the mouth and the palm of the weak hand are considerably less common, yet more frequent than any other location. Notably, continuous body contact is the most common, followed by final contact. Clearly, signs appear to be structured on a sub-lexical level. In line with Sandler's criteria for phonology, in KK there are a number of minimal pairs such as PRAY and SHY (differing only in location); a rough glance suggests that the Symmetry as well as the Dominance condition (Battison 1978) may apply to the majority of signs; variation across deaf signers can mostly be classified as phonological and lexical variation but shows a higher degree of inter-signer consistency: PIG-A and PIG-B, simply are two phonologically unrelated variants with different iconic motivations that are used and known across the community while COW-A, COW-B and COW-C share the same iconic motivation of the horns but differ in the degree of curving of the index finger and thumb extension and could probably be considered as phonological variants. Crucially, these signs do not appear to be idiosyncractic variants.

Figure 1: Stills from the KK dataset in Global Signbank for the corresponding signs.

Nevertheless, recent field-observations do not exclude the possibility that the tolerance for low level variation in e.g. handshape is not equally distributed across all generations of signers, due to natural aging impacting the articulators of older signer or, similar to ABSL generation III signers, less developed phonological rules of an emerging phonological system. Nevertheless, there are some signs that demonstrate that usage is influenced by age: old deaf (and hearing) signers tend to use the older variant GOOD-B, while younger signers have almost completely switched to GOOD-A. Whether or not the distribution of these signs is influenced by factors such as age, kinship, geographical location, or context is yet to be determined. In addition to the manual features mentioned, the extensive use of nonmanual markers is an interesting observation. It is possible that nonmanuals and mouth gestures in particular occur more frequently and take over some additional functions in KK when compared to other sign languages (Lutzenberger 2018).

The study may be the largest and most comprehensive database (1,200 entries) of a rural sign language lexicon collected to date, and because of the mixed methods constitutes a representative sample of the KK lexicon. As one of the few comprehensive studies of rural sign language phonology, this study has the potential to contribute substantially to sign language typology. Using the same methodology and software as for urban sign languages, but especially also the same coding scheme as for Sign Language of the Netherlands and other sign languages in Global Signbank, we pave the way for direct and instantaneous cross-linguistic comparisons.

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Referent tracking and constructed action in jokes of German Sign Language – A corpus-based investigation

Claudia Macht

Friday, 2.36

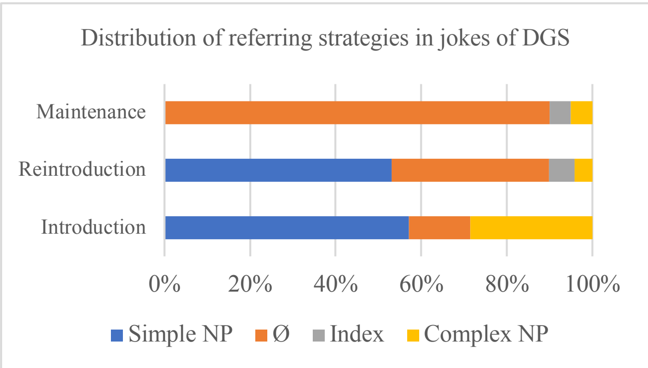
Research on signed discourse and information structure in sign languages suggests that for introducing new referents, signers use referring expressions such as full nouns and noun phrases, and for maintenance or reintroduction of referents, signers tend to use pointing, classifiers, and constructed action (CA) (e.g. Morgan 2006, Frederiksen & Mayberry 2016). Very often, research on CA and referent tracking focuses on narratives and storytelling using some kind of visual material as an elicitation tool (i.e., short video clips or picture stories (e.g. Cormier et al. 2013) or written stories (e.g. Herrmann & Pendzich 2018)). These materials often include anthropomorphized animals, that do not usually appear very often in natural conversation. In the study presented here, the focus is on: i) a real time text type, namely jokes, and ii) the analysis of referents with the criterion of the feature [+human]. Jokes are a genre that has neither been linguistically investigated in German Sign Language (DGS), nor, to the best of my knowledge, in other sign languages apart from the typological overview of American Sign Language and British Sign Language by Sutton-Spence & Napoli (2012). Jokes have many specific characteristics when it comes to referent introduction and maintaining mechanisms: They are short and coherent strings of signed text and usually have a clear starting and ending point, and a predefined storyline which is chosen by the narrator. Protagonists are talked about with no prior linguistic context and no shared knowledge between narrator and addressee concerning the referents. Thus, in setting the stage, referents are expected to be formally introduced, in order for the joke to be comprehensible and in order for the referents to be clearly identifiable in the course of the narration. This study presents specific properties of discourse structuring and referent tracking in jokes of DGS.

Background: Taking the accessibility hierarchy (Ariel 1990, 2001) as a background, referring expressions are ranked according to their high and low accessibility in discourse. Thus, a highly accessible referent (due to topicality/unity, small local distance to antecedent, less competitive referents, high saliency) is usually expressed by a low informative expression, such as (null)pronouns and ellipses. The opposite holds for low accessible markers. For sign languages, Barberá (2012) applied this to Catalan Sign Language investigating deictic and anaphoric reference in space within a Discourse Representation Theory (DRT) framework. In terms of CA and referent tracking, Cormier et al. (2013) investigate the introduction of CA in retellings of film clips such as Pink Panther and look at the number of active articulators and the way CA is introduced. In their study, they found evidence for subject omission in maintained referents and contiguous reference for reintroduced referents after the first mentioning. The underlying assumption that CA (as in the case of maintained referents) has strong referential properties and therefore requires no explicit nominal introduction is also stated by McKee et al. (2011).

Aim: The aim of this evaluation is twofold: i) analyzing the referent tracking and its specific properties in a particular genre like jokes with 2 human referents and ii) a quantitative evaluation of occurrences of CA and the combinations with other referential expressions used to identify the active referent.

Methodology: In this study, 4 jokes selected from data of the DGS Corpus Project were investigated, restricted by the following criteria in accordance with the categorizations of the project: age 18-30, nativeness and jokes including 2 human referents. In addition to that, only jokes were considered, where also the addressee matched the nativeness criterium, to avoid adaptation strategies. The jokes were annotated using iLex (Hanke & Storz 2008). Referring expressions for the 2 referents were annotated for complex NPs, single word NPs, pronouns, introduced CA (e.g. using NP, pronouns or simultaneous combinations) and unintroduced CA (Ø CA), and were marked for the associated referent (i.e., R1 for the referent introduced first and R2 for the secondly introduced referent), so it was possible to distinguish whether or not the referent was maintained or reintroduced.

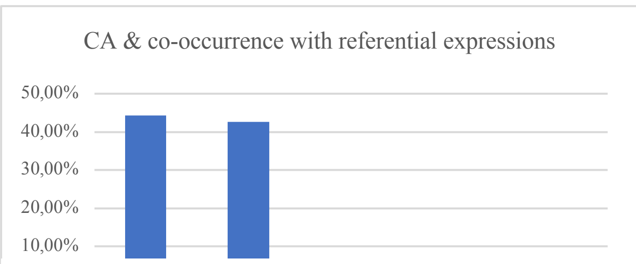
Results and Discussion: In most cases, jokes with 2 referents set the stage using NPs for each referent, most of the time referring to referents in a generic sense (such as MAN, WOMAN, DEAF, HEARING, etc.). This is consistent with data in spoken language jokes (Attardo & Chabanne 1992). However, the introduction of referents in jokes of DGS may also be expressed by using an immediate CA to set the stage without introducing an antecedent (see Graph 1). Another strategy is taking over the protagonist role right away as the narrator by using a first person pronoun. The latter strategies are rather unexpected for default discourse structuring in sign languages and also DGS (cf. Becker 2009, Barberá-Altimira 2015, Barberá & Quer 2018, Herrmann & Pendzich 2018). In the quantitative analysis (Graph 1), the strategies for identifying referents in the 4 jokes were analyzed. For maintained referents in 90 percent of the cases, the referent was not lexically identified. In half of the cases for reintroduction, referents were identified via a simple NP, and in a third of the cases the referent of the CA was not lexically identified. Referents were only rarely identified with an INDEX sign (only four cases altogether). When



Graph 1: Distribution of referring strategies in jokes of DGS

	Ø CA	NP	IX	IX NP
Inf. A	54%	38%	8%	0%
Inf. B	46%	43%	4%	7%
Inf. C	70%	0%	20%	10%
Inf. D	0%	100%	0%	0%

Table 1:Means of eintroduction/maintenance of referents by informant



Graph 2: CA and its co-occurrence with referential expressions

looking at the jokes separately (Table 1), one of the informants (Inf. D) seems to prefer one referent-tracking strategy exclusively, namely full NPs. On closer look, Inf. D never maintained the referent for more than one utterance, but instead switched the referent every time, which explains this tendency. The results are in line with Cormier et al.'s (2013) findings for narratives. One difference though was found in 1 of the 4 jokes, where referents were introduced by a CA sequence without specifying the character first. This is most probably due to different mechanisms in joke-telling, where the creation of suspense could be used to get the attention from the addressee. Interestingly, in contrast to Ariel's (1990) accessibility hierarchy, there were two referring strategies that were mostly used, namely subject omission and simple NPs (Graph 2). Other strategies were only marginally used. Whether these different strategies have an impact on the comprehensibility or the humorous quality of the joke has yet to be looked into.

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A corpus-based approach to clausal negation in Turkish Sign Language

Bahtiyar Makaroğlu & Josep Quer

Friday, 2.37

Background. The syntactic phenomenon of clausal negation (CN) has received considerable attention in the Sign Language (SL) literature (cf. Zeshan 2006a, Pfau & Quer, 2007; Quer 2012, Pfau, 2017). Despite the typological similarities in basic CN, there is cross-linguistic variation in the domain of negation – particularly in non-manual morphemes. It has been reported for various SLs that the use of manual negator is obligatory (e.g., Italian SL), while in others, clauses are commonly negated by means of a non-manual marker (NMM) only as in German SL (Pfau, 2016). In the literature, it has been addressed that TİD has basic SOV order and the manual negator DEĞIL/NOT occupies a clause-final position (Zeshan, 2006b; Kubuş, 2008; Gökgöz 2011). This negative sign tends to be accompanied by a backward head tilt ('bht'). Actually, all SLs studied to date can be typologically classified as being manual or non-manual dominant. Following Zeijlstra's featural approach to CN (2004, 2008), Pfau (2016) proposed that TİD is a Non-strict Negative Concord (NC) language and also allows for NC between the negative marker NOT and an n-word.

Present study. In contrast to the previous studies, we analyze CN based on naturalistic data from the TİD Corpus that is partially annotated and described in Dikyuva, Makaroğlu and Arık (2015). It was obtained from 116 native signers from 26 different cities, including dialogues and narratives. On the basis of corpus data, our study offers a novel account of CN on morphosyntactic grounds: (i) by focusing on NMMs, we showed that a clause can be negated by means of a NMM only – a pattern that has been typologically proposed for other SLs, (ii) the combination of two negative lexical elements in the sentence-final position can change the polarity of the sentence.

I. Negative NMMs. Although Zeshan (2006b) and Gökgöz (2011) proposed that a clause cannot be negated only by means of a NMM in TİD, it is possible to negate a clause by means of only NMMs as shown in (1-3). NMMs – (i) brow raise (br) (1), (ii) negative completive marker – puffed cheeks (pc) (2), (iii) backward head tilt (bht) (3) – can change the polarity of sentences on its own without the clausal negator NOT. Actually, this is not a rare strategy in the TİD Corpus. The examples thus reveal that TİD does not strictly feature a manual dominant negation system – at least at first sight –, against what Zeshan and Gökgöz suggest. In a manual dominant system, a proposition can be negated by a manual marker exclusively, except for some specific contexts. Although Gökgöz (2011) assumes that the clausal negator NOT is lexically specified for bht, it can be noticed that the negative NMMs are not accompanied by NOT (1-3). So we assume that bht is not lexically specified on the clausal negator NOT but rather combines with the NOT in syntax.

(1) ________br
SENTENCE TOPIC UNDERSTAND [21:002 S:00:06:10 E:00:06:12]
"I didn't understand the things told."

(2) _pc
IX$_1$ IX LESS IX$_1$ GO [65:003 S:00:01:05 E:00:01:07]
"I just didn't go there."

(3) ________bht
STILL GROWN-UP IX$_3$ [65:005 S:00:05:36 E:00:05:38]
"He still hasn't grown up."

II. Negative concord. Despite the prominent similarities in the form of the NC between German and Italian SL (Pfau, 2016) and TİD, it is certainly worthwhile to derive cross-linguistic variation particularly in terms of the positioning of the negative elements. Here, the following differences arise: (i) when NOT combined with a negative non-manual completive marker ('pc'), the sentence remains negative (4); (ii) NOT and the negative modal CANNOT accompanied by sideward head tilt (sht) co-occur in a sentence, without changing the negative interpretation of the sentence (5); (iii) NC reading is available despite the use of two negative morphemes (e.g. 'pc' accompanied by 'bht' in (6); (iv) however, the combination of the negative adverbial NEVER and NOT in the sentence-final position yields a double negation (DN) reading (7) – in contrast to what Zeshan and Gökgöz proposed. As far as TİD is concerned, the first observations show that there is a relation between the syntactic position of the negative signs and DN. So we will leave open the question whether TİD should then be classified as a NC or DN language. Corpus analysis reveals that NOT does not occupy a clause-final position strictly in sentences including double negative elements and also has two different positions after the verb. Therefore, it seems that considering the example in (7) we propose an analysis that multiple negative elements allow single CN through a 'negative topicalization' strategy and the NMM spread over the entire topicalized elements.

(4) _pc _bht
KONYA GO NOT [17:004 S:00:07:59 E:00:08:01]
"I didn't go to Konya."

(5) ________sht
UNDERSTAND NOT CANNOT [63:010 S:00:01:52 E:00:01:53]
"I couldn't understand it."

(6) __pc+
__________bht
SHOPPING TAKE [17:007 S:00:00:33 E:00:00:34]
"I didn't buy anything."

(7) _bht
_____________________bl
TELEVISION IX$_1$ WATCH NEVER NOT [21:002 S:00:06:17 E:00:06:19]
"Not that I didn't watch television." (= "I watched television sometimes.")

Conclusion. Based on these patterns, corpus-based investigation of how CN is expressed differs to some extent from previous research in that (i) TİD does not strictly feature a manual dominant negation system and a clause can be negated by means of NMM – be it a bht, pc or br – only, (ii) NC between the NMM and the negative manual sign, between a manual negation sign and another negative element, or between a non-manual component and other NMM can be seen within a clause, (iii) the negative NMM of TİD is not limited to the bht, but also encompasses a br, bl, pc and sht, (iv) the topicalization strategy can be argued to explain cases of DN readings.

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Voxelwise connectivity of right-hemisphere BA44-STG in American Sign Language

Evie Malaia & Toshikazu Ikuta

Friday, 2.38 **– CANCELLED**

Background: Signed languages differ dramatically from spoken languages in that the linguistic signal is encoded spatially. Right hemisphere involvement appears to be critical for sign language processing (Emmorey et al., 2013); however, the specific role and mechanism of this involvement is not well understood. Prior work has identified important roles of right IFG and right STG in both resting state activity (Malaia et al., 2014) and language processing in Deaf signers (Malaia et al., 2013). To better understand the roles of these regions in sign language processing and comprehension, we conducted voxelwise connectivity analysis on fMRI data of 12 Deaf signers and 11 hearing non-signers (Malaia et al., 2013), during presentation of signs and gestures. The analysis was conducted using left and right pars triangularis (BA 45), pars opercularis (BA 44), and pars orbitalis (BA 47) as seed regions.

Methods: During four functional series of 5 minutes and 40 seconds, video clips of signs and gestures were presented. Data preprocessing and statistical analyses were conducted using FMRIB Software Library (FSL), as well as Analysis of Functional NeuroImages (AFNI). Skull stripping and segmentation were performed on the structural volume, to which EPI volumes were co-registered. The first six volumes were removed from each of the four series and then four series were concatenated as one volume. The EPI volume was despiked, motion-corrected, smoothed, regressed with white matter and CSF signals, and scrubbed for excessive micro-motion. To conduct voxelwise functional connectivity, the each of the regions of interest (left and right pars triangularis (BA 45), pars opercularis (BA 44), and pars orbitalis (BA 47)) was segmented by Freesurfer (Sischl, 2012) on the MNI 1mm space. Voxel-wise connectivity analysis was conducted from each of the voxels in the region of interest to the whole brain. The time course was spatially averaged within the region registered to the EPI space, so that correlations could be tested in each individual voxel across the brain. The Z-scores representing the correlations between the region of interest and each voxel across the whole brain were used for group level analysis after registration to the MNI 2mm brain space. The fMRI data between the two groups were compared using t-test script in FSL. Using threshold-free cluster enhancement, contrast images were estimated by the threshold of $p<0.001$.

Results: The right pars opercularis in Deaf participants demonstrated significantly higher connectivity to right Superior Temporal Gyrus (STG; MNI [64-324 2]) (FWE corrected p=0.044) (Figure 1). The five other ROIs (right pars opercularis, and BA 45 and BA 47, left and right) did not show significant differences in connectivity between two groups.

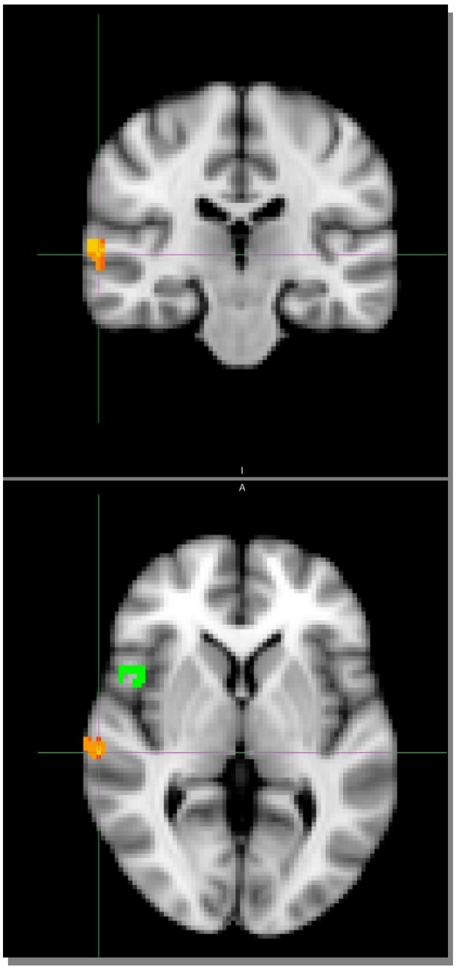

Figure 5. Right STG (orange) in Deaf signers has significantly higher voxelwise connectivity to right BA 44 (green), as compared to hearing non-signers.

Discussion: We observed significantly greater connectivity between the right pars opercularis (BA 44) and the right STG and during processing of sign language stimuli in the Deaf signers, as opposed to hearing non-signers. Right STG has been previously implicated in sign syllable processing (Malaia et al., 2013); the present results suggest that information flow between phonotactic (syllable-segmenting) and semantic system in sign language is right-lateralized. This might be due to the frequency ranges of visual signal variability in sign language: even in auditory modelity, more slowly modulated signals preferentially drive the right hemisphere (Boemio et al., 2005). The visual frequencies of sign language signal fall, correspondingly, within computational ranges of these highly interconnected regions.

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Cortical entrainment to visual information as basis of sign language comprehension

Evie Malaia, Julia Krebs, Joshua D. Borneman & Dietmar Roehm

Saturday, 3.12 – **NEW 1.62**

Background: When people listen to speech, neural activity is cued by the fluctuation in the acoustic envelope (Peelle, Gross, & Davis, 2012). For spoken languages, this cue-based entrainment is the basis of signal parsing and predictive processing (Ding et al., 2016). A growing body of research also indicates that humans are highly sensitive to motion differences in the visual signal (Strickland et al., 2015), and signers make neurolinguistic distinctions based on motion profiles of signs (Malaia et al., 2012). The temporal mechanism of predictive parsing in the visual modality, however, is not yet clear. We tested the hypothesis that in signers, as in speakers, the syllable-driven fluctuations (~4 syllables per second, or 4Hz) in the envelope of the signal are cues to predictive entrainment.

Participants, stimuli, and recording: EEG data was collected in signers viewing signed sentences (meaningful stimuli), and the same sentences played in reverse (meaningless stimuli with rich spectrotemporal structure). We then assessed the optical flow in the visual stimuli, which is a validated measure of dynamic entropy in the overall signal (Borneman et al., 2018), as well as a measure of overall motion in time that marks sign-syllable boundaries in continuous signed discourse. We then computed cross-correlation between the variations in the optical flow of the visual signal, and neural activity of the participants. 15 native signers of Austrian Sign Language (ÖGS) (9 F, age M = 39.37, SD = 10.19), who were born Deaf or lost their hearing early in life, participated in the study. They viewed 40 sentences in Austrian Sign Language (ÖGS), as well as the same sentences, but reversed in the time domain, and rated comprehensibility of the stimuli on a Likert scale. Each video was 5 to 7 seconds in duration. 80 critical sentences were presented to the participants in pseudo-random orders, with 200 fillers to distract from strategic processing (total 280 sentences).

Analysis: Optical flow (OF) for each video was determined using MATLAB vision toolbox optical flow function (Malaia et al., 2016); the amplitudes across all velocity bins were added to calculate the magnitude of optical flow for each frame, thereby generating an optical flow timeseries. Coherence was calculated between the optical flow timeseries for each stimulus video, and the neural response in each electrode timeseries for each participant.

Results: Behavioral data indicated that only sentences in the direct video condition were rated as linguistically acceptable (signing videos acceptability M=6.24, SD=.8; reversed videos M=1.7, SD=.89). Peak coherence between the stimuli and neural activity occurred between 100 msec and 250 msec post-stimulus onset in response to both meaningful and meaningless video stimuli conditions. Negative values of cross-correlation were observed in response to reversed videos, which were rated as not linguistically acceptable. Frequency-domain analysis revealed cued entrainment at 1.2

Hz, 2.4 Hz, and 4.2 Hz, in response to language stimuli. In response to non-comprehended reversed video stimuli, cued entrainment peaks were distributed at 1 Hz, 1.6Hz, 2.6Hz, 3.2Hz, and 4.2 Hz, indicating broad search for cues at lower frequencies, and robust syllable-frequency response (~4Hz) regardless of stimulus type.

Discussion: The combined behavioral and EEG data reveal that linguistic acceptability and comprehension of signed sentences in rooted in entrainment of neural oscillations to the dynamic variations in spatial entropy of the visual signal, as measured by optical flow metric. The findings demonstrate that the cortical tracking of spectro-temporal entropy of the signal is a modality-independent mechanism for information transfer in humans. These results point to the likelihood of modality-independent evolution of language based on cortical entrainment that facilitates event, and, later, syllable segmentation, and action perception and production (Blumenthal-Dramé & Malaia, 2018).

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Sign influences spatial encoding in speech in bimodal bilinguals

Francie Manhardt, Susanne Brouwer & Asli Özyürek

Friday, 15:30-16:00

Bimodal bilinguals are fluent in both a signed and a spoken language[1]. Previous research has demonstrated that bimodal bilinguals' knowledge of sign language influences their expressions in the manual modality accompanying spoken language. For example, bimodal bilinguals increase the use of co-speech gestures during spoken language production [e.g., 2]. Furthermore, they appear to use code-blends, which are simultaneous productions of a spoken word and a sign. However, it is less explored whether sign language also influences expressions in the speech of bimodal bilinguals.

To address this, the present study investigated bimodal bilinguals' descriptions of spatial relations elicited through pictures both in their signed and spoken language to explore the influence of sign on speech. We selected the domain of spatial language as our test case because spatial relations are often encoded iconically to the real event in sign languages[3] and contain typically more spatially specific information than speech (see Fig. 2a vs. Fig. 2b). That is, signers can choose certain handshapes to classify a set of objects and place them in the signing space corresponding to the relative relations and orientation of the objects (i.e., classifier constructions, CL) (Fig. 1d). We investigated if iconic specificity regarding orientation of objects might be transferred to bimodal bilinguals' spatial encodings in speech.

We tested 12 non-signing speakers of Dutch, 11 hearing bimodal bilinguals of Sign Language of the Netherlands (NGT) and Dutch, and 20 deaf NGT signers and presented them with visual displays (N=24) consisting of four pictures. Participants had to describe one of the pictures highlighted by an arrow to a deaf signer or hearing speaker who had to select the correct picture out of four. Non-signers were only tested in Dutch, deaf signers were only tested in NGT, and bimodal bilinguals were tested in Dutch and in NGT with 3-5 weeks between each session. For spoken language descriptions (i.e., from non-signers and bimodal bilinguals), we coded whether spatially specific information, such as object orientation, was encoded in speech and/or in the manual modality (i.e., through code-blends and/or co-speech gestures). For signed NGT descriptions (i.e., from bimodal bilinguals and deaf signers only), we coded whether object orientation was encoded through CLs and/or specific signs indicating object orientation (Fig. 1d).

We conducted three types of analyses. First, we assessed whether bimodal bilinguals encoded spatially specific information (i.e., using more adverbs such as *vertical* and *horizontal)* more often in their speech than non-signers. A logistic regression analysis on amount of spatial specific information yielded a main effect of Group (non-signers vs. bimodal bilinguals; β=2.21, SE=0.44, z=5.00, p<0.01), indicating that bimodal bilinguals use indeed more spatially specific descriptions in their speech (e.g., "*the glove is to the right of the cup and the fingers of the glove are pointing upwards"*) compared to non-signers (Fig. 2b). In addition to the research question, we tested whether bimodal bilinguals encode spatially specific information as often as deaf NGT singers do. A logistic regression analysis on amount of spatial specific information yielded a main effect of Group (deaf signers vs. bimodal bilinguals*;* β=0.65, *SE*=0.15*, z=4.21, p*<0.01), indicating that bimodal bilinguals use less spatially specific descriptions in their sign (Fig. 2a). However, as shown in Fig. 2a they still encode those spatially specific information frequently (65% of all trials).

Second, we determined whether the extra specificity in speech is a co-adaptation to the similar information encoded in the manual modality co-expressed with speech or appears mostly in speech only. A Pearson's Chi-Square test showed a strong positive association between bimodal bilinguals and the encoding of spatial specificity in speech only ($\chi^2(2, N=23)=35.03$, $p<0.01$), but a weak association between bimodal bilinguals and spatial specificity encoding in the manual modality co-expressed with speech. For non-signers, we found a negative association for both encoding options. This suggests that bimodal bilinguals' spatial specificity occurred mostly in speech only. Therefore their encodings in speech are not adaptations to information expressed in the manual modality through code-blends or co-speech gestures but is rather likely to indicate transfer from sign to speech.

Third, to provide more evidence that bimodal bilinguals' spatially specific speech encodings are transfers from their NGT descriptions, we used linear mixed-effects regression models to assess whether the spatial specificity in bimodal bilinguals' speech can be predicted by the iconic encodings (i.e., through CLs or specific signs to encode object orientation) in their signed NGT descriptions. In the model, we entered Sign (amount of CLs and extra depictive object orientations in signs) and Speech Encoding Type (spatially specific information encoded or not) as fixed effects and participants as random effect. The results revealed a significant interaction between Sign and Speech Encoding Type (β=0.36, *SE*=0.17*, t*=2.113*, p*<0.05), suggesting that sign predicts bimodal bilinguals' encoding of spatial specificity in their speech. That is, the more a bimodal bilingual used iconically specific spatial encodings in NGT, the more a bimodal bilingual encoded extra information about object orientation in speech.

In conclusion, these results provide first evidence that sign influences speech. This shows that language transfer is not a unimodal phenomenon (i.e., within one modality), but can also occur across different modalities. It furthermore supports and extends the bimodal bilingual language production model[1] by showing that linked production systems not only hold for the sign-language pair ASL and English but also for NGT and Dutch.

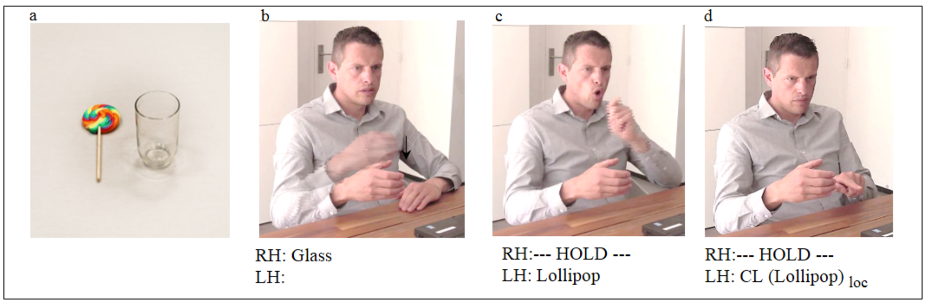

Fig1. An example for “the lollipop is to the left of the glass” (panel a) in NGT from a bimodal bilingual by encoding the lexical signs for the objects involved (panel b and c) as well as specific spatial and orientation information (panel d).

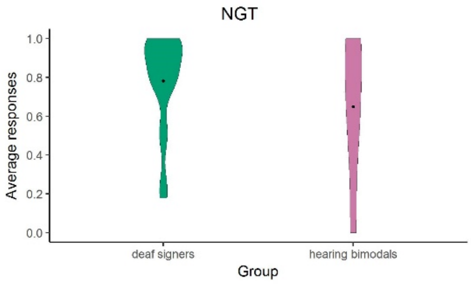

*Fig 2a.*Amount of spatial specificity encoded in NGT across deaf signers and bimodal bilinguals.

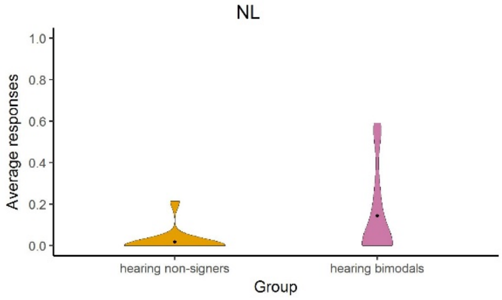

Fig 2b. Amount of spatial specificity encoded in NL across hearing non-signers and bimodal bilinguals.

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Finding systematicity in the margins: Polysyllabic forms in the ASL lexicon

Aurora Martinez del Rio

Friday, 10:30-11:00

While the lexicon of American Sign Language (ASL) is comprised largely of monosyllabic forms, a small number of lexical items do not fit this categorization. While most of the polysyllabic lexical items are compounds or signs with concatenative affixes, a small portion of the lexicon comprises polysyllabic forms that fall into neither of these categories. The existence of these signs brings rise to the need to characterize their forms and compare their distribution to that of other polysyllabic items in the lexicon, as their rarity marks them as exceptional. Within phonology, marginal cases have been shown to provide additional insights into the distributional patterns within a language, sometimes revealing productive sub-patterns (Bybee, 1994). I examine whether this principle proves a fruitful avenue of inquiry when applied to ASL by focusing my analysis on the rarest sub-type of polysyllabic forms in the ASL lexicon, those which are not compounds and do not employ concatenative morphology. While one might predict that the polysyllabic forms that do not fit this characterization display the same distributional characteristics in their structure and are subject to the same constraints as the rest of the lexicon, previous analyses (Perlmutter, 1993; Brentari, 1998) have proposed that there are additional constraints on the form of these lexical items. Building on these previous analyses, I show that while some of these forms violate the constraints proposed previously, the distributions of phonological characteristics within these forms are not completely random and can be regularly categorized in a manner that is distinct from other parts of the lexicon.

2. **Background:** Previous accounts have proposed a set of constraints on polysyllabic forms in the lexicon, focusing on restrictions in the types of movements that are allowed in a particular form. The first of these constraints was proposed in Perlmutter (1993), where the author argued that secondary movements, later termed 'trilled movements', do not occur in monomorphemic, disyllabic lexical items. In a subsequent analysis, Brentari (1998) argued that polysyllabic forms in the lexicon are constrained to two movements and identified a pattern of a circular movement followed by a straight movement that often occurs in these forms.

3. **Methodology and distributions:** This analysis is conducted using lexical items from the Gallaudet Dictionary of American Sign Language (Valli, 2006), a dictionary comprising 2,998 video entries of lexical items in ASL. For the purposes of this analysis, these items are used as a representative sample of the ASL lexicon. To provide a complete distributional description of monosyllabic and polysyllabic forms, the lexicon was divided into sub-parts. Signs were first divided into categories based on the number of unique syllables in their forms, separated into the monosyllabic lexical items 1 and the polysyllabic lexical items. The polysyllabic lexical items were then further divided into polysyllabic compounds in which two unique syllables were identifiable, lexical items with concatenative morphemes, and other polysyllabic forms, termed here as 'other', that fall into neither of the previous categories.

The calculation of the distribution of these categories, as predicted, revealed a heavily skewed distribution towards monosyllabic forms in the lexicon, with only 8% of the data set comprising polysyllabic signs. Of the polysyllabic signs, only 13% of these, comprising 31 lexical items, fell into the ‘other’ category. The signs within the ‘other’ category were then coded further, with each sign annotated for the type of movement articulated in each syllable, encompassing distinctions in the shape of the path movement, along with the type of local movement. The presence or absence of an aperture change was noted, along with any change in handshape. To provide a point of comparison to the other polysyllabic forms in the lexicon, a subset of the polysyllabic compound forms was also annotated for the same distinctions.

4. **Analysis of the ‘other’ polysyllabic forms:** The signs in the ‘other’ category of polysyllabic lexical items display both a set of distributional patterns that sets them apart from the remaining types of polysyllabic lexical items, as well as two sub-regular patterns that comprise the majority of the ‘other’ signs. All of the signs in this category were limited to two unique syllables and the large majority of the signs (30/31) were articulated with the same set of selected fingers throughout the entire sign. Neither of these characteristics were shared by the other categories of polysyllabic items in the lexicon.

Not only did the ‘other’ forms display distinct tendencies in the number of syllables and selected fingers, but they also displayed two sub-regular patterns that comprised the majority of the signs under consideration. The first of these, termed here as Type A, forms a category previously identified in Brentari (1998) and comprises signs articulated with a circular movement followed by a straight movement (ex. APPOINTMENT, NECK-TIE). These form 42% (13/31) of the disyllabic forms under analysis. Another set of signs (Type B), a group that violates Perlmutter’s constraint on secondary movements, is articulated with a straight path movement followed by a local, repeated tap or nod movement (ex. LICK, MEXICO). These comprise 29% (9/31) of the ‘other’ category. The remaining 29% (9/31) of the disyllabic forms fit into none of the categories identified and display no apparent consistencies in their form.

5. **Implications:** The existence of two regular sub-patterns within the ‘other’ category brings rise to the questions of what pressures might be shaping these distributions and why some forms do not fit into these categories. One possible reason for the dominance of Type A/B signs might be a pressure within the lexicon towards retaining perceptual distinctiveness between syllables. For Type A signs, the circular and straight movements are more perceptually distinct from one another than other possible combinations of path movements, such as, for example, a straight path and a curved path movement in sequence. Similarly, for Type B signs, the larger, full path movement in the first syllable of the signs contrasts with the second, trilled movement of the repeated tap. Of the signs that did not fall into these categories, most of the forms appear to be based in classifier constructions or in constructed action (ex. ARCHERY) and are highly iconic, a factor that may be influencing them to remain true to their form-meaning mapping. Classifier forms have also been analyzed as morphologically complex, perhaps indicating a pressure towards retention of this aspect of complexity.

The set of lexical items used in this analysis was not large, but revealed striking patterns in the distribution of movement types in the ‘other’ category of polysyllabic forms. The identification of these patterns provides a descriptive contribution, characterizing their distribution in the lexicon, as well as an analytic one, expanding previous analyses of polysyllabic forms. Additionally, it argues for how edge cases might be able to provide additional insights into the pressures that shape the phonological systems of sign languages.

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The contribution of emblematic gestures to the emerging sign language of Guinea-Bissau

Mariana Martins, Marta Morgado & Victoria Nyst

Friday, 2.39

In Guinea-Bissau, deaf people were brought together for the first time in 2004, when the first school for deaf children was established. The Sign Language of Guinea-Bissau (GBSL) has been emerging spontaneously in a fast growing deaf community, based on an autochthonous vocabulary strongly influenced by the national culture with little, if any, influence of other languages, signed or oral. Being very recent, it enables the observation of the formation of a new sign language in real time (Martins & Morgado 2008, 2016, 2017).

The use of a repertoire of emblems is observed in most if not all cultures today. It is also widely observed that these emblems are "absorbed" in sign languages, either as lexical items or as grammatical markers or both (Loon, Pfau & Steinbach 2014). In Guinea-Bissau, hearing people in social interactions with deaf people seem to use a particularly extensive set of common, conventional gestures. This happens naturally and consciously and appears to be the case in other parts of West Africa as well (Brookes and Nyst, 2014). To understand the point of departure of sign languages emerging in West Africa and Guinea-Bissau in particular, it is vital to get a good understanding of the gestural environment in which they emerge.

We will present the results of a study on the overlap between the lexicon of GBSL and the emblematic gestures of the surrounding hearing culture. To this end, we triangulated three types of data: (1) awareness of deaf signers on which gestures they feel are widely known by hearing; (2) common knowledge of hearing people, signers and non-signers about gestures previously identified by the deaf; (3) West African emblems identified by Nyst as part of the Gesture Research Africa database project.
In our presentation, we will discuss the results of this study, including observations regarding semantic and formal shift undergone by the emblems upon becoming part of the sign language.

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N400 phonological priming effects in ASL are modulated by task

Natasja Massa, Brittany Less, Katherine J. Midgeley, Phillip J. Holcomb & Gabriela Meade

Friday, 2.40

Phonological priming paradigms allow for an investigation of the organization of the lexicon and the connections between sublexical and lexical representations. In this paradigm, prime-target pairs are presented and the phonological relationship between them is manipulated. Processing of the target is compared between a related condition, in which the preceding prime shares phonological features, and an unrelated condition, in which it does not. For signed languages, behavioral effects of phonological priming are inconsistent across studies; the presence and direction of the priming effects seem to depend on the phonological parameters that are manipulated. When the prime and target only share location, responses tend to be slower than in the unrelated condition, but other parameter combinations tend to yield the facilitation or no effect at all [e.g., 1-3].

Recent studies have begun to explore how sign language phonological priming is reflected in the event-related potential (ERP) waveform, with emphasis on the N400 [4-6]. The N400 is a negative-going peak in the ERP waveform that occurs approximately 400 ms after stimulus onset. It has been shown to be sensitive to lexical processing for both spoken words and signs. In general, a smaller amplitude N400 is indicative of less effortful processing. Target signs elicit smaller amplitude N400s following phonologically related primes that share two parameters compared to unrelated primes [5]. The smaller N400 is interpreted to indicate that the target is pre-activated by the related prime sign, likely via shared sublexical parameters, and therefore easier to process. In contrast, target signs elicit *larger* amplitude N400s following phonologically related primes that share only location [4]. This effect has been interpreted to reflect lexical competition between the prime and target. As the prime is being recognized, it inhibits form-similar neighbors that share location, including the target sign. In turn, this makes the location-related targets more difficult to process. Capturing these dynamics has important implications for our understanding of how the sign lexicon is organized and how signs are recognized. However, making this comparison across studies is problematic because these two studies differed not only in terms of the type of phonological manipulation (i.e., two-parameter overlap vs. location-only overlap), but also in terms of language (ASL vs. LSE), task (semantic relatedness vs. lexical decision), and other critical variables.

The first aim of the present study was to verify the dissociation between two-parameter overlap and location-only overlap within the same group of participants using the same language and task. Twenty deaf native/early signers viewed pairs of ASL signs that overlapped in either handshape and location (e.g., HUNGRY-COUGH; both are produced with a C handshape on the chest) or location only (e.g., COLOR-WHO; both signs are produced on the chin, but they differ in movement and handshape). Participants pressed a button when the target sign was a country (e.g., FRANCE), a semantic decision that requires identification of the target sign. Relative to the respective unrelated conditions, we expected that target signs in the two-parameter overlap condition would elicit smaller amplitude N400s [5, 6] and that targets in the location-only overlap condition would elicit larger amplitude N400s [4].

A second aim of the present study was to compare the size of phonological priming effects across tasks that differed in their lexical processing demands. We did this by presenting the same signs to the same group of 20 deaf native/early signers, but in the context of a form-based task. The country target signs were replaced with repetitions of the corresponding prime signs, and participants were instructed to press the button when the prime and target signs were identical. Based on the spoken language rhyme priming literature, we expected larger effects of phonological priming in this task. Biasing participants' attention toward the form of the signs and reducing the need to select a single lexical representation should increase the size of the phonological priming effects relative to the semantic task. Participants waited at least one month between the two experiments and completed them in different orders in order to minimize repetition effects.

With respect to the first aim, the phonological priming effects in the semantic task (country sign detection) followed the dissociative patterns previously reported across studies. That is, when prime and target signs shared both location and handshape, the target sign elicited smaller amplitude N400s (indicating facilitation), but when prime and target only shared location, the target sign tended to elicit a larger amplitude N400s (indicating interference). With respect to the second aim, we found that task demands influenced the N400 phonological priming effects. More specifically, the two-parameter phonological priming effect occurred for both tasks, but the effect was larger for the form-based task (detection of a repeated sign) than for the semantic task. Task also influenced the location-only priming effect, which reversed direction across tasks. Location-only primes facilitated sign processing in the form-based task (i.e., smaller N400s for related targets) but hindered processing in the semantic task (i.e., larger N400s for related targets). Overall, N400 amplitude was larger in the semantic task than in the form-based task, confirming that this task induced more lexical processing.

Our interpretation of these results is that phonological relatedness yields two opposing effects: shared sublexical parameters facilitate processing but competition between neighbors at a lexical level hinders processing. The relative strength of these two forces is modulated by both the number of parameters that are shared and the task demands. Together they determine the net direction of the priming effect. The semantic task requires participants to select specific lexical items, which increases lexical competition among neighbors relative to the form-based task. When only location is shared, lexical competition overrides the effects of sublexical facilitation and the net effect is more difficult processing (i.e., a larger amplitude N400). In the two-parameter case, we hypothesize that the sublexical facilitation is stronger, which makes related pairs easier to process than unrelated pairs in both tasks. The increased lexical competition in the semantic task diminishes the size of the sublexical facilitation effect, but does not reverse it for the two-parameter case. Taken together, these results reinforce a distinction between sublexical and lexical levels of representation and suggest that the effects of phonological overlap at each level can be modulated by whether lexical-semantic processing is required by the task.

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Matching pictures and signs: An ERP study of the effects of iconicity and structural alignment in American Sign Language

Meghan McGarry, Natasja Massa, Megan Mott, Katherine J. Midgley, Phillip J. Holcomb & Karen Emmorey

Friday, 2.41

We capitalized on the temporal sensitivity of Event-Related Potentials (ERPs) to investigate whether the effects of sign iconicity and visual structured alignment observed by Thompson et al. (2009) occurred during lexical access or at a later decision stage. In that study, ASL signers performed a picture-sign matching task, and decision times were faster when an iconic property of the sign aligned with a salient feature in the picture than when preceded by a non-aligned picture. For example, the iconic sign CAT depicts a cat's whiskers and aligns with a picture of a cat with prominent whiskers, and the sign does not align with a picture ofa cat seen from behind without a clear view of the whiskers (see Figure 1). The N400 component is a negative-going wave that peaks around 400ms after stimulus onset and has been shown to reflect lexico-semantic processing for spoken words and signs. If the effect of iconic alignment occurs during lexical access, then we would expect alignment to effect this component.

Twenty-five Deaf native signers were presented with a total of 360 black and white line drawings depicting a total of 180 concepts, followed by videos of ASL signs that's meaning either matched or did not match the object shown in the preceding picture. Of the 180 signs that were in the matching condition 60 were aligned with preceding picture, 60 were not aligned with the preceding picture, and 60 were non-iconic fillers. Videos were clipped three frames (100ms) before sign onset. Participants responded on each trial by pressing a button indicating whether the picture and the sign matched or not. The order of pictures was counter-balanced across participants. Twenty-five hearing controls completed the same task and were presented with the same pictures followed by videos of spoken English (clipped 300ms before speech onset). As there was no form overlap between spoken English words and the pictures, the English words were neither aligned nor non-aligned with the pictures, and thus no effects of alignment were expected. ERPs were time-locked to the onset of the sign or the spoken English word and averaged offline.

For ASL signers, response times for signs with aligned pictures tended to be faster than signs with non-aligned pictures, and there were no RT differences in these conditions for English words. For the deaf signers, the N400 to signs in the aligned picture condition showed reduced N400 amplitude compared to signs in the non-aligned condition. This finding suggests a priming effect that occurs during lexico-semantic processing when the visual features of an aligned picture overlap with the iconic features of the to-be-matched sign. The distribution of this N400-like priming effect was right temporal and front-temporal sites (see Figure 2a). These results are consistent with a production study from our lab, which found similar anterior priming effects for iconic signs when deaf signers naming aligned versus non-aligned pictures. No effect of alignment was found for hearing English speakers (see Figure 2a).

Priming for matching versus non-matching trails was also observed. For all participants, response times for the non-matching (“no”) trials were slower than for the matching (“yes”) trials. As expected, trials preceded by unrelated (non-matching) pictures resulted in greater negativity in the N400 window (300-500ms). For both participant groups, this negativity was robust and found broadly over all electrode sites (Figure 2b).

Overall, the results indicate that the structural alignment between visual features of an iconic sign and a picture facilitates comprehension compared to when there is no visual feature overlap. The presence of effects during the N400 window suggests that this facilitation occurs at the level of lexical retrieval.

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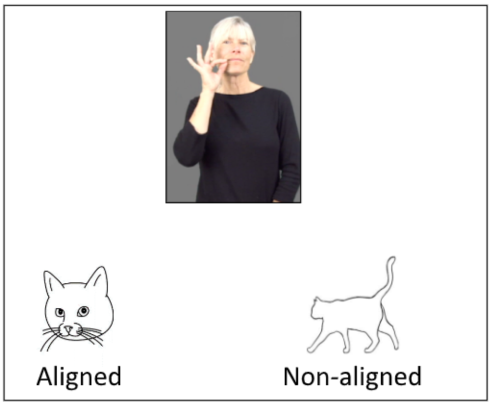

Figure 6. Aligned and non-aligned images for the ASL sign CAT. The aligned image depicts the iconic mapping of the cat’s whiskers, which are absent in the non-aligned picture.

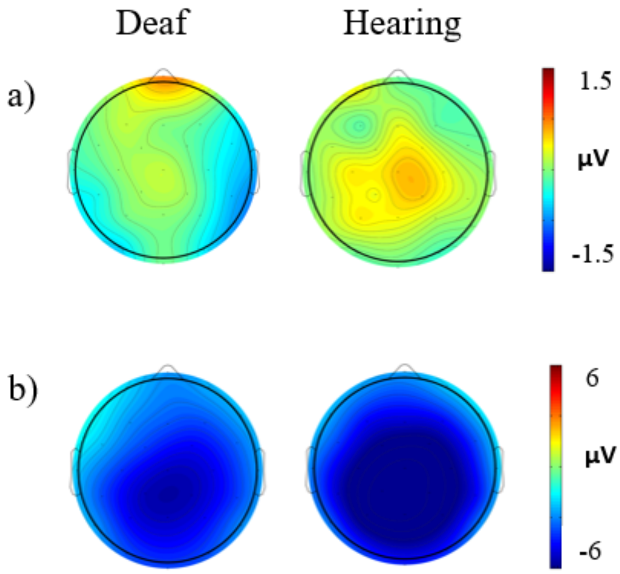

Figure 2. Voltage maps of the scalp from 300 to 500 ms after sign or word presentation. A) Effects of alignment, demonstrating a subtraction of effects found in the aligned condition from those found in the non-aligned condition (resulting blue reflects distribution of greater negativity for non-alignment). B) Effects of matching, showing a subtraction of the effects of the matched condition from the unmatched condition (resulting blue reflects distribution of greater negativity for the unmatched condition).

Signs of globalisation: What is ASL doing in NZSL?

Rachel McKee & David McKee

Friday, 2.42

Language variation and change is often explained in terms of internal linguistic processes. However, in small language communities, external interventions and intentional (socially motivated) innovations can also be important triggers of language variation, change and shift (Milroy 2003, Walworth 2017). The NZSL lexicon changed abruptly in the 1980s due to educational intervention, and has been borrowing and innovating ever since, so that contemporary NZSL differs not only in lexicon but also in aspects of phonology and morphology from the variety used 40 years ago (McKee & McKee 2011). Apart from documented evidence, this diachronic variation can be observed in the different repertoires of NZSL used within multi-generational Deaf families.

In the 2000s, increased international exchange, migration, and online connectedness accelerated NZSL users' exposure to sign languages beyond New Zealand (and 'traditional' sources of borrowing from related languages Auslan and BSL) - in particular, to ASL, as the language that is dominant in Deaf cyberspace and which carries prestige associated with higher education and international mobility. Over this period, we have observed an apparent increase in NZSL users' adoption of ASL variants; this might be seen as parallel to a shift in NZ English towards US variants - such as 'cookie' (NZ 'biscuit'), 'movie' (NZ 'film'), 'sweater' (NZ 'jersey'), (Meyerhoff 1993) – although that shift has occurred between varieties of English, rather than between historically unrelated languages as in the case of NZSL/ASL.

This study investigates forms and extent of ASL borrowing (lexical and phonological) in NZSL and aims to identify triggers and processes of borrowing and dissemination. Further, the study examines perceptions and attitudes of the Deaf community vis a vis the presence of ASL influence in NZSL, to understand the extent to which change is at the level of consciousness, and whether it is attributed to the spontaneous effects of digital communication and mobility typical of 'superdiverse' societies (Blommaert & Rampton 2011), and/or to the influence of 'linguistic leaders' in the community who have intentionally or unconsciously introduced change (Labov 2001).

At a theoretical level, the study considers whether the 'globalising' influence of ASL should be seen as a threat to the local, bounded identity of NZSL, contributing to the loss of diversity among sign languages (cf. Meier 2000). Alternately, the adoption of ASL forms could be understood as a resource for expanding the semiotic repertoire of NZSL, for indexing generational identity, and for facilitating inclusion in trans-national Deaf discourses. The study contributes to understanding externally motivated language variation and change in sign language communities, which relates to growing interest in the hybridity and fluidity of trans-national language(ing) practices among sign language users globally (eg, Kusters et al 2017).

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Plasticity in the neural substrate of language: Insights from unimodal and bimodal bilingual infants

Evelyne Mercure, Samuel Evans, Laura Pirazzoli, Laura Goldberg, Harriet Bowden-Howl, Kimberley Coulson, Indie Beedie, Sarah Lloyd-Fox, Mark H Johnson & Mairéad MacSweeney

Thursday, 15:30-16:00

Adult neuroimaging studies robustly demonstrate that sign language is processed in a similar brain network as spoken language in adulthood (Capek et al., 2008; Emmorey, 2001; Hickok et al., 1996; MacSweeney et al., 2004; MacSweeney et al., 2008; Petitto et al., 2000). This is a strong argument for the idea that classical language areas are specialised for the processing of natural languages independent of their modality. In infancy, spoken language activates a similar network to the adult language network and activation of frontal and temporal areas is often larger in the left than right hemisphere (Dehaene-Lambertz et al., 2002; Minagawa-Kawai et al., 2010; Pena et al., 2003). The neural activation for sign language has never been studied in infancy. Moreover, it is unclear how the neural substrate of language is shaped by early language experience. The present study used functional Near Infrared Spectroscopy (fNIRS) to study the neural activation elicited by spoken and signed language in three groups of hearing infants with different language experience: monolingual infants exposed to English exclusively, unimodal bilingual infants who are frequently and regularly exposed to English and one or more additional spoken language(s), and bimodal bilingual infants with a deaf mother exposed to spoken English and British Sign Language (BSL). Bimodal bilingual infants are likely to have reduced experience of spoken language. These infants also have experience of language in the visual modality. As a result of these differences in experience, it was predicted that bimodal bilinguals would demonstrate reduced activation in fronto-temporal language areas and reduced lateralisation in response to spoken language, but increased activation in fronto-temporal language areas and increased lateralisation in response to sign language compared to other infants. It was also predicted that bimodal bilingual's patterns of activation for spoken and for sign language would be more similar than in infants who only experience spoken language (monolinguals and unimodal bilinguals).

Data is presented from 60 infants between 4 and 8 months: 19 monolingual infants, 20 unimodal bilingual infants, and 21 bimodal bilingual infants. FNIRS with 46 channels was used to measure brain activation while infants were presented with audiovisual videos of short stories in spoken or signed language. Univariate analyses and multivariate pattern analyses (MVPA) were used to study the neural substrate of spoken and signed language in the three groups of infants. In MVPA, a support vector machine using a leave-one-participant-out cross validation and permutation testing was used to decode patterns of activation for each modality.

Spoken language elicited widespread activation in the infants' brain, which included the inferior frontal and posterior temporal regions of interest. Sign language elicited significant activation mostly in the temporal and temporo-parietal areas of the brain. In the posterior temporal region of interest, activation was larger for spoken than signed language. Moreover, lateralisation significantly differed between groups in this area. Contrary to our hypothesis, this group difference was mainly driven by unimodal bilinguals who showed significantly right lateralised activation, while the other two groups of infants showed non-lateralised patterns of activation. Interestingly, this pattern of results was observed for both spoken and signed language, which suggests that the early experience of two spoken languages can influence brain activation for sign language when experienced for the first time.

Patterns of activation for spoken and signed language were compared at the network level using MVPA. In monolinguals, patterns of activation for spoken and signed language could be classified at a level greater than chance using left hemisphere channels (proportion correct = 0.68; $p = 0.039$), but not right hemisphere channels (proportion correct = 0.47; $p = 0.733$). It was initially predicted that classification would be less successful in bimodal bilinguals compared to monolinguals and unimodal bilinguals given that these infants have experience of both language modalities. However, MVPA could not classify patterns of activation elicited by spoken and signed language with an accuracy higher than chance in both groups of bilinguals.

Both groups of bilinguals experience increased variability in language input compared to monolinguals. Experiencing two spoken languages, which are more similar and more difficult to distinguish than a spoken and a sign language, may have a stronger impact on the process of neural specialisation for language. This could explain the difference in the degree of lateralisation and involvement of the right hemisphere observed in unimodal bilinguals compared to monolinguals and bimodal bilinguals. Moreover, the experience of two spoken languages in infancy may contribute to developing an increased sensitivity to the general structure of languages, which in turn would lead to similar patterns of activation for an unfamiliar language modality. Taken together, these results suggest that the neural substrate of language is plastic in infancy and influenced by language experience.

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Segmentation in sign languages

Johanna Mesch & Ronice Müller de Quadros

Friday, 2.43

The aim of this paper is to discuss different levels of segmentation considering linguistic analyses of sign languages. These levels of segmentation include the (1) sign gloss by sign gloss; (2) the utterance, based on each statement; (3) the single syntactic unit with any number of embedded clauses; (4) the smaller syntactic/pragmatic components. Each level of segmentation will be presented considering specific criteria: prosodic, semantic, and syntactic (predicate-argument structure). The segmentation of sign languages focused on in this presentation was proposed based on data from two sign language corpora: the Swedish Sign Language Corpus and the Brazilian Sign Language Corpus. We analyzed annotations from conversation settings of eight Deaf people, four from each country, each one an interactive setting in pairs. Conversation is a setting that involves more spontaneous production about Deaf community and culture, without previous planning. This kind of setting needs additional criteria for segmentation to be analyzed at different levels of linguistic analysis.

An utterance is a full proposition, and is a segment including formal marks such as intonation and pauses in association with the context in which it is produced. A syntactic component is expressed through a predicate (verbal or nominal). Each predicate is separated in this specific component. Following Börstell et al. (2016:19), we define a clause "a clause as a unit in which a predicate asserts something about one or more elements (the arguments)." The base of the clause is driven by syntax, while the utterance is driven by meaning. A full proposition can have more than one syntactic component. In both cases, prosody is taken into account. Prosody includes non-manual markers, pauses, body or gaze shifting, blinks and head nodding (as analyzed for Finnish Sign Language and Swedish Sign Language, in Puupponen et al. 2016, see also Fenlon et al. 2007)

For syntactic analysis, we can consider multiple syntactic units for studying different sentence levels of only one syntactic phrase or more, including different scopes of the clause (such as a verbal phrase, a nominal phrase, an adverbial phrase, an adjectival phrase, a topic phrase, a focus phrase, or a complement phrase).

The following examples illustrate the criteria established for both languages:

SSL (SSLC01_246 00:02:18.500-00:02:24.090)
One utterance, four syntactic components
Utterance: TO DEAF YOUNG POINT.PL YOUNG PRO1 OLDER PU PRO1 MUST TELL POINT.PL KNOW-NOT WHO POINT
Syntactic components: TO DEAF YOUNG POINT.PL YOUNG / PRO1 OLDER PU / PRO1 MUST TELL / POINT.PL KNOW-NOT WHO POINT
Translation: When I, a little older, meet deaf young people, I usually tell them about him, they usually do not know who he is.

SSL (SSLC01_246 00:01:12.936-00:01:15.756)
One utterance, two syntactic components
Utterance: IMPORTANT GET SIGN-LANGUAGE GRAMMAR (facial expression) EFFECT
Syntactic components: IMPORTANT GET SIGN-LANGUAGE GRAMMAR / (facial expression) / EFFECT
Translation: It is important to acquire sign language grammar, it is a wow experience and a good start.

Libras (FLN_G1_D1_CONVER_Escolasurdoouvinte 00:00:01:000-00:00:10:000)
One utterance, three syntactic components
Utterance: SCHOOL INCLUSION HARD BECAUSE THERE-IS-NO THINKING KNOW DEAF CULTURE RIGHT?
Syntactic components: SCHOOL INCLUSION HARD / BECAUSE THERE-IS-NO THINKING KNOW DEAF CULTURE / RIGHT?
Translation: The inclusive school finds some difficulty, because there is no knowledge of deaf culture, isn't it?

Libras (FLN_G3_D6_CONVER_Escolasurdoouvinte
One utterance, three syntactic components
Utterance: POINT.PL STUDENTS HEARING TALK PRO1 DEAF DV(stay-static) HELP NOTHING
Syntactic components: POINT.PL STUDENTS HEARING TALK / PRO1 DEAF DV(stay-static) / HELP NOTHING
The hearing students talk to each other, while I, a deaf child, stay still observing without help (to communicate) from the others.

The purpose of establishing the same criteria for segmentation is to make possible corpus-driven and comparative studies among sign languages.

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The development of person and agreement in Nicaraguan Sign Language

Kathryn Montemurro, Molly Flaherty & Susan Goldin-Meadow

Saturday, 15:30-16:00

Introduction. In this study, we look at the development of spatial modulation in an emerging morphosyntactic system of Nicaraguan Sign Language (NSL). Spatial modulation in sign languages is used for person reference and verbal agreement in which R-loci contrast paradigmatically (Padden 1983, Mathur 2000) with a first/non-first person distinction posing the body in opposition to neutral space (Meier 1990). Thus in studying an emergent system, we look also look to the body, itself an anchor in space that we must disentangle the body of the signer itself from abstract grammatical categories attached to referents (Padden et al. 2010). To explore pathways to grammaticalization of the body and space, we isolate the expression of spatial modulation through the following devices: use of the body/space for referents, axis and role shift. Crucially, we map how these devices function within a system by comparing their usage across two event types: transitive and reciprocal.

Methods. Based on pilot data, we track the use of the spatial modulations through four participant groups: 4 homesigners, 4 cohort 1 (C1), 5 cohort 2 (C2), and 5 cohort 3 (C3) signers. Participants were shown short video clips and asked to describe what they saw. Stimuli consisted of two animate participants and an event. Events included 20 singular verbs of direction (e.g. pinch) or transfer (e.g. give) and 11 reciprocal events (e.g. punch each other). At present, we have only stimuli with third person referents, but will collect new data to fill this gap.

Results. Overall, though they clearly establish participants in the event, homesigners produce few spatial modulations (n=22). NSL cohorts produce more *(C1 n=156, C2 n=310, C3 n=210)*, but differ in how they modulate signs. Beginning with the most basic case, we analyze the expressions of modulation for verbs of direction and transfer. First, we look at how signers use the body and space to establish referents (fig. 1)

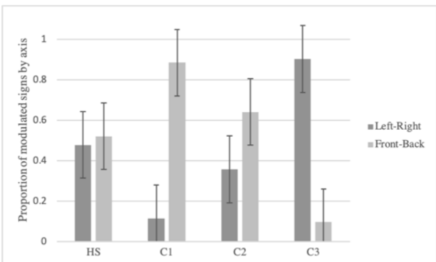


Figure 7. Comparison of axis preference

For most C1 signers, loci are established so that the signer's body represents one of the participants in the event, either the subject or object, with the second referent assigned to neutral space. When posed in opposition to the body, the axis utilized to establish discourse referents is the front-back axis. In general there is little role shift (11.23%). Many NSL signers use a two-verb structure (fig. 2; Flaherty 2014), yet we find that agreement in C1 generally occurs on a single verb within the construction (fig. 3).

a.
b.

Figure 8. Two examples of the vignette ‘woman squeezes man’ in (a) C1 and (b) C3.

In contrast, C3 localizes referents in neutral space. Both third person referents have been displaced from the body using the left-right axis, as attested in other young and emerging languages (see Padden et al. 2010). This change in axis is accompanied by an increase in the use of role shift on the verb (69.37%) aligned with established loci which clarifies participant relations and allows for a higher proportion of agreement on both verbs (fig. 3). The left-right axis frees up the body for third-person shifted reference (Engberg-Pedersen 1995) rather than acting as a fixed participant. Falling somewhat in the middle, in C2 we find high variation within cohort involving mixed usage of devices, particularly of axis and role shift, some patterning as C1 and others like C3.

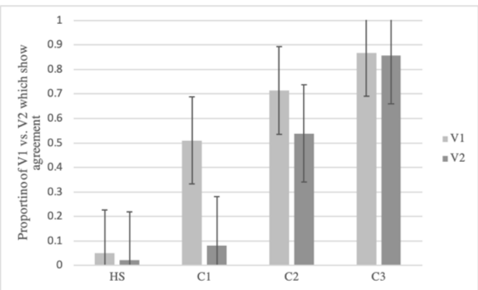
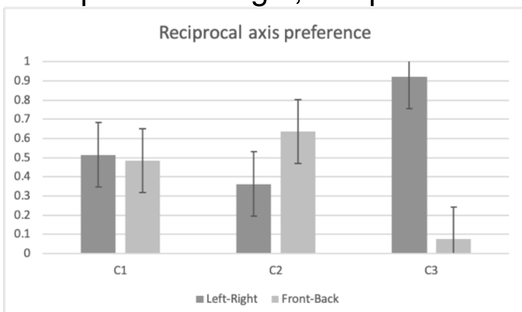


Figure 9. Comparison of agreement in V1 vs. V2

Looking to reciprocal constructions however, distinct patterns arise. We find that all cohorts show a mixture of verbal strategies, though most prefer a single, reciprocal verb involving a symmetrical inward motion with both hands oriented toward one another. Compared to the previous axis preference, for reciprocals, C1 signers are much more likely to utilize the left-right axis both to set up referents and on the verb, with the verb more likely to inward movement of both hands laterally. C1 also shows us mismatches in axis, with signers utilizing the front-back axis to establish a referent, but employing the symmetrical-lateral axis on the verb. In C2, we again find that signers are still more likely to maintain the front-back axis but less likely to have mismatches. Again in C3, the left-right axis is used with the lateral reciprocal verb.



Discussion. Looking at these verb types within the purview of an emerging system, a few clear patterns arise. The body and space enter the language relative to one another. As the spatial layout of contrast changes from front-back to left-right, C3 shows a separation of the signer's body from that of the third person referents of the verb, leading to a hypothesized distinction between first and non-first person in C3.

Though earlier cohorts do show agreeing behavior based on reference tracking prior to this establishment, it increases by the third cohort, who have the phonological devices developed and readily available in order to explicitly mark both participants in the event. These devices have consequences in agreement, whereas the lateral axis and role shift allow for agreement. In the reciprocals, we very acutely see the role of competing iconicities (Padden et al. 2010) of the lateral and midsagittal axes. This may relate to the subjecthood of both participants in a reciprocal action. Over time, we find a consistency across the lateral axis across event types rather than localized to reciprocals as is favored by C1.

Conclusion. Precursors to spatial modulation are present relatively early on, as we find early cohorts differentiate participants in an event by using their body in opposition to neutral space. Interaction of the body and space, born out of this contrast and a need to track participant relations, is crucial to the emergence of a grammatical, morphosyntactic system. Along this trajectory, 'disengagement from the body' (Padden et al. 2010) manifested by a change in axis is an integral step which must reconcile competing iconicities of the body with those of efficiency and expressiveness in the verbal domain across myriad event types.

Beyond 'Double Contact': Arguments for a new prosodic type in sign languages

Hope Morgan

Friday, 2.44

Many sign languages have what been referred to as "two-touch" or "double contact" signs. These signs make contact with the body twice using a short approach movement, first in one location and then in another, and were identified in the early days of sign language research in ASL (Stokoe 1965; Friedman & Battison 1973; Klima & Bellugi 1979); e.g., FLOWER (**Fig. 1**), HOME, COMMITTEE, etc. In an analysis of two historically unrelated languages, Kenyan Sign Language (KSL) and Israeli Sign Language (ISL), I identified dozens of signs that share some but not all properties of such double contact signs, and in this talk I propose that these signs would be better included as members of a larger class that have not been sufficiently described to date. I refer to this larger class as *displaced iteration signs*, following Newkirk et al. (1980). In this talk, I will show that current models of sign phonology do not adequately account for them, and therefore propose a new implementation, using the Dependency Model (Kooij 2002), as well as a new prosodic 'manner of movement' feature (Ahn 1990; Wilbur 1993; Hulst 1993), *displaced iteration*.

Figure 1. FLOWER in ASL (Newkirk et al. 1980)

This study is based on 135 such signs in KSL (from a dataset of 1,880 signs; Morgan 2017), and 44 signs in ISL (from a dataset of 965 signs). Many of these signs are of the familiar double contact variety, with two end-contact syllables at two locations on the body; i.e., 55 (41%) signs in KSL and seven (25%) in ISL are double contact. However, the majority of signs have other properties that I will argue must be specified in the phonological description of the sign.

First, it is not only end-contact movements that are repeated. Other movements are also repeated in two locations, which include: those moving away from the body (e.g., FAMOUS [KSL], HEDGEHOG [ISL]), those moving parallel to the body (e.g., DIRTY [KSL; **Fig. 2**], SANDALS [ISL]), handshape movements (e.g., TEACHER [KSL], LADDER [ISL]), orientation changes (e.g., TO-ENUMERATE [KSL], SHUTTER [ISL]), and different combinations of these (e.g., PARENTS-2 [KSL], GRASS [ISL]). Following Brentari (1998: 205), these signs are considered disyllabic because if the movements were produced only once, a single iteration would be a well-formed sign. Among displaced iteration signs with path movements, both directions along an axis are attested. On the vertical axis in KSL and ISL there are both high>low (e.g., DIRTY [KSL; **Fig. 2**], TRAFFIC-JAM [ISL]) and low>high (e.g., SUPPORT [KSL], HEDGEHOG [ISL]) signs. On the midsagittal axis, there are both in/proximal>out/distal (e.g., MEASURE [KSL; **Fig. 3**], CHASE [ISL]) and out/distal> in/proximal (e.g., BATHE [KSL],

Figure 2. DIRTY in KSL; high>low path moving parallel to the cheeks

MOTHER [ISL]). This means that the direction of movement at the **syllable level** should be specified in the phonology because it cannot be predicted on the basis of other means. Interestingly, however, it was found that horizontal movements in both languages are consistently in the direction contralateral>ipsilateral (e.g., ZEBRA in KSL and ISL, SQUEEGEE in ISL), suggesting that there may be a predictable default direction along the horizontal axis, unlike the other two axes.

Second, at the level of the whole word, the configuration of the two sub-locations in a displaced iteration sign—e.g., the locations on either side of the nose in FLOWER are positioned horizontally to each other—is also not predictable. Displaced iteration signs can be ordered along all three axes—*horizontal* (e.g., FLOWER [ASL], DIRTY and CHILDREN [KSL], TEACHER [ISL]), *vertical* (e.g., IMPORTANT [KSL; **Fig. 3**], FATHER [ISL]), and *midsagittal* (e.g., MEASURE [KSL; **Fig. 4**], TRAFFIC-JAM [ISL]). Further, within each axis, opposite directions are attested. For example, in KSL there are sub-locations ordered up>down on the vertical axis (e.g., IMPORTANT [Fig. 4]) and also down>up (e.g., HAY, BUILD). In addition, there are antonyms that are minimally different on the basis of word-level directionality; e.g., IMPROVE and WORSEN in ASL move up and down the arm, respectively. Thus, in addition to the syllable level, I propose that the configuration of sub-locations (using the three axes) must also be encoded at the **word/morpheme level** as part of the phonology.

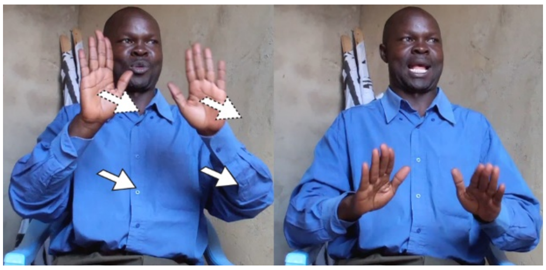


Figure 3. IMPORTANT; word-level *vertical* axis


Figure 4. MEASURE; word-level *midsagittal* axis

Further evidence for the categorical nature of these signs comes from signing errors in ASL documented by Newkirk et al., who describe two errors featuring the double contact sign FLOWER. The first is a slip of 'IN FLOWER' in which the double contact was produced on the non-dominant hand instead of nose, and the second was a slip of 'RED FLOWER' in which the hooking movement of the index finger in RED was repeated twice on either side of the nose instead of the chin. As the authors point out, these errors suggest a type of phonological "frame" (1980: 295, endnote 8)—here interpreted as a manner feature—that is specified for repeated movements displaced in location. The sign evidence from KSL and ISL (and ASL) presented in this study reveals that this overall frame can be filled in with many different kinds of syllables, in many different locations (restrictions on locations to be discussed).

At present, none of the phonological models that use branching dependencies has accounted for any type but the 'double contact' displaced iteration signs. In particular, both the Hand Tier Model (Sandler 1989) and Prosodic Model (Brentari 1998) do not have ways of simultaneously encoding both the syllable and word/morpheme level properties of these signs. In contrast, the Dependency Model's branching hierarchies can be modified in a relatively straightforward way to accommodate this information. I show how this can be done using a combination of syllable licensing (Brentari 1998) and a new manner of movement feature, *displaced iteration*. Finally, I will show that having a means of encoding both syllable- and word-level properties also provides a way of accounting for other signs that should be represented in phonological models; namely, (i) different types of distribution of secondary movement (e.g., TO-MUSE versus TO-DREAM in KSL), and (ii) aspectual modifications to signs by repetition on a path.

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Phonological complexity and frequency in the lexicon: A quantitative cross-linguistic study

Hope Morgan, Rama Novogrodsky & Wendy Sandler

Saturday, 10:00-10:30

Phonological complexity plays an important role in language acquisition and processing. Previous literature has examined phonological complexity in sign languages in terms of allowable co-occurrences in the lexicon,[1,2,3] differences in complexity in the core and non-core lexicon,[4,5,6] patterns of child language acquisition,[7,8] and performance on a non-word repetition task.[9] Taken together, these studies reveal relatively similar constraints on complexity. More complex handshapes are less common, more confusable, do not appear on the non-dominant hand in unbalanced signs, and are acquired later. Similarly, complex movements are less common in lexicons and are simplified in L1 and L2 acquisition.

Yet while these studies reinforce a similar picture of the constraints on phonological complexity, no previous analysis has presented a quantification of complexity across a sign language lexicon. In the current study—the largest of its kind to date—we quantify complexity across the lexicons of three sign languages. It is known from spoken language research that frequent words tend to be less complex in certain ways than infrequent words,[10] and here we test this generalization about natural language lexicons in sign languages.

We focus on three questions regarding the distribution of phonological complexity. (1) What is the distribution of relative complexity in different sign languages? (2) How similar is this distribution across languages? (3) Does lexical frequency play a role in the distribution of phonological complexity; i.e., are more frequent signs less complex?

Phonological complexity was evaluated using lexical databases of three macro-community sign languages containing detailed phonological descriptions of monomorphemic (non-compound) signs: American Sign Language (2,303 signs from ASL-LEX 2.0[11]), Israeli Sign Language (748 signs[12]), and Kenyan Sign Language (1,880 signs[13]). Subjective frequency ratings were available for ASL[11] and for ISL.[12]

We used a suite of six featural complexity ratings based on previous proposals and studies,[5,8,9] shown in Table 1, and summed these to obtain a per-sign measure of complexity. The maximum per-sign complexity rating is 9, although due to limits on syllable length in signs,[14] not all highly complex movement types are attested in a single sign. For example, a sign with a complex path (e.g., zig-zag, spiral) that repeats in two locations is not attested.

#	Complexity variable	Description of feature	Rating
1	2HANDS: different HSs	In a 2-handed sign, the handshapes on each hand are the same	0
		In a 2-handed sign, the handshapes on each hand are different	1
2	HANDSHAPE: selected fingers 1	The selected fingers are all or index only	0
		The selected fingers are other than all or index only	1
3	HANDSHAPE: selected fingers 2	The dominant hand has only one set of selected fingers ("HS contour")	0
		The dominant hand has two different sets of selected fingers ("HS contrast")	1
4	HANDSHAPE: joint configuration	The flexion of the joints in the selected fingers are straight or closed	0
		The flexion of the joints in the selected fingers is bent, hooked, or curved	1
		The flexion of the joints in the selected fingers is crossed or stacked	2
5	MOVEMENT: primary, secondary	There is only one movement type in the sign, either primary movement or secondary	0
		There are two of three simultaneous movements: path, handshape, &/or orientation	1
		There are three movements at the same time (path, handshape, orientation)	2
6	MOVEMENT: path shape	The path shape is straight	0
		The path shape is circle or arc	1
		The path shape is something other than straight, circle or arc	2

Table 1. Six complexity variables, with ratings

Across all three sign languages, we found that complexity is distributed quite similarly (Figure 2). The bulk of the lexicon in each language has a complexity value of two or less and there are very few signs with values above four, and none above six. This conforms to previous expectations that the core lexicon is made up of signs at the low end of possible complexity, yet provides new insight into the actual distribution.[5,8,9]

We were also curious to learn how similar the distributions would be across sign languages, considering that ASL is an older language than ISL, and KSL is the youngest (ages ~200, ~90, and ~60 years, respectively). We found that complexity does differ significantly between them ($H = 186.74$, d.f. = 2, $p < 0.001$), with most to least complex in this order: ASL > ISL > KSL. **This suggests that young languages gain complexity as they develop over time.**

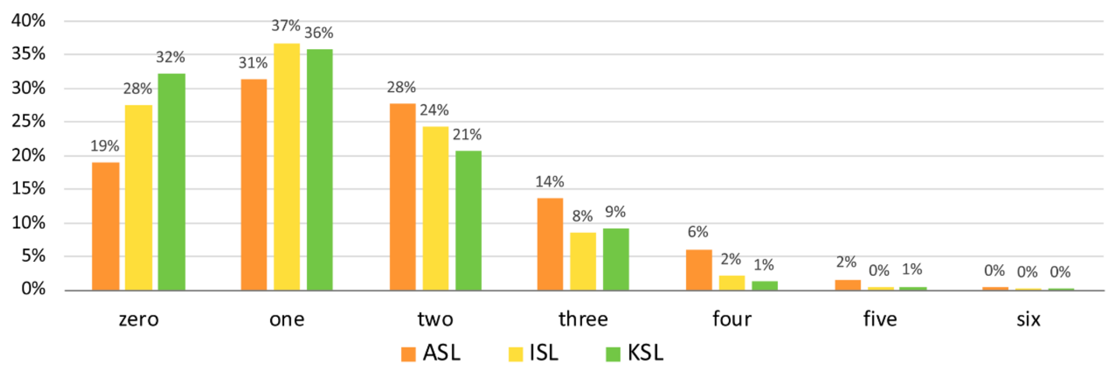

Figure 2. Per-sign complexity ratings in ASL, KSL, and ISL for the six complexity measures

Finally, we considered whether frequency of use is correlated with phonological complexity. In spoken languages, frequent words are more likely to be phonologically reduced (e.g., *going to* becomes *gonna*). Reduction is realized in many different ways, most notably in the Zipfian distribution whereby frequent words tend to be shorter than infrequent words, but also in other ways like vowel reduction and deletion.[15] Frequent words also tend to have more common phonemes and bigrams.[16] We might expect a similar pattern of phonological simplification among high frequency words in sign languages. As hypothesized, we found **that there is a negative correlation between lexical frequency and phonological complexity in the two languages for which**

we have frequency ratings: ASL (r_s = -0.162, p < 0.001) and ISL (r_s = -0.064, p < 0.046), such that frequent signs are indeed less complex than infrequent signs.

In summary, we have developed a system for evaluating phonological complexity that can be applied systematically to an entire lexicon and can be used to draw cross-linguistic comparisons. The results reveal that the distribution of complexity in the core lexicon is similar across three unrelated sign languages of different ages, consistent with the idea that, while languages may differ in the dimensions in which they are complex, there may be an optimal level of complexity overall. This helps to validate the proposed measure of complexity, providing a useful tool for addressing relative complexity in acquisition and processing. Our results also show that a significant correspondence between frequency and complexity is a universal feature of human language lexicons – whether spoken or signed.

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The role of marriage patterns on the persistence of shared sign languages

Katie Mudd, Bart de Boer & Connie de Vos

Friday, 2.45

Communities where shared sign languages have emerged exhibit a variety of marriage norms for deaf individuals (de Vos & Zeshan, 2012), but the effect of marriage norms on sign language persistence is not entirely clear. Marital patterns, such as deaf-deaf marriages or the lack thereof, likely affect the number of deaf offspring and ultimately the persistence of the sign language. In the following research we ask, what is the role of marital patterns on sign language persistence in shared signing communities?

To investigate this question, we build on a mathematical model by Aoki & Feldman (1991) investigating sign language persistence; persistence and transmission of deafness is determined by deaf alleles and marriage patterns, while whether individuals are deaf or hearing determines the probability of the sign language being transmitted from parents to offspring. Marriage patterns, here called assortative mating, refer to the tendency for an individual to marry another based on deafness. In the current research, the components of Aoki & Feldman's (1991) mathematical model are implemented in an agent-based model, allowing us to observe random fluctuations and more easily incorporate community structure.

In this agent-based model, we use information about the shared sign language Kata Kolok to set model parameters, such as the number deaf and hearing agents (Marsaja, 2008), and the percentage of hearing carriers of the deaf gene (Winata, 1995). Because many shared sign languages have been found to emerge in communities with high incidences of recessive hereditary deafness, we model this case. With regards to sign language transmission, deaf children always learn the sign language from their parents if a parent is a signer. For hearing children, we investigate different probabilities that they acquire the sign language from a signing parent. In order to investigate the effect of marital patterns on sign language persistence, the value for assortative marriage is varied in a set of experiments: no deaf-deaf marriages (Figure 1A), 50% of the population marries assortatively (Figure 1B), and 100% of the population marries assortatively (Figure 1C).

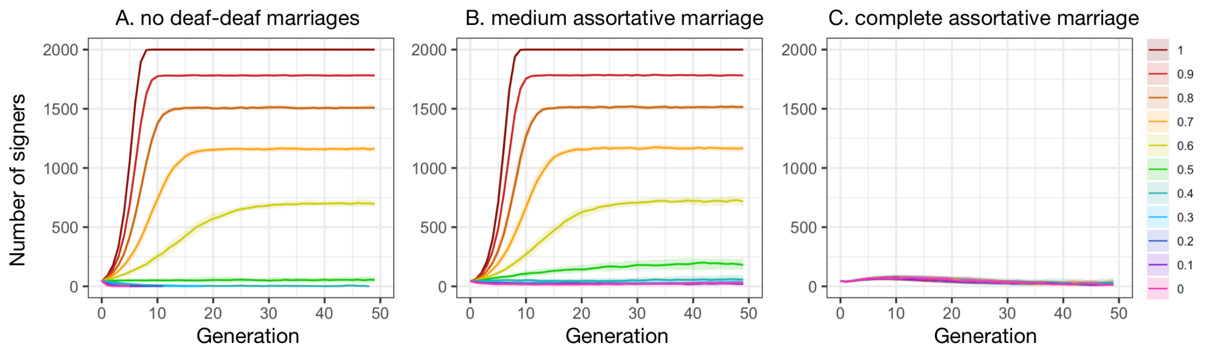

Figure 1. The number of signers over 50 generations for various probabilities that hearing children acquire the sign language from signing parents, shown by colored lines. Plot A shows a situation where

no deaf-deaf marriages occur, plot B where assortative marriage occurs for half of the population, and plot C where the whole population marries assortatively.

In these experiments the effects of marital patterns on sign language persistence are demonstrated. When no deaf-deaf marriages occur (Figure 1A), a substantial number of hearing signers is required for the sign language to persist. This marital pattern is akin to the one observed in the case of Al-Sayyid before 2004 (Kusters, 2012; Kisch, 2007) and in Adamarobe after 1975 (de Vos & Zeshan, 2012).

Next, the sign language always persists when half of the population marries assortatively (Figure 1B), similar to the case of Kata Kolok (Marsaja, 2008; Branson, Miller & Marsaja, 1999), and when there is complete assortative marriage (Figure 1C). This is because in deaf-deaf marriages, genetic transmission of deafness and sign language transmission from parent to offspring is ensured. In the case of complete assortative marriage, as no hearing children are born to deaf parents, the transmission of sign language is restricted to families with deaf individuals.

There are a variety of assortative marriage patterns observed in communities where shared sign languages have emerged. Using an agent-based model simulating recessive deafness, sign language transmission and various marriage patterns, sign language persistence and the number of signers in the population is shown to be influenced by marriage patterns. This methodology allows us to investigate a plethora of genetic and sociocultural scenarios to see which situations can lead to the emergence and persistence of shared sign languages.

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Language policies in Brazil: The place of Libras in science and in society

Ronice Müller de Quadros

Saturday, 9:00-10:00

The presentation considers language policies in Brazil with respect to Brazilian Sign Language (Libras) in Science and Society. With respect to Science, we focus on the large-scale research project "Libras Documentation in Brazil". Several researchers have used this resource, including Deaf academics. Considering societal impacts, we focus on the way that research guides social policy, such as policies on Deaf education, sign language teaching and interpreting.

A semantic-pragmatic analysis of contrast types in Catalan Sign Language (LSC)

Alexandra Navarrete-González

Friday, 2.46

Background. Most of the studies on Information Structure (IS) in sign languages have been made from a syntactic perspective assuming that there is not a category for contrast ([2], [4], among others). However, this categorization does not account for the fact that in Catalan Sign Language (LSC) focus and topic display the same marking in order to express contrast. In LSC both sides of the signing space are used in discourse to localize two entities, which are under a contrastive relation [1]. The same markers are described for coordination and gapping in LSC in both contrastive focus and contrastive topics [7]. Thus, it is relevant to approach contrast from a different perspective, a more general one incorporating related facts which have been analysed separately until now.

Goals. On the one hand, we describe the non-manual markers (NMMs) used in the expression of contrast in LSC. On the other hand, given that in LSC contrast markers may also be found in topics, we analyse the notion of contrast as a different dimension, which can also overlap with topics, and we offer an analysis of the expression of contrast in LSC from a unifying semantic-pragmatic perspective following [6]. Moreover, we identify three different subtypes of contrast expressed through different combinations of markers based on [5].

Methods. The data for this research have been collected from two deaf native signers of LSC through a combination of different elicitation tasks: question-answer pairs, dialogues, translations, and felicity judgments. Moreover, the LSC corpus from the *Institut d'Estudis Catalans* has been consulted in order to contrast the elicited data with natural discourse data.

Data. Contrast in LSC is mainly expressed through a combination of prosodic NMMs: left and right body leans (bl), and head tilts (ht), and morphophonological marking: the use of the opposite sides of the signing space (see [2] for similar findings in Sign Language of the Nertherlands (NGT)). These markers are always present when there are salient contextually contrasted alternatives and can spread across different types of constituents. In (1) the focused signs INTERPRETER and LINGUIST are contrasted and marked with left and right body leans, and also through the use of the opposite sides of the signing space.

(1) ________left_bl ____right_bl

RAQUEL PERSON [[INTERPRETER]$_F$]$_x$ ALSO [[LINGUIST]$_F$]$_y$.

'Raquel is an interpreter and a linguist.'

Example (2) shows an instance of double contrast. GIORGIA is contrasted with RAQUEL, and LINGUIST is contrasted with INTERPRETER. The same NMMs for the expression of contrast (body leans, head tilts and the use of space) spread over both topics and focus.

(2) ______________left_bl ________________right_bl
[[GIORGIA]$_T$ [LINGUIST]$_F$]$_x$ [[RAQUEL]$_T$ [INTERPRETER]$_F$]$_y$.
'Giorgia is a linguist and Raquel is an interpreter.'

Moreover, there is a lexical marker for contrast, the sign LIST, that is used when more than two alternatives are explicitly contrasted. This sign is optional, and can either substitute the NMMs used for contrast (3) or combine with them.

(3) 'What did you buy at the supermarket?'
LIST-1 POTATOES, LIST-2 EGGPLANT, LIST-3 TOMATOES, LIST-4 FISH, LIST-5 MEAT, ETC.
'Potatoes, eggplant, tomatoes, fish, meat, and other things.'

If the context requires selecting one alternative and excluding the other, a repeated head nod (hn) is commonly added, which is directed towards the selected alternative (4).

(4) What is the woman doing: riding a bike or riding a horse?
right bl+ht+hn
[BIKE RIDE]$_x$
'Riding a bike.'

In order to express a correction, body leans and head tilts are again displayed, but, in addition, a strong head thrust (hthr) is found in the correction (5). Moreover, when the correction is expressed with a fragment, the same markers of contrast appear spread over the fragment (6).

________hthr
________________left_bl+ht ______right_bl+ht
(5) [MARY PIZZA-EAT NOTHING]$_x$, [OTHER BURGER]$_y$.
Mary didn't eat a pizza, but a burger.'

(6) A: The sea is yellow.
____hthr __hthr
________right_bl+ht
B: NO, [SEA SPECIFIC BLUE]$_y$.
'No, the sea is BLUE.'

Similar to what happens in NGT [2], in LSC forward-backward body leans can be found in combination to left-right body leans, especially in corrections. In these cases, the contrast between the correction and the corrected element is expressed with a forward-backward body lean and, if the correction includes more than one element, a left-right body lean expresses the contrast between the elements within that conjunct.

Analysis. Based on the data presented, I suggest that in LSC different types of contrast can be distinguished: i) *parallel contrast* (1, 2, 3) introduces symmetric alternatives; it is expressed through left and right body leans and head tilts, and the use of signing space, and it can overlap with both focus and topics; ii) *selective contrast*

(4) provides an alternative previously selected from two or more overt alternatives; it is expressed through the same markers plus a head nod addressed towards the side where the selected contrasted alternative is placed, and iii) *corrective contrast* (5,6) provides an alternative that is true and substitutes a previous overt alternative, which is considered false; it is expressed again with the same markers plus a strong head thrust emphasizing the correction. This additional marking in ii) and iii) results in a more emphatic prosody, which indicates a more marked contrastive context. Following [5] I argue that in i) there is contrast due to similarity (common integrator) plus dissimilarity (semantic independence); in ii) there is contrast due to similarity plus dissimilarity, plus contrast due to exclusion; in iii) I suggest that there is similarity plus dissimilarity, contrast due to exclusion, and, additionally, a conflict with the expectations of the interlocutor [3]. The classification proposed here is also compatible with [5], who distinguishes between contrast and correction based on the different presuppositions they trigger. In LSC, i), ii), and iii) are expressed through the same NMMs, and the additional marking in ii) and iii) is increasing the intensity in the articulation of the contrasted elements. So, our analysis suggests that there is an independent notion of contrast, and the different subtypes identified before correlate with different interpretations in terms of exhaustivity, related with the selection of an alternative, and expectations, related to the correction of an alternative.

Conclusion. The results obtained from this research fill a gap in the LSC literature by describing contrast encoding in LSC, and, more broadly, they contribute to a better understanding of IS notions in languages in general, regardless of their modality. The fact that in LSC the marking of contrast is the same for both focus and topics can be seen as empirical evidence to support the proposed semantic-pragmatic analysis of contrast.

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The "Flat Chin" marker in ASL

Lauren Nikolai & Ronnie Wilbur

Friday, 2.48

In American Sign Language (ASL) little is known about the linguistic function of the non-manual marker (NMM) "flat chin," also known as Action Unit 17 (AU-17) (Ekman and Friesen, 1978). (See Figures 1 & 2 below.) Previous research suggests that AU-17 correlates cross-culturally with expressing disgust and anger (Ekman, Sorenson, & Friesen, 1969) and, in ASL, with negation (Benitez-Quiroz, Wilbur, & Martínez, 2016). Bross and Hole (2017) predict that "the wider/higher the scope of a clausal operator [is], the more likely its expression will occur with a high body part by way of layering" in sign language: e.g., such functions as scalarity and evaluation should be shown on the lower face (i.e., nose, mouth, chin). Given this, we hypothesize that AU-17 has wider linguistic functions in ASL than previously noted.

Figures 1 & 2: AU-17 with two different lip shapes as produced by native signers of ASL.

Our data comes from both corpus and elicited sources. A small percent of usage is lexical and won't be discussed further. Of more interest, we observe AU-17 functioning as a marker of speaker evaluation and scalarity. It may also function as a negative polarity item (NPI). For speaker evaluation, AU-17 occurs where the signer evaluates a proposition as good or bad (see Sentence 1 below). For scalarity, AU-17 occurs where the signer evaluates something as being much or little (Sentence 2). When AU-17 behaves as an NPI, it appears to have a meaning connected to scalarity (Sentence 3). Interaction with other lower face NMM, particularly the lips, will be discussed when differentiating between the various functions.

AU-17
(1) IX-3 WRITE THREE BOOK WOW GOOD
He has written three books, and that's really impressive!

AU-17 AU-17
(2) IX-3 LION IX-3 WOAH HEAVY WEIGH MORE-THAN TWO-HUNDRED
Wow, Lions weigh even more than 200 pounds.

AU-17
(3) IX-3 HEY SEE IX-3 CL:F "spots" SEE NONE
He doesn't see any spots there.

These functions account for the majority of AU-17's appearances in our data, indicating that it does indeed have wider linguistic functions than previously noted. Moreover, our findings correlate with Bross and Hole (2017)'s predictions about the functionality of the lower face. Ultimately, our analysis of AU-17 will feed the development of automatic non-manual detection algorithms, improve education of both native and non-native ASL signers, and fill in a gap in our overall linguistic knowledge.

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IX signs in Turkish Sign Language relative clauses: A (re)analysis of variation

Derya Nuhbalaoglu & Okan Kubus

Friday, 2.49

Pointing (IX) signs have a multitude of functions in sign languages (e.g. pronominal, determiner, adverbial), which can be identified looking at the formal as well as distributional properties of these signs (Pfau 2011). For Turkish Sign Language (TİD), Kubus (2016) has observed varying frequency of pointing signs within Relative Clauses (RC) in relation to their distribution. Accordingly, pointing signs can occur within the RC, mainly at the beginning (clause-internal IX: 37,68%) or else between the RC and the matrix clause (clause-final IX: 71,01%). In a follow up study, the primarily discourse function of these IX signs has been suggested to track and disambiguate the head nouns of the RCs in larger contexts (Kubus & Nuhbalaoglu, 2018). In the present study, we take a closer look at the distribution of IX signs within RCs embedded in natural discourse and (counter to Kubus 2016) we suggest that their distribution and optionality can best be explained by their varying behavior of indicating topics.

We (re)analyzed 112 RCs which contain a total of 97 IX signs, in a small-scale corpus collected by Kubus (2016), by looking at: (i) referential context of occurrence (i.e. introduction, maintenance, reintroduction), (ii) position with respect to the head noun, (iii) distribution and scope of the non-manual markers, and (iv) (relative) duration of IX. Our observations showed that clause internally in the pre-nominal position (36/97 (37,11%)), IX signs mainly appear in the maintenance contexts, typically get the scope of the neighboring non-manuals, are produced without accompanying mouthing, and are short in duration (example 1). On the other hand, IX signs occurring at the clause boundary (i.e. clause final position) (32/97 (32,99%)), appear in the introduction and re-introduction contexts, are always marked with an eyebrow raise, are either followed or preceded by a pause, are accompanied with /o/ mouthing (3rd person singular pronoun in spoken Turkish), and are signed with a longer duration compared to the pre-nominal IX signs (example 2). In addition, 29/97 (29,90 %) of IX occurrences in the data were observed to serve various grammatical functions at the clausal level (e.g. locative, demonstrative, pronominal), also previously documented by Nuhbalaoglu & Özsoy (2014) for nominal phases in TİD.

Our findings suggest two discourse-pragmatic functions of IX signs in TİD RCs. That is, clause-internal and pre-nominal IX signs, appear to indicate the topicality of the head nouns in the current context of utterance. On the other hand, clause-final IX signs seem to signal the head nouns which are to be the topics of the following contexts. Therefore, we claim that pre-nominal IX signs act like backward looking centers while clause-final ones, appear to be forward-looking centers (Grosz, Weinstein, & Joshi, 1995). In fact, the prominence increasing role (i.e. indicating discourse topicality for the future contexts) for IX has already been proposed for signed discourse, but only for those IX signs which immediately accompany their referents (Barberà, 2012; Steinbach & Onea, 2016; Wienholz et al. 2018). To recap, we suggest that the distribution of IX signs within RCs can best be explained by categorizing these signs according to their proximity vs. distance with respect to the head noun. In addition, we claim that their optional appearance in RCs might be due to the differing discourse functions of IX signs (i.e. marking forthcoming vs. current topics).

(1) **Pre-nominal IX**

____________________hs
____________________sq
[**IX**$_i$ GRANDMOTHER$_i$ EAT] IN CUT-OFF
'They cut open (the wolf), who had eaten grandma.'

(Kubus 2016, p.258)

(2) **Clause final IX**

'o'
hf
__________________________________sq br
[MOVIE$_i$ SAME S-E-R-I-E-S MUSLIM SAME **IX**$_i$] IX$_1$ $_1$SEE$_i$ WATCH SAD
'I watched the film that is a religious series. I got upset.'

(Kubus 2016, p. 324)

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Deaf parenting in rural and urban communities in Ghana: A case study of Adamorobe community and Koforidua

Marco Stanley Nyarko

Friday, 2.50

In many communities, families with deaf parents and hearing children are often bilingual and bimodal, that is both spoken and signed language are used by the family members (Pizer, Walters & Meier, 2012). Guided by the questions as to what mode of communication children of deaf adults are exposed to in their early years, I investigated 6 children of deaf adults in two separate locations (Adamorobe and Koforidua)

Adamorobe is a village in Ghana with a high incidence of heredity deafness (Nyst, 2007) and therefore Adamorobe Sign Language (AdaSL) is used by the deaf and hearing population. Kusters (2014) maintained that AdaSL is a shared sign language with its form, function and status related to spoken Akan, the language spoken in Adamorobe. Deaf parents in Koforidua, the capital of the Eastern Region of Ghana with a population of 122,300 according to 2010 population and housing census use Ghanaian Sign Language. This is the national sign language that is also used in education. Both languages have their own grammatical rules, forms and function (Kusters, 2014).

In my study I videotaped 6 children aged between 9 months to 2:3 years as they engaged in communication and played with their mothers and siblings between April 2017 and August 2018. Over 10 hours data was recorded. Four children from Adamorobe and two children from Koforidua. Interestingly, one of the children of deaf adult from Koforidua is also deaf hence Ghanaian Sign Language is exclusively used. The children and their mothers and siblings were videotaped 30 minutes every 6 weeks to gather data for the studies. Using a time sampling technique, videotapes were coded to determine the frequency with which mothers used specific related attention strategies in communication with their children.

My analysis reveals that all the children in the study are exposed to bilingual skills which suggest that children of deaf adults in Ghana grow up in highly multilingual bimodal settings. Interestingly, the children in Adamorobe are exposed to lexical signs from two different sign languages (AdaSL and GSL). In Koforidua, children are also exposed to two different types of manual communication, i.e. Ghanaian Sign Language and gesture/home sign. In my paper, I will discuss the different types of multilingualism attested in the data and which factors seem to affect the linguistic landscape these children grow up in.

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A cross-linguistic comparison of representation techniques in the signing of deaf children and adults in Côte d'Ivoire, Ethiopia, Ghana, Guinea Bissau, Kenya, Mali, and the Netherlands

Victoria Nyst, Kidane Admasu, Timothy Mac Hadjah, Moustapha Magassouba, Mariana Martins, Marta Morgado, Evans Namasaka, Marco Nyarko & Dieydi Sylla

Friday, 2.51

This study looks at the distribution of representational strategies in objects in nine different sign languages (SLs), i.e. Adamorobe SL, Bouakako SL, Ethiopian SL, Ghanaian SL, Guinea Bissau SL, Ivorian SL, Kenyan SL, and Malian SL, as well as for Sign Language of the Netherlands. It is a sub-study in a larger, 2 year project, documenting sign language socialization in Deaf families in Africa. The project has led to an longitudinal, annotated video corpus of interactions in 25 families. This corpus involves interactions in seven different sign languages, including two village sign languages.

Recent research on iconicity in sign languages has found various patterns in the selection of iconic strategies in lexical signs. One such pattern concerns the representation of hand-held tools, which are regularly represented by the hand virtually handling the tool (handling handshape) or by the hand embodying the tool (entity handshape). Significant cross-linguistic variation is found in the preference for one or the other strategy (Padden et al. 2014). Also, non-signing speakers of different spoken languages seem to differ in preference when inventing signs. Using slightly different categories, Ortega et al. 2016 find a difference between deaf children and deaf adults, with deaf children preferring action depiction of objects over the depiction of their size and shape.

In West African languages, another alternating pair of representational strategies is observed in signing or gesturing, i.e. of body based vs space based depiction (Nyst 2007, Nyst 2016). A study of lexical signs in four West African sign languages finds a similar avoidance of space based depiction, and a seemingly related dispreference for space-based depiction (Nyst, in press).

The current study aims to identify whether deaf children, deaf adults, and hearing (non-signing) adults differ from each other in their selection of representation technique. To this end, we collected and compared responses to a picture task containing pictures of 14 objects. Data were collected for the three groups for each of the nine sign languages mentioned above.

1 deaf children 6-10 (n=15)

2 deaf adults (n=15)

3 hearing, non-signing adults (n=15)

In our presentation, we will present the results of this comparison, asserting to what extent the three types of data differ from each other across the sign languages considered. Also, we will discuss to what extent the preference for embodied depiction found in West African sign languages can be observed in comparison to the data from Sign Language of the Netherlands.

Finally, we will discuss some of the factors that complicate the study of preferences for representational techniques, such as the interaction of age and intra-linguistic variation, and the definition of non-signers.

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The contribution of lexical overlap to perceived iconicity in foreign signs

Rehana Omardeen

Friday, 2.52

Communicating across a language barrier is no easy task. Interestingly however, this linguistic challenge may yield more success in the signed modality than the spoken one. In fact, recent research has begun to examine “cross-signing”, the communication between deaf signers with no shared language (Zeshan, 2015). In such situations, one key to success may lie with iconicity; the fact that sign languages capitalise on the visual modality to exploit not only arbitrary but also non-arbitrary linguistic encoding. While iconicity has traditionally been defined as an objective resemblance between form and meaning, recent studies suggest that what is iconic to one person may not be iconic to another. For example, Occhino et al. (2017) found that deaf signers from both Germany and the US displayed a native language bias in iconicity judgements; each group found their native signs to be more iconic than foreign sign translation equivalents. These results highlight the subjective contribution of language experience to perceived iconicity. When faced with a foreign sign, alongside any objective analysis of iconic form-meaning resemblance, repeated experience mapping their own native forms to the same meaning may influence a signer’s perception of iconicity.

How specifically this language experience might affect perceived iconicity is an open question. One avenue may be lexical knowledge. In fact, in sign languages, iconicity and phonology are intimately intertwined and both analysable at the sub-lexical level. To illustrate this, we examine the sign CAT in the sign languages of the Netherlands (Nederlandse Gebarentaal; NGT) and China (Chinese Sign Language; CSL), both of which iconically depict a cat’s whiskers. Iconicity is embedded in the form of these signs; the location of the cheek places the whiskers on a cat’s face. Subtle differences in the phonological realisation of iconic mappings result in different signs across languages; while NGT CAT pinches thumb and forefinger to trace whiskers (Figure 1a), CSL CAT rotates this handshape and traces whiskers with three fingers pulled across the cheek (Figure 1b). The selected fingers are thus completely different, despite similarity in handshapes. By using phonological criteria to compare the two signs, we can produce a discrete measure of form-based overlap. These scores can help us unpack how overlapping form-meaning mappings across sign languages may contribute to cross-language iconicity judgements. The present study first examines the native-language iconicity bias in two distinct sign languages, NGT and CSL, then using a phonology-based measure of lexical distance to examine if the overlap between native and foreign signs contributes to iconicity judgements.

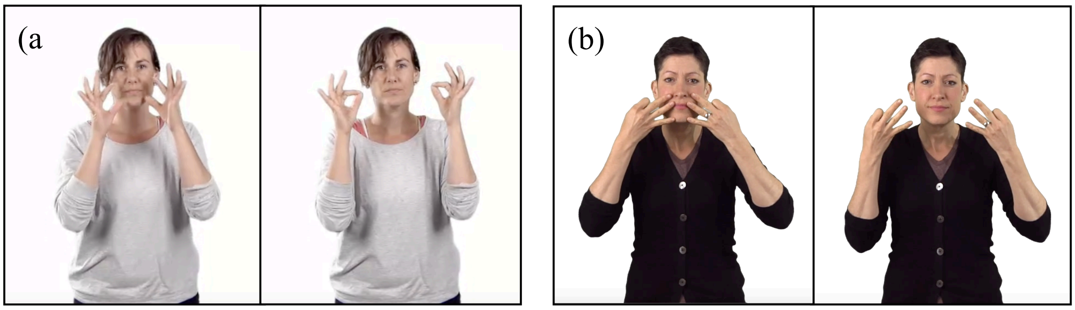

Figure 1. The sign CAT in (a) NGT and (b) CSL

In Part I, I examined a subset of signs from NGT and CSL and quantified overlap between translation equivalents using an algorithm based on Levenshtein's distance, a measure commonly used to determine lexical distance in spoken languages. Using the lexical database Global Signbank (Crasborn et al., 2018), I retrieved signs from NGT and CSL that corresponded to core concepts from a sign language Swadesh list (Woll et al., 2010). Signs were then coded for 20 phonological features, using the detailed coding scheme of the database that encompasses fine grained formational units such as finger selection, relative orientation and movement repetition. I then performed a pairwise comparison across translation equivalents for each of the 20 phonological features, to create a discrete overlap score for each pair. Part II of this study then used this overlap measure to predict how signers judged iconicity in foreign signs. I presented 11 signers of NGT with 45 pairs of signs from NGT and CSL, and asked them to rate both native signs and their foreign translation equivalents for iconicity. I predicted that foreign signs with a higher overlap score would be perceived as more iconic than foreign signs with a lower overlap score. In addition, following Occhino et al. (2017), I expected native signs to be rated as more iconic than foreign translation equivalents.

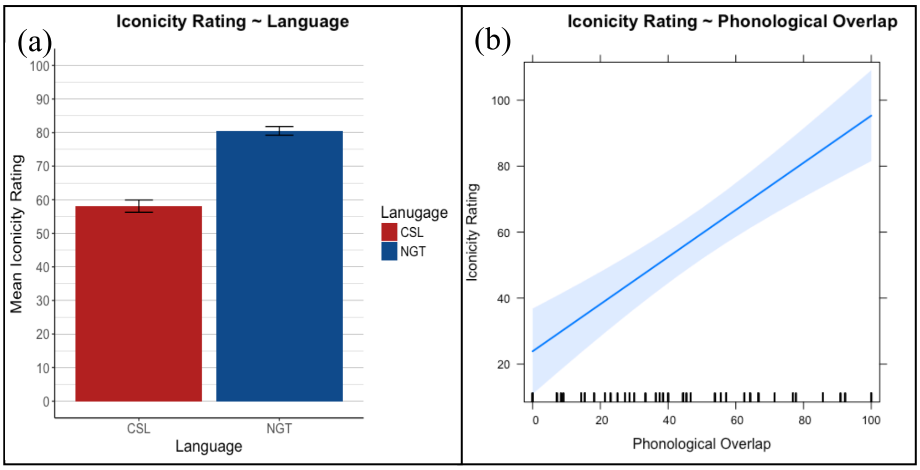

Figure 2. (a) Average Iconicity rating by Language (b) Effect of Phonological Overlap on Iconicity Ratings

Results demonstrated two major findings. First, participants overall judged signs from a foreign language to be less iconic (m = 57.931, SE = 1.666) than signs from their native language (m = 78.341, *SE* = 1.260; *t* (10) = -4.868, $p < 0.001$), replicating Occhino et al.'s findings for another language pair (Figure 2a). This result was confirmed by mixed model analysis, which included Item and Participant as random effects, and Language as a fixed effect. Results showed that native signs were more likely to be judged as more iconic than foreign signs ($\beta = 20.410$, *SE* = 5.255, *t* (88.0) = 3.884, $p < 0.001$); suggesting a native-language bias in perceiving iconicity. Secondly, I examined the subset of foreign signs and tested the effect of Phonological Overlap on Iconicity Rating, also using mixed models with random effects of Item and Participant. Here, I found foreign signs that shared high phonological overlap with native signs were more likely to be rated as highly iconic than those that shared low overlap ($\beta = 0.7143$, *SE* = 0.1111, *t* (43.00) = 6.431, $p < 0.001$) (Figure 2b).

These results reinforce the idea that iconicity is not necessarily inherent to the sign, but instead constructed by the observer, and in this sense subject to the influence of linguistic experience. An examination of individual items revealed that some signs were considered inherently more iconic than others, however group level analysis shows that despite this, linguistic experience shapes perceptions of iconicity. Indeed, by using the phonological overlap score it was possible to quantify a measure of this language experience and use it to predict iconicity rating. While this is a preliminary measure, this study provides an interesting starting point for questions of cross-language communication in the signed modality. Given that perceiving a foreign sign as iconic may help it be understood, a more refined measure of this lexical overlap may prove a useful tool in diagnosing cross-language intelligibility across sign languages.

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LOOK-AT that! An attitude predicate in German Sign Language (DGS)

Marloes Oomen

Friday, 2.53

Introduction. In German Sign Language (DGS), a sign glossed as LOOK-AT consistently appears in constructions involving role shift. I offer a description of the articulatory and morphosyntactic properties of LOOK-AT to pinpoint its linguistic function.

Data. A detailed analysis was conducted of 30 constructions with LOOK-AT identified from a subset of 51 dialogues from the DGS Corpus (Blanck et al. 2010; data accessible via http://ling.meine-dgs.de). Each clause with LOOK-AT plus the directly preceding and succeeding clauses were annotated in a data document. Annotations indicating the articulatory properties of LOOK-AT as well as scope of role shift were also created.

Articulatory properties. LOOK-AT (Figure 1a) is articulated with the handshape T or Y, which iconically represent eyes. The orientation of the sign can be modified, although the fingers are never directed toward the signer. The back of the hand, in contrast, is always oriented toward the signer. LOOK-AT can be articulated in front of the eyes, although it is frequently articulated lower in the signing space (see Figure 1a). The predicate does not appear to have a specified movement, but depending on the phonological specifications of the preceding sign, there can be a transitional movement, which is realized as a sideward movement.

LOOK-AT differs subtly but crucially from a similar sign which I gloss here as LOOK-AT:mv ('main verb'). The latter, illustrated in Figure 1b, involves a path movement that can be modified to express agreement with both a subject and an object (including non-first person subjects and first-person objects). LOOK-AT:mv tends to be articulated in front of the signer's eyes, or otherwise at a relatively high location in the signing space.

Figure 1 | a. An instance of the form LOOK-AT. **b.** An instance of the form LOOK-AT:mv.

Morphosyntactic properties. Analysis of the 30 constructions reveals that – unlike LOOK-AT:mv – LOOK-AT has hallmarks of bearing a grammatical function. Examples (1) to (3) illustrate the properties I describe below.

rs

(1) WOMAN LET-KNOW1 SWIM / INDEX1 LOOK-AT3 / HEAD-NOD
‘My wife tells me I should swim and I’m like, yeah…’ [goe01-B-05:51.05][1]

rs

(2) CL:board3 MISS THIS-AND-THAT / MOTHER LOOK-AT3 / VERY GOOSEBUMPS VERY
‘There were boards with missing people. It gave my mother goosebumps.’
[koe09-B-00:39.90]

rs

(3) NOW MODIFY ALSO MORE-AND-MORE / INDEX1 LOOK-AT3 / ALSO NOT BAD
‘There’s a trend toward more unusual clothes, which I rather like.’
[koe03-A-09:13.65]

First, LOOK-AT is consistently followed by a clause under role shift (see Herrmann & Steinbach 2012 for an overview of such markers in DGS). In fact, the sign itself is also marked by non-manual role-shift markers, which might explain why it is consistently articulated with the back of the hand toward the signer as if expressing first-person agreement – even when the subject is not first person (2). Second, although the orientation of the fingers may be modified to express apparent object agreement, an object never occurs within the same clause and in some cases the locus the verb ‘agrees’ with is not associated with a particular referent but rather appears to represent a more abstract situation (3). Third, LOOK-AT appears to have gained a broader, less literal, meaning: it introduces a referent’s affective response, usually internal, toward a situation previously introduced in the discourse. In (3), for instance, there does not appear to be any looking involved in the literal sense.

Structures with LOOK-AT can be schematized as in (4). The subject is optional.

( ) rs

(4) [STIMULUS] / SUBJ LOOK-AT$_{stimulus}$ / [(INTERNAL) REACTION]

LOOK-AT in ASL. Winston (2013) and Healy (2015), who both investigate constructions with psych-verbs, describe a sign in American Sign Language (ASL) that has many overlapping properties with DGS LOOK-AT. Winston (2013) observes that LOOK-AT connects a clause stating the cause of a psychological state to a clause indicating the relevant referent’s response, and analyzes the sign as a light verb. Much like in DGS, Winston notes that role shift accompanies both LOOK-AT and the following clause. However, she also notes that LOOK-AT is a fully directional verb, while in the DGS data only (non-first person) object marking is observed. Healy (2015), who refers to LOOK-AT as a ‘Prospective Attending Sign’, argues that the sign anticipates an experiencer’s internal response, again similar to what I propose for DGS. Thus, with the exception of the difference in directionality (although Healy does not explicitly report non-first person subject agreement), LOOK-AT in ASL and DGS behave in the same way.

[1] Code between brackets indicates DGS Corpus video file, signer (A/B), and time stamp. In glossed examples, ‘/’ indicates a prosodically marked clause boundary. ‘rs’ indicates role shift.

An attitude predicate. The findings reported above are consistent with an analysis of LOOK-AT as an attitude predicate that introduces role shift (see e,g, Lillo-Martin 1995; Schlenker 2003, among others). Now, it is evident from the data is that LOOK-AT itself is also marked by role shift, while an attitude predicate such as SAY – often mentioned in examples – is not. Here, I follow Koulidobrova and Davidson (forthcoming) in distinguishing between *proffering* predicates such as SAY (i.e. verbs of assertion) and *doxastic* predicates such as THINK (i.e. verbs of belief). In doxastic constructions, the entire proposition including the predicate is offered up for discussion (i.e. 'Mom thinks she's busy' – 'Does mom think she's busy?'), as opposed to proffering constructions, where only the truth of the proposition in the complement is evaluated with respect to the common ground ('Mom says she's busy' – 'Is she busy?'). Koulidobrova and Davidson show that, in ASL, this distinction is reflected in the scope of role shift: while proffering predicates fall outside the scope of role shift (5a), doxastic predicates are included in it (5b). In other words, the difference between the two types of attitude predicates is claimed to be pragma-semantic in nature.

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              (??  )__________rs                          *(     )__________rs
(5) a.  MOM SAY INDEX1 BUSY                b.     MOM THINK INDEX1 BUSY
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[ASL; Koulidobrova & Davidson in press]

The spreading behavior of role shift in constructions with LOOK-AT mirrors that of constructions with doxastic predicates in ASL. In addition, given that what follows LOOK-AT usually represents an affective internal response, LOOK-AT is semantically more similar to other doxastic predicates such as think or believe than proffering predicates such as say or claim.

Thus, based on its articulatory and morphosyntactic properties, I claim that LOOK-AT in DGS functions as an attitude predicate of the doxastic type. I tentatively suggest that the ASL counterpart can be analyzed in the same way.

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On the nature of Neg-raising in Sign Language of the Netherlands

Marloes Oomen, Roland Pfau & Ulrika Klomp

Friday, 12:00-12:30

BACKGROUND. The phenomenon of Neg-raising (NR), in which negation in a matrix clause appears to be interpreted in an embedded clause (1a), has intrigued linguists for many years. Across languages, NR is only observed with certain predicates (e.g. English *think*, *believe*, *expect*), and consequently, a NR reading is not available in (1b).

(1) a. I don't think that Vadim will come to the party.
  ≈ I think that Vadim will not come to the party.
 b. I don't claim that Vadim will come to the party.
  ≠ I claim that Vadim will not come to the party.

NR is a fairly well-described phenomenon in spoken languages (e.g. Horn 1989; Zeijlstra 2017), but has to date received only little attention in the sign language (SL) literature. Zeshan (2004) mentions NR, but does not describe it in her typological study; Johnston (2018) and Göksel & Kelepir (2016) only briefly discuss NR in Turkish SL and Australian SL, respectively.

We present the first detailed discussion of NR in a SL, viz. SL of the Netherlands (NGT). Based on grammaticality judgments and corpus data, we describe the properties of NR constructions in NGT – focusing in particular on the scope of non-manual marking (headshake) – and we show how the NGT data can be accounted for within an approach that posits syntactic movement of the negation from the embedded clause into the matrix clause.

METHODOLOGY. First, grammaticality judgments of NGT sentences with and without NR predicates were provided by two native signers of NGT. As representatives of NR and non-NR predicates, we used THINK and SAY. Importantly, manually identical sentences were presented with headshake (hs) of varying scope. The informants also discussed the examples with each other and in all cases agreed on (un)grammaticality. Second, we checked the patterns we obtained against naturalistic data from the Corpus NGT (Crasborn et al. 2008) by searching the corpus for typical NR predicates occurring with an embedded clause and negation.

RESULTS. In NGT, use of the basic manual negator NOT in standard negation is optional, while use of hs is obligatory (Coerts 1992; Oomen & Pfau 2017). For examples with the NR-predicate THINK, our informants indicate that presence of NOT in either the matrix or the embedded clause is possible, and yields approximately the same sentence meaning. Headshake occurs in the same clause as NOT, and spreads over the embedded clause in case NOT is in the matrix clause. Having NOT in the embedded clause but hs (also) over the matrix clause, on the other hand, is judged to be marginally acceptable. Given that our main concern will be the scope of the hs, we will neglect cases with NOT for the time being. For hs, there are two options: either it accompanies only (the verb in the) embedded clause (2a), or it scopes over both the verb (and optionally the subject) in the matrix clause *and* the entire embedded clause (2b). Sentences in which hs occurs in just the matrix clause are judged ungrammatical (2c).

(2) a. (_____) ___hs
INDEX$_1$ THINK VADIM COME
'I think Vadim is not coming.'

b. ________________hs
INDEX$_1$ THINK VADIM COME
'I don't think Vadim is coming'
≈ 'I think Vadim is not coming.'

c. ___hs
* INDEX$_1$ THINK VADIM COME

(3) a. (_____) ___hs
INDEX$_1$ SAY VADIM COME
'I said Vadim wasn't coming.'

b. ______________hs
INDEX$_1$ SAY VADIM COME
\# 'I didn't say Vadim was coming.'
'I didn't say Vadim was **not** coming.'

c. _hs
INDEX$_1$ SAY VADIM COME
'I didn't say Vadim was coming.'

As shown in (3), the pattern is crucially different in clauses with the non-NR predicate SAY. Hs on the embedded clause is interpreted as negation of the embedded clause, i.e. (3a) patterns with (2a). However, when hs scopes over both the matrix and the embedded clause, both informants agree that the sentence can only be interpreted as involving double negation (3b), i.e. no NR reading is obtained. In contrast to (2c), hs on only the matrix clause/verb is grammatical, but then only the matrix clause is negated (3c).

The examples extracted from the Corpus NGT, both with NR and non-NR predicates, provide overall support for these patterns. Two examples are provided in (4). In (4a), the NR predicate BELIEVE is accompanied by hs, which – in accord with (2b) – extends over its complement made up of the verb UNDERSTAND, a non-NR predicate. In correspondence with (3c), hs then does not spread further. Example (4b) provides a particularly interesting example with a non-NR predicate: hs does not extend over the embedded clause, but appears again on the sentence-final matrix clause double.

(4) a. ___________________hs
INDEX$_1$ BELIEVE [UNDERSTAND [INDEX$_{1PL}$ SAY]]
'I don't believe (he) understands what we are saying.'

b. ____hs _____________hs
SELF KNOW [CHILD COME DEAF HEARING] KNOW SELF INDEX$_1$
'I don't know whether the child who's coming is deaf or hearing, that I don't know.'

ANALYSIS. NR has been explained both in terms of movement (Horn 1971; Collins & Postal 2014) and in pragma-semantic terms (Horn 1989; Zeijlstra 2017). We discuss here how the NGT data fit within a syntactic approach (yet do not exclude the possibility that the same facts can be explained from a pragma-semantic standpoint). The syntactic account posits syntactic movement of the negation from the embedded into the matrix clause, i.e. (2b) would receive the representation in (5). We assume here that negation, realized as NOT+hs or hs only, follows the verb, although Oomen & Pfau (2017) show that NOT can also precede the VP in NGT.

(5) INDEX$_1$ THINK [+Neg] [VADIM COME $t_{[+Neg]}$]
‘I don’t think Vadim is coming’ ≈ ‘I think Vadim is not coming.’

We posit that the obligatory spreading of hs witnessed in clauses with NR predicates overtly signals that a movement operation has taken place. The three steps involved in NR constructions with hs only are sketched in (6). Negation originates in the embedded clause (6a). In the absence of NR, the hs (which spells out [+Neg]) would associate minimally with the embedded verb (Oomen & Pfau 2017; cf. (2a)). In the presence of a NR predicate, [+Neg] optionally moves into the matrix clause, leaving behind a trace, and hs now attaches to the matrix verb (6b). However, in order for negation to be interpreted in the embedded clause (i.e. in the position of $t_{[+Neg]}$), NGT employs a modality-specific strategy: spreading of hs over the embedded clause (6c). This establishes an overt relation between the surface position of Neg and its trace, yielding the pattern previously illustrated in (2b). Crucially, this strategy is not available with non-NR predicates (3c), as there is no $t_{[+Neg]}$ in the embedded clause.

(6) a. INDEX$_1$ THINK [VADIM COME [+Neg]]
　　　　　　　　　______________hs
b. INDEX$_1$ THINK [+Neg] [VADIM COME $t_{[+Neg]}$]
　　　　　　　　　_____________________________________hs
c. INDEX$_1$ THINK [+Neg] [VADIM COME $t_{[+Neg]}$]

We conclude that the NGT data provide a type of evidence for a syntactic account of NR that is not available in spoken languages: non-manual marking of a relation between a moved functional element and its trace (cf. Cecchetto et al. (2009) for another instance of non-manual marking of a syntactic dependency).

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A morphological analysis of number signs in TİD

Aslı Özkul & Serpil Karabüklü

Friday, 2.54

In previous studies, numbers in TİD have been analyzed at different levels such as phonological (fusion - Kubus, 2008), morphological (affixation and compounding - Dikyuva et al., 2017) and syntactic (incorporation - Zeshan, 2002). In this study, we merely investigate the morphological characteristics of cardinal numbers in TİD. Basing our analysis on well-known definitions of morphological categories (Bauer, 2001; Haspelmath, 2002; Booij, 2005; Meir et al., 2010; Meir 2012), we observe that the distinction between an affix, a blend and a compound should be based on the (non)systematicity and (non)productivity in creating new forms with designated meanings. Note that we distinguish morphological categories and processes (e.g. base, concatenation) from syntactic (e.g. fusion, head, incorporation) and phonological ones (e.g. phone, fusion).

The aims of this study are twofold: (i) to give a full morpho-phonological description of the numeral system of Turkish Sign Language (TİD) (cf. Zeshan, 2002; Kubuş, 2008; Dikyuva et al., 2017), and (ii) to use this as a step to evaluate morphological criteria for understanding the status of morphological units in the context of numeral signs in TİD. We show that numbers (digits) from 0 to 9 are morphologically simplex while numbers above 9 are complex. We propose that all these complex numbers are either sequential or simultaneous compounds. More crucially, we suggest that blending (as described for spoken languages, cf. Bat-el, 2006; Bauer, 2012 i.a.) is not a prevalent category in the derivation of numerals (cf. Taşçı & Göksel, 2014).

We analyzed the citation forms of numbers in TİD. The data cover cardinal numbers, all of which are one-handed (as in LSC, ASL (Stamp et al., 2015)). The cardinal numbers 1-5 are monomorphemic signs expressed by the digits of the hand and are iconic (TWO, Figure 1); 0 and 6-9 are also monomorphemic and iconic based on graphic similarity (NINE, Figure 2). Below, we present our evidence that are in favor of compounding observed in TİD numbers.

1) To derive the numbers except for the multiples, the digits in a number are represented by the handshape, i.e., the handshape of the number 12 starts with the handshape of 1 and ends with the handshape of 2 (TWELVE, Figure 1). 1 loses the movement of tens when compounded with 2. Based on that, we propose that the morphological process is sequential compounding since the result is a new meaning ‘twelve’, rather than two independent digits ‘one’ and ‘two’.

2) Duplet numbers, in specific, have orientation change in addition to the movement loss defined in the previous paragraph (TWENTY-TWO, Figure 1). All the digits have horizontal orientations (TWO, Figure 1), but their orientation becomes vertical in the numbers 22, 33, and 44 (TWENTY-TWO, Figure 1).

3) Numbers 1-5 show different patterns from 6-9 in the multiples of tens, hundreds and thousands. Tens of the former group are derived by an additional movement appearing with the digit (TWENTY, Figure 1) whereas tens of the latter group are derived by sequencing digits of the number as 6-0 or 9-0 (NINETY, Figure 2). Proposing that the movement in 10-50 carries an abstract meaning of tens, we analyze the first morphological process as a simultaneous compounding while the second one as sequential compounding.

4) For the multiples of hundreds, there are two patterns: either they (i) all have simultaneous compounding or (ii) 1-5 are simultaneous while 6-9 are sequential (c.f. Dikyuva et al., 2017). For the first pattern, the place of articulation is the difference between 1-5 (in front of the face, THREE^HUNDRED, Figure 3) and 6-9 (in the ipsilateral side, SIX^HUNDRED, Figure 3). For the second pattern, 1-5 is the same with the first pattern while 6-9 is signed as 6 and HUNDRED as sequential compounds. The second pattern is also observed with thousands in which 1000-5000 are derived from the digit expressing 1-5 and the movement of THOUSAND. In contrast, 6000-9000 are derived by signing 6 and THOUSAND, separately.

5) Sequential compounding in hundreds and thousands show that the signs HUNDRED and THOUSAND are synonymous with ONE^HUNDRED and ONE^THOUSAND. Thus, it is difficult to pinpoint whether the sign refers to the number HUNDRED or the concept 'hundred'. Based on this, we propose that the sign TEN also stands for both the number TEN and the concept. Therefore, we propose compounding for 10-50 (c.f., affixation by Dikyuva et al., 2017). We admit that it is a remaining puzzle why we do not see the same sequential compounding with 60-90 like 600-900.

To summarize, we argue that the morphological processes in complex numbers are either sequential or simultaneous compounding. In the numbers with simultaneous compounding, the movement generally carries the meaning of tens, hundreds, or thousands while the handshape carries the digit. In the numbers with sequential compounding (i.e. between 11-99 and 60-90), the numbers are derived by signing the digits sequentially. We argue that compounding presents a uniformed analysis for all complex numbers in TİD.

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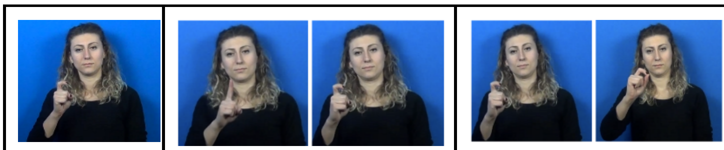
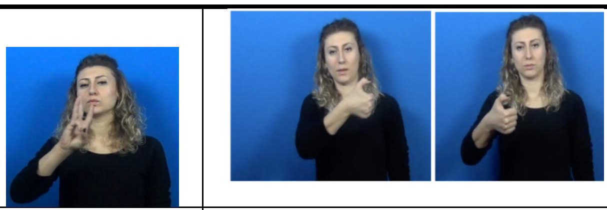
TWO	TWELVE	TWENTY	TWENTY-TWO

Figure 1. Numbers with TWO



NINE	NINETEEN	NINETY

Figure 2. Numbers with NINE



THREE^HUNDRED	SIX^HUNDRED

Figure 3. Hundreds

One sign language, two manual alphabets: Variation across fingerspelling-related tokens in the BISINDO Corpus

Nick Palfreyman

Saturday, 3.13

Cross-linguistically, signers use manual alphabets in different ways, including initialised signs (Machabée 1995) and so-called ‘Single Manual Letter Signs’ (Sutton-Spence 1994). While researchers have examined fingerspelled loans in one-handed fingerspelling systems (Brentari & Padden 2001) and two-handed systems (Cormier, Schembri & Tyrone 2008; Brown & Cormier 2017), their studies largely focus on signers who use a single manual alphabet.

Little if any attention has been paid to sign languages such as Indonesian Sign Language (BISINDO), where two discrete manual alphabets are in use. Adam’s (2012) sociolinguistic study examines Australian signers who use fingerspelling systems associated with Australian-Irish Sign Language and Auslan, respectively, but that fascinating example is a slightly different case to BISINDO, as his subjects are bilingual signers, and each sign language is associated with a different manual alphabet.

BISINDO’s two-handed manual alphabet is thought to have been introduced to what is now Indonesia by Dutch hearing teachers since the 1930s, as a means of enforcing neo-oralist methods (Palfreyman 2019). It features 17 letters produced with two hands, and nine produced with one hand (see Figure 1).

Figure 1: The two-handed manual alphabet (courtesy of Gerkatin Solo).

The one-handed ASL manual alphabet was first introduced to Indonesia in 1980 and has influenced several younger generations of signers, but while it is widespread in some parts of Indonesia, it has far from supplanted the two-handed system (Palfreyman 2016). More recently the sign community has become aware of the uniqueness of its two-handed alphabet, leading to attempts to reverse the shift towards the one-handed fingerspelling system (Palfreyman, 2019).

As a result, several sociolinguistic phenomena can be observed in the BISINDO Corpus, which comprises spontaneous texts from over 130 signers aged 16-71 in six

Indonesian cities. For example, some signers use fingerspelling exclusively from one system, while other signers use both systems. For the latter group, it is not uncommon to switch from one alphabet to the other, and some fingerspelling productions mix letters from both manual systems while representing a single Indonesian word.

Furthermore, some lexicalised forms based on the two-handed system (e.g. FS:MG-MINGGU, "Sunday", which comprises the two-handed letters -M- and -G-) have synonyms based on the one-handed system (e.g. FS:m-MINGGU, "Sunday", comprising the one-handed production -m-) – see Palfreyman 2016 for examples of 'lexical sets' in colour terms. As a result, some signers use lexicalised signs based on one system alongside non-lexicalised fingerspelling loans based on the other system.

To explore these phenomena further, and especially the choice of one system over another, over 1,500 tokens of fingerspelling-related productions (including SMLS and initialisation) are coded for linguistic and social factors. Statistical analysis is currently underway, but a preliminary study suggests that older signers produce considerably more SMLS and few initialised signs, while these trends are reversed for younger signers. Potential explanations for this include the replacement of SMLS with other signs over time, and the preference of many younger signers for the ASL manual alphabet, which is not specified for location and hence highly suited to initialised signs.

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Variation and social meaning in BISINDO (Indonesian Sign Language): An investigation at the micro-level

Nick Palfreyman

Friday, 2.55

This presentation is situated in the field of sociolinguistics and concerns variation. Rather than looking at variation at the macro-level, according to social groupings such as region, age or gender, this research focuses on the ‘micro-level’ (Sharma 2017); that is, variation which occurs between individuals, and intra-individually.

Using analytic methods from the Third Wave of sociolinguistics (Eckert 2008), I aim to analyse the linguistic practices of four users of BISINDO (Indonesian Sign Language), with a view to looking at how variation is used to express social meaning and create different identities (Palfreyman 2016).

The study uses data collected in 2017 from four deaf individuals who live in the Javanese city of Solo. They have been filmed in different locations and situations around the city, including a place of work (a building site), a hobby group (an Arabic writing class), a deaf social gathering, and in the home (with a deaf spouse).

An example already uncovered in the data entails variation at the discourse level, and focuses on the *arisan,* a monthly deaf social gathering. At the arisan, signers spend almost seven minutes guessing whose name has been picked out of the hat to receive that month’s financial donations. One of the signers is Prima, a deaf Javanese woman in her 40s, who plays an active role in this guessing game. In order to give social meaning to this gathering, Prima uses functionally equivalent variants to complain about the number of contradictory clues, to grumble (teasingly) about mental exertion, and to express frustration in a playful manner.

This and other examples will be explained with a view to shedding light on where and how variation in BISINDO creates social meaning at the micro-social level.

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Sociolinguistic variation of two-handed signs in French Belgian Sign Language: Weak Drop as a stable reduction phenomenon

Aurore Paligot

Saturday, 3.14

We investigate the assumption that there is a "growing observation across unrelated sign languages that a phonological shift is occurring over time from two- to one-handed signs" (Stamp et al. 2015: 168). Recent works on sociolinguistic variation in two-handed signs show evidence of change towards the one-handed variants in all subgroups of signs under focus (symmetrical signs in (A)ASL (McCaskill et al. 2011); number signs in NZSL (McKee et al. 2011) and BSL (Stamp et al. 2015)). A large-scale corpus study of NGT (Paligot et al. 2016) highlights that, contrary to previous hypothesis about weak drop (Battison 1974), there is no significant difference between symmetrical and asymmetrical signs regarding their rates of weak hand deletion. In the light of these results, we consider whether the change towards one-handed forms affects the realization of all two-handed signs in a given sign language.

We analyzed all one-handed (9,5%) and two-handed variants (90,5%) of two-handed signs (N=33,762) in the Corpus LSFB (Meurant 2015) in relation with several (socio)linguistic factors: discourse genre, preparedness, interactivity, age, sex, linguistic profile and sign frequency. Results of a mixed-effects model indicate that one-handed variants are favored in conversations and explanations, spontaneous discourses, male signers and frequent signs. No difference between the generations of signers was observed, which, by virtue of the apparent time construct (Bailey 2002), suggests that there is no global change towards one-handed variants in LSFB. Instead, we argue that weak drop is a stable reduction phenomenon in the language, an argument strengthened by the men's preference for the reduced forms. This was shown to be an indicator of stable variation pattern in several vocal languages (Labov 1990). We do not exclude that subgroups of signs might be undergoing change in LSFB and we call for further comparison between global and local variation phenomena as well as between unrelated sign languages.

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Laban's efforts and signing styles in narratives, poetry and song

Stephen Parkhurst

Saturday, 3.15

In discourse studies of signed language texts, small changes in signing style can help signify a change in role in narratives. The same elements of style determine the overall mood and feeling of a text. They can also mark a text as being poetry, narration, or some other genre. I have found that these same kinds of minute changes in style are used frequently in Deaf song to differentiate sub-genres and to create mood and effect. It is often difficult to describe these small changes in a meaningful and consistent way. I have found that studies of dance and movement from the early 1900s provide a useful rubric for accurately describing these types of changes.

Rudolf Laban, a dance instructor, choreographer, and philosopher, active from 1913-1958, looked at movement and effort in an attempt to distinguish what it was about some movements that gave the appearance of dance rather than just everyday movements (Laban and Lawrence, 1974; Maletic, 1987; Thornton, 1971). What did dancers manipulate to create one effect or another? He established four elements, which he refers to as dimensions, which are manipulated in any type of movement: Time, Space, Weight and Flow. These same principles can be used in sign language studies to distinguish between different signing styles and have proven to be a useful rubric for making this kind of distinction, whether it is in discourse studies of narratives, poetry, or song. Each of the four dimensions can be viewed as a continuum where the center location on the continuum is a default position which you might find in a normal conversation.

Time refers to the rapidity of the movement segment of a sign. A movement here is understood as a change in location, orientation, handshape, or even a change in facial expression.

Space can be either direct, moving the shortest distance between two positions, or flexible, in which the movement is larger and often in a circuitous motion. Another perspective is that direct movements are smaller whereas flexible movements cover more area and are thus larger.

Weight describes the tenseness or laxness of the muscles during the sign or phrase.

Flow refers to the transition between signs. A smooth flow would be one where the viewer would have a hard time telling where one sign stopped and the next one started. Obstructed flow is where there is a hold at the end of the sign or a movement to some neutral location.

While these concepts are not entirely new in the area of Deaf discourse studies, as can be seen in much of the literature on visual vernacular, the terminology and concepts that are highlighted in dance theory give a fresh and useful perspective on this topic.

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Conditional clauses in German Sign Language (DGS) and Brazilian Sign Language (Libras) – A comparison

Liona Paulus

Saturday, 3.16

Video abstract:

http://medien.e-learning.uni-goettingen.de/daten/-11/20101/30377/4-mp4/Abstract_TISLR13_Paulus.mp4

Describing the nonmanual marking of polar interrogatives in Catalan Sign Language: Approaching its pragmatic function through a feature-based theory of biases

Sara Cañas Peña

Friday, 17:30-18:30 (SIGNopsis)

Introduction. Cecchetto (2012) suggested that polar interrogatives (PIs) in sign languages (SLs) involve a combination of several of the following nonmanual markers (NMMs): eyebrow raise, eyes wide open, eye contact with the addressee, head forward position and forward body posture. Further, it has been shown that nonmanual features marking PIs "tend to be very similar across SLs" (Zeshan 2004[1]). Despite these assumptions, it is quite common to find PIs in Catalan Sign Language (LSC) marked with eyebrow furrowing, head upward position and backward body posture. Moreover, LSC optionally adds a question particle (YES-NO Q-sign). Therefore, this paper provides evidence from LSC showing an unexpected puzzle: different combinations of NMM can appear for PIs and, contrary to previous assumptions, eyebrow furrowing can be the most salient feature. I argue, based on Sudo's (2013) feature-based theory of biases, that each combination of NMM features, as well as the appearance of the question particle, convey a different flavor of bias. Therefore, the NMMs, just as the YES-NO Q-sign, are shown to not only mark sentence type, but to encode pragmatic meaning.

Data. LSC uses a specific combination of NMMs, a characteristic device of gestural-visual modality languages, to perform a PI. It has been claimed that LSC most prominent feature for marking PIs is eyebrow raise (Quer et al. 2005). But further data examination shows that PIs in LSC can also be performed with a combination of features involving eyebrow furrowing as the most prominent feature. Thus, eyebrow position feature in PIs is not constant:

[1] This is supported by data from ASL (Wilbur & Patschke 1999; Neidle et al. 2000; Fischer 2006; Valli et al. 2011), AUSLAN (Johnston & Schembri 2007), BSL (Sutton-Spence & Woll 1999), FinSL (Savolainen 2006), HKSL (Tang 2006), HZJ (Šarac & Wilbur 2006), IPSL (Zeshan 2004), in ISL (Meir 2004), LIBRAS (de Quadros 2006), LSC (Quer et al. 2005), LSE (Herrero 2009), NS (Morgan 2006), NZSL (McKee 2006), ÖGS (Šarac et al. 2007), TÍD (Zeshan 2006) and VGT (Van Herreweghe & Vermeerbergen 2006).

(1) ________________br
PARIS CAPITAL FRANCE
"Is Paris the capital city of France?"

PARIS CAPITAL FRANCE

(2) ________________bf
PARIS CAPITAL FRANCE
"Is Paris the capital city of France?"

PARIS CAPITAL FRANCE

In addition, other nonmanual features can be combined with eyebrow positions, such as head forward or upward position, and forward or backward body posture. LSC also seems to optionally add a question particle, namely the YES-NO Q-sign, at the very end of the utterance:

(3) ________________bf
IX-2 PARTY GO YES-NO
"Are you going to the party?"

This empirical picture draws a puzzle in LSC that falls far short from expectations and needs to be solved. According to Zeshan (2004), "it is common for the question particle to occur only in certain contexts that are often pragmatically constrained", and, coincidentally, this applies to the YES-NO Q-sign. The question now is whether this statement can be extended to NMM combinations.

Theoretical background. Sudo's (2013) feature-based theory of biases, built up considering Büring and Gunlogson's (2000) analysis, claims that PIs are associated with two major types of bias: one concerning the information available in the conversational context (evidential bias) and one concerning the speaker's private beliefs or expectations (epistemic bias). Each bias can have positive or negative values and each resulting combination is performed by a different PI. Moreover, apart from being neither positive or negative, each bias can demand a specific value, gradually increasing the combinations that would end up triggering different PIs (positive PIs, outside-negation negative PIs, inside-negation negative PIs and a combination of these structures with question particles). Sudo's (2013) theory successfully describes the inferences that affect the biases of at least the most basic kinds of PIs in English and Japanese.

Analysis. Given Sudo's (2013) theory, I assume that NMMs, as well as the YES-NO Q-sign, can be a trigger for showing different kind of biases in LSC. The analysis relies on new elicited data obtained through different tasks that have been conscientiously designed to control the factors that can influence the consultants' behavior. Slightly different contexts —regarding the knowledge of the participant about some fact and the evidence in the communicative context suggesting the negative or the positive answer— were proposed, and consultants were asked to perform a PI as an answer to the context. Here, I provide a table that shows how different NMM combinations are derived from the different variables (*positive*, *negative* or *as a required value* or *as an incompatible value*) applied to the two kinds of biases (*evidentiality* and *epistemicity*).

	Evidential Bias I'm watching it in-situ	(–) Incompatibility (+) Requirement	**Epistemic Bias** My ideas/beliefs	
Brow furrowing + Body backward position	Contextual evidence - what I'm watching (y): Requires contextual evidence for answer "YES"	+ Positive	Unexpectedness - the opposite to what I think (n): Expected answer "NO"	Negative
Brow raise + Body backward position	No contextual evidence (y/n): Only felicitous in absence of contextual evidence for either answer	– Negative – Positive	Unexpectedness- the opposite to what I think (n): Expected answer "NO"	Negative
Brow raise + Head and body forward position	Contextual evidence - the opposite to what I'm watching (n): Requires contextual evidence for answer "NO"	+ Negative	Expectedness (conflict) - what I think (y): Expected answer "YES"	Positive
Brow furrowing + Head and body forward position	Contextual evidence - what I'm watching (y): Requires contextual evidence for answer "YES"	+ Positive	Expectedness (confirmation) - what I think (y): Expected answer "YES"	Positive
Brow furrowing + YES-NO Q-sign	No contextual evidence (y/n): Only felicitous in absence of contextual evidence for either answer	– Negative – Positive	No expectations Don't expect a specific answer	None

Figure (1). LSC nonmanual combinations in PIs and the biases that triggers them.

Conclusions. This paper provides evidence from LSC showing that PIs can be performed with an unexpected combination of NMMs: eyebrow furrowing is also a common feature to signal this sentence type. Sudo's (2013) novel feature-based description system can explain why LSC displays more than one combination of NMMs for PIs, and it predicts when to use some of the combinations. The same can be applied to the YES-NO Q-sign: far from being an optional question particle, it appears in very restricted contexts. Further data also points towards an analysis in which each combination of features in PIs conveys a different bias.

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Effect of minimal sign language instruction on hearing learners' constituent order

Deborah Chen Pichler

Saturday, 3.17

Background: This study compares constituent order elicited from hearing learners of American Sign Language (ASL) as a second language (L2) at three points in time: prior to any formal instruction, after a short ASL vocabulary lesson, and after two weeks of intensive instruction. Goldin-Meadow et al. (2008) describe a robust preference for preverbal objects in hearing nonsigners' silent gestures, regardless of the canonical word order of their spoken language. Hall et al. (2014) further demonstrated that participants constituent order varies depending on the semantic reversibility of the predicate: OV is more common with nonreversible predicates, but VO appears with reversible predicates. Our study extends the Hall et al. (2014) methodology to actual learners of L2 ASL, known as second-modality (M2) L2 signers (Chen Pichler & Koulidobrova, 2014) for the first time, examining the effect of minimal sign language instruction on their initial patterns of constituent ordering.

Methodology: We elicited short gestured narratives from nine hearing participants about to begin an ASL 1 course at a summer intensive ASL program, following the methodology of Hall et al. (2014) and instructing participants to maintain consistent forms for their gestures throughout the experiment. Participants watched brief videos showing one or two characters performing transitive actions in reversible, non-reversible and ditransitive contexts, then described each event using silent gestures. Next, a Deaf ASL instructor taught each participant 17 signs covering the characters appearing in the videos (*boy, girl, man, woman*), as well as objects and actions featured in the videos. Signs were taught through ASL using pictures, without English glosses or mouthing. Participants then watched a new set of videos and retold each one in ASL, using the signs they had just learned. The task was repeated when participants concluded their 2-week intensive ASL course. All utterances with a verb and an object were coded for reversibility of the predicate and position of the object gesture or sign (1).

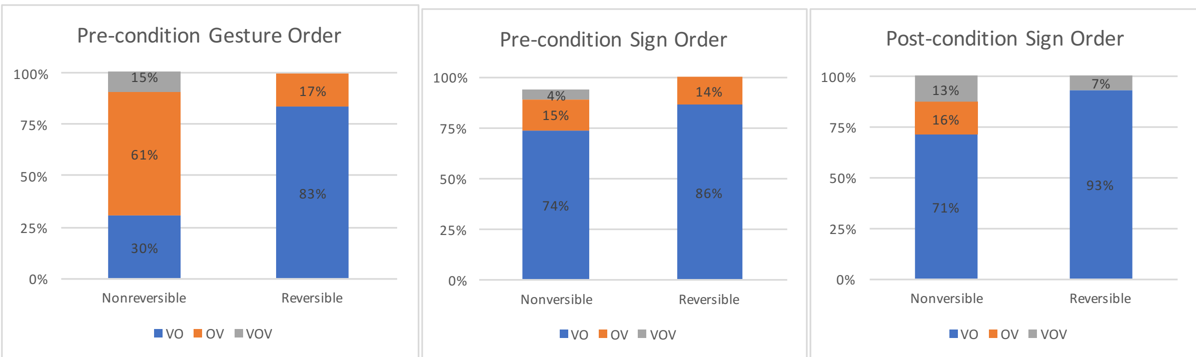
Results: Participants frequently employed a multi-clausal strategy, breaking transitive events into a sequence of intransitive events (2). For utterances that featured an object, participants' initial gesture order was consistent with Hall et al. (2014): OV order predominated for nonreversible predicates, and VO order for reversible predicates (3a). This pattern changed dramatically following the mini ASL lesson (3b) and continued after participants completed their two-week intensive ASL course (3c), with VO becoming the dominant order for both reversible and nonreversible predicates (3b). This pattern echoes the observation by Hall et al. (2014) that instructing participants to maintain consistent gesture forms resulted in increased rates of SVO for both reversible and nonreversible predicates. Our findings in (3b) suggest that this effect is even more pronounced when gesturers use signs from an actual language, even if their knowledge of that sign language is limited to a few vocabulary items. Overall, our results indicate that signed narratives of beginner M2L2 signers are already quite distinct from their initial elicited pantomime with respect to constituent order. Furthermore, although sign-naïve hearing adults' predisposition for OV order in gestured strings may be a robust, universal pattern, especially for semantically reversible predicates, it is nonetheless highly sensitive to minimal amounts of sign language instruction and quickly shifts towards SVO for all predicates.

		VO	OV	VOV
Pre- Gesture	**Nonreversible**	10	18	5
	Reversible	5	1	0
	Ditransitive	3	0	0
Pre- Sign	**Nonreversible**	34	7	2
	Reversible	31	5	0
	Ditransitive	3	1	0
Post- Sign	**Nonreversible**	44	10	8
	Reversible	28	0	2
	Ditransitive	3	1	0

(1) Reversibility and constituent order of gestured/signed strings with a verb and object

boy **push** **woman** **fall-back**

(2) A transitive event *Boy pushes woman* gestured as a sequence of two intransitive events with SV order by hearing gesturer: *Boy pushes; Woman falls back.*



(3a) (3b) (3c)

Constituent order before any ASL instruction (2a), after mini ASL vocabulary lesson (2b) and after two weeks of intensive formal ASL instruction (2c)

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The emergence of signed language in Tajik schools for the deaf: A scalar ecological investigation of a complex contact situation

Justin Power

Saturday, 12:30-13:00

Traditional models of contact-induced change presuppose contact between existing language communities (e.g., Thomason & Kaufman 1988, Winford 2003). In many parts of the world, however, where signed languages have been introduced to deaf populations in educational institutions, interactants in contact do not always, in any obvious way, constitute linguistic communities, nor do they contribute fully-formed linguistic systems. This paper presents evidence from a signed language in Tajikistan (hereafter, TSL), which emerged beginning around 1940 primarily in the Leninsky residential school for the deaf, when hearing Russian educators began teaching L2 varieties of Russian Sign Language (RSL) to children. Neither of the interacting groups in this contact situation formed language communities: It is unlikely that RSL functioned as the community language amongst Russian-speaking educators; and deaf children came together from a heterogeneous mix of geographic and linguistic backgrounds. Can existing theories of language contact and creation explain the complex set of sociolinguistic factors and linguistic features implicated in the emergence of TSL?

Scalar ecological models of contact (e.g., Pagel 2015; Mufwene 2001, 2008) abstract away from language communities, emphasizing instead contact between *codes*, which may be the common languages of large communities, but which may also be less widespread communication systems. The ecological part of the model incorporates sociolinguistic and extra-linguistic features of a contact situation that can influence linguistic outcomes, such as differences in prestige or frequency that privilege one set of linguistic features over others. In this paper, I argue that the contact situation in Tajikistan is best understood as a complex of two sets of interactions: (i) between hearing signers of RSL and deaf signers of codes indigenous to Tajikistan, potentially including home sign and codes in more widespread use; and, simultaneously, (ii) amongst Tajik signers from heterogeneous linguistic backgrounds.

This analysis compares five Tajik signers (adults, 25-55y) with published descriptions of RSL (e.g., in Kimmelman 2012, 2017; Zeshan & Perniss 2008) across 150 basic vocabulary items and 20 grammatical features. Data for TSL were collected in Dushanbe, Tajikistan. I used the meaning list from Max Planck Institute's Cognacy in Basic Lexicon project[1] to elicit basic vocabulary and compared these using lexical distance measures. The Argument Structure Production and Comprehension task (Carrigan & Coppola 2017) and the Pear Story[2] were used to elicit responses for analysis of grammatical features, including word order, constituent order in noun phrases, negation, possession, and existential constructions. Grammatical analysis is ongoing. Preliminary results show (i) close lexical similarity compared to RSL, from 72-78%, but (ii) divergent grammatical structures (e.g., differences in word order) and

[1] https://github.com/lingdb/CoBL-public/wiki
[2] http://pearstories.org/

differing forms used for structures that are similar across the two languages (e.g., existential copulas, classifiers).

Two primary ecological factors may help to explain the lexical similarity results. First, limited, but asymmetrical, teacher-student interactions in the context of the first governmentally-supported school for the deaf gave competitive advantage to Russian-origin lexical signs in the changing linguistic ecology during TSL's emergence. Second, there may have been few widespread, conventional lexical signs in competition with RSL signs. In contrast, Tajik signers did not, to the same degree, adopt RSL structural features, which may not have been found consistently in hearing educators' L2 varieties. The question remains whether TSL's grammatical features today are a result of imposition of existing features from indigenous codes, or whether grammar emerged through contact amongst deaf Tajiks. Research on L1 acquisition from non-native sources and on Nicaraguan Sign Language provide support for the latter explanation. Deaf children exposed to Signed English (Supalla 1990) and signed language of late learners (Singleton & Newport 2004) acquire lexical forms but create different, more complex grammatical structures. In Nicaragua, contact amongst deaf children led to the rapid emergence and complexification of grammar across successive school cohorts (e.g., Kegl et al 2001, Senghas et al 2004). I conclude that, in Tajikistan, the hearing teachers' L2 RSL did not provide sufficiently consistent and complex grammatical structures required for the emerging TSL; nor could any contributing indigenous code fully supply these. As in Nicaragua, TSL's shared structural features likely developed in the intensive interactions amongst deaf children in school and in the dormitories.

This approach to theorizing signed language emergence in the context of deaf education acknowledges differences compared to the creation of spoken contact languages: Fully-formed linguistic communities are not typically the interactants in these contact situations. At the same time, the approach emphasizes similar synchronic processes, such as copying from existing codes, and diachronic results, such as shift from indigenous codes, that form the core of a theory of language contact relevant to languages in both modalities.

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Can the *comparative method* be used for signed language historical analyses?

Justin Power, David Quinto-Pozos & Danny Law

Saturday, 3.18

Sound change can be highly regular in the world's spoken languages (Osthoff & Brugmann 1878), and this principle has allowed linguists to systematically compare the outcomes of these regular changes and infer, on that basis, earlier forms from which modern languages developed and how various languages relate to one another within a family. This heuristic for inferring historical insights from carefully controlled comparisons of contemporary related languages is the *comparative method* (CM) *(*Rankin 2008, Campbell 2013*)*. The CM has been successfully applied to spoken languages around the world, and is generally held to be universally applicable. However, to date, no published studies have attempted to apply the CM to signed languages (cf. Woodward 2011). This lacuna in the field follows in turn from the fact that no published studies have attempted to identify a signed language correlate to recurring sound correspondences in spoken languages. In this work, we apply the CM to 5 putatively related signed languages and detail the potential obstacles that the affordances of a signed modality produce for the CM, as well as the insights that a careful application of the CM to related signed languages can yield. Application of the CM to signed languages sheds new light on the processes and mechanisms of signed language change, and allows us to reframe generalizations about language change based only on spoken languages to more fully account for language across modalities.

A central question of this project is whether changes in signed language are regular in the ways that sound change in spoken languages is. This remains an empirical question. Published studies to date have not attempted to show regular correspondences across languages. Here, we address that gap. One hypothesis is that signed language change is regular, since sign languages are naturally-evolving languages with levels of structure that parallel spoken languages. If this is the case, it should be possible to identify regular correspondences across related languages. However, an alternative hypothesis is that change in signed languages is always irregular due to features unique to or particularly prevalent in signed languages. In particular, iconicity and indexicality of forms along with language transmission phenomena—including language contact—may play more fundamental roles in signed language change.

Some signed language analyses have considered diachronic changes within a single language (Frishberg 1975, Moita et al 2018). For example, Frishberg (1975) noted that in asymmetrical two-handed signs in ASL in which the dominant acts on the non-dominant hand, the non-dominant hand changed to match the dominant configuration. Signs like DEPEND and INSTITUTE, among others, exhibit these diachronic changes. If this type of language-internal change for ASL were regular in the signed modality, one would expect other signs within the language to have changed systematically in the same way, and by extension, we would expect other languages to follow similar patterns.

Data from 5 signed languages are included in this analysis. In particular, those languages are: American Sign Language (ASL), Langue des signes française (LSF), Lengua de Señas Mexicana (LSM), Língua de Sinais Brasileira (Libras), and Vlaamse Gebarentaal (VGT). These languages were chosen because they have all been suggested to have historical ties to LSF, typically through collaborations between educators who used LSF and individuals or communities in the various countries that were developing education systems for deaf children.

300 signs (dozens from each language) have been transcribed using HamNoSys (Hanke 2004), a transcription system that captures details of handshape, movement, location, orientation, and handedness (1-vs-2 handed). Data transcription and analysis are ongoing, with the goal of comparing a set of 75 signs across all these languages. These careful transcriptions of cognate signs across several languages can then be compared systematically using the tools of the CM.

A representative example from the completed transcriptions is provided in (1), which forms a putative cognate set for the concept "hard". This systematic comparison allows one to note various facts: signs are two-handed in all five languages, but the handshapes are symmetrical only in ASL and VGT. Additionally, LSF, LSM, and ASL share the same dominant handshape form (index and middle selected and bent), while VGT and Libras share a different form (index selected and bent). Fingers contact at the back of the wrist in LSF and at the back of the hand in LSM and Libras; in VGT, contact is made at the finger; and in ASL on the radial side of the hand. Movement is similar in all languages, with differences only in the number of repetitions, and, in ASL, in the small backwards movement after contact (so-called *bounce*). Continuing this analysis across a large body of signs in multiple related languages will allow us to identify systematic patterns of similarity and difference across the family of languages, and infer from those patterns the historical changes that have led to the current variety within the family.

(1)

Language	Concept	Handshape	Orientation	Location	Movement
LSF	hard	[illegible]	[illegible]	[illegible]	[illegible]
LSM	hard	[illegible]	[illegible]	[illegible]	[illegible]
VGT	hard	[illegible]	[illegible]	[illegible]	[illegible]
Libras	hard	[illegible]	[illegible]	[illegible]	[illegible]
ASL	hard	[illegible]	[illegible]	[illegible]	[illegible]

This paper details, for the first time, an approach for applying the comparative method to investigate the linguistic history of a family of signed languages. Our work establishes the feasibility of developing systematically comparable cognate sets for a family of signed languages. The full study, which is ongoing, will allow us to more directly evaluate whether any diachronic phenomenon comparable to regular sound change in spoken language can be identified for signed languages. Regardless of the findings, the results will have far-reaching consequences for our approaches to the diachronic study of signed languages and for theories of language change more generally, which so far remain uninformed by change in signed languages.

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Metaphors in (e)motion: The case of Italian Sign Language

Morgana Proietti, Alessio Di Renzo & Bonsignori Chiara

Saturday, 3.19

A strong connection intertwines our perception of the world with the motoric system and the formation of mental images (Shapiro 2007). This bond leads us to consider language as a multimodal system, in which each utterance is a combination of visual and kinetic images, expressed by words and gestures. The uniqueness of sign languages is their capacity for expression solely through the sight and the use of the hands and the body. Therefore, from a theoretical perspective, sign languages can be considered a special window for exploring the route from perception to concept construction as the linguistic embodiment of the perceptual experience is visible in them (Volterra, Capirci, Rinaldi, & Sparaci, 2018; Wilcox & Xavier, 2013). In this route from perception to a linguistic symbol, iconicity takes the core role mapping form and meaning. Iconicity is not just a link between the real world's objects and the signs' formal properties. According to Wilcox (2004), iconicity shows the congruence of semantic and phonological structures, revealing a common conceptual space grounded in the cognitive abilities of language users, connected to perception and interaction with the world.

Previous researches (Boyes Braem 1981; Pietrandrea 2002; Russo 2004) observed the presence of visual metaphors in signs highlighting the importance of embodiment and perception of the surrounding world in the construction of meaning leading to language.

The present study investigates the linguistic representation of emotions in Italian Sign Language (LIS) focusing on the visual metaphors underlying the lexical units. The study analyzes the phonological parameters of signs referring to emotions, in order to identify semantic traits metaphorically linked to the parameters' perceptual features. The analysis considers handshapes, orientation, movement, and location of the hands, as well as facial expressions, mouth gestures and the body's movement. Data were provided by Italian sign language dictionaries (spreadthesign, Radutzky et al, 2001), and by the collaboration of 3 native deaf signers as linguistic informants. We collected 70 signs and we coded them using ELAN. We validate more than 60% of our collection of signs finding actual instances of them in video interviews and in videos posted publically on the web. We found out the presence of peculiar occurrence of specific parameters related to a specific type of emotion (e.g. the presence of major occurrences of the 5-tense configurations and the downward movement in signs related to negative emotion – Figure 1, SAD).

We found out the presence of metaphors linking the peculiar parameters to different semantic areas, for example, the downward movement as spatialization metaphor of “down is bad” is present in many signs referring to negative emotions.

Investigating the tight metaphorical relation between form and meaning in lexicon expressing emotions could be effective to improve a cognitive approach to language

(Occhino & Wilcox, 2017).

Figure 1 TRISTE - SAD

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Does verb type matter? Investigating word order in German Sign Language

Sina Proske

Saturday, 3.20

Background: One of the most fundamental questions in typology research is the question of languages' basic word order. Basic word order concerns the order of subject (S), object (O), and verb (V) with respect to each other and how they occur in an unmarked declarative sentence. Several studies have shown that different factors like animacy and reversibility of the arguments, the verbs' semantic properties and complexity, and pragmatic reasons may lead to word order variations in sign languages (e.g. Johnston et al. 2007, Kimmelman 2012). In addition, morphosyntactic factors like verb class may also influence word order and object position (e.g. Kimmelman 2012, Milković et al. 2006, Rutkowski & Łozińska 2016). In particular, plain verbs, for instance, allow for a more flexible word order. With regard to locative constructions, it is reported (Pavlič 2016 among others) that semantic features like size and animacy of the entities/participants determine their positions in the sentence, so that bigger and inanimate entities ('ground') precede smaller and animate entities ('figure').

Based on judgment data, Glück & Pfau (1998) claim that German Sign Language (DGS) displays an underlying SOV order. In this paper, I will focus on verb class influence on word order in DGS and will present the first exhaustive investigation of basic word order in DGS using the method of a modified Sentence Reproduction Task (SRT) (Pendzich et al. in prep.). Based on that results, DGS signers indeed favor a SOV structure.

Data: The presented study involves a SRT whereby participants see a conversation of two signers and have to reproduce the critical sentence from memory. The stimuli sentences used in the SRT were manipulated according to position of the verb (verb-final or not verb-final) and according to verb class (plain, forward and backward agreement verbs, spatial classifying verbs and non-spatial classifying verbs). For each condition eight stimuli sentences were created, resulting in 80 critical sentences as a whole (2x5x8=80). Furthermore, transitive and intransitive verbs were included to test whether sentences with transitive verbs show a different word order pattern (OV vs. VO) than sentences with intransitive verbs (SV vs. VS). In addition, eight filler content questions were added to see if participants understood the presented conversations.

All stimuli sentences used in this study were signed by two Deaf female native signers and presented within a programmed questionnaire using OnExp (Onea 2011). The overall design of the questionnaire was the following: Participants saw a controlled context signed by signer I. This was followed by a question of signer II (e.g. *What happened then?)* and an answer sentence to that question signed by signer I (the critical sentence). Participants were asked to memorize the content of the critical sentence and to reproduce it after they saw the context of signer I and the question of signer II again. The answer sentences fit the content of the contexts and consist of 5-

7 signs. The word order in the contexts and answer sentences was varied according to the position of the verb and always matched.

22 participants (9 males, 13 females, mean age 31.7) participated in this study. 19 of them had Deaf parents and acquired DGS from birth, 3 had hearing parents and learned DGS before the age of 6. The participants were presented one out of two lists of stimuli including 40 stimulus sentences. The stimulus videos were presented only once in a pseudorandomized order. The participants' responses were videotaped, annotated with ELAN and analyzed according to the order of the elements and their grammatical function. With regard to verbs, transitivity and verb class were considered.

Results: The preliminary results of the data based on 105 sentences elicited from three participants (two males, one female; mean age 26) show that SOV is the preferred order in DGS (69%). Only 9% of the sentences appear in SVO order and other attested orders comprise OV (2%) and SV (20%) order. Interestingly, if there is a subject, it always precedes the verb, hence, it can be assumed that the basic position for subjects is preverbal.

The position of the object, however, is more flexible. Regarding forward agreement verbs, in 22 out of 23 sentences, the object is signed in a preverbal position. Only in one case SVO order is chosen. Backward agreement verbs also show a clear tendency for preverbal objects (18 out of 22 sentences). Nevertheless, in four sentences, the object is signed postverbally. With respect to classifier verbs (excluding spatial verbs), the object also occurs preverbally in the majority of sentences (21 out of 22). Only in one case the object is signed postverbally. Plain verbs, however, allow for a more flexible word order as assumed before. In 11 transitive sentences containing plain verbs, 7 show an SOV order. 4 sentences, however, display an SVO order. 9 sentences are intransitive without any objects and therefore are analyzed as SV.

The sentence structure concerning spatial verbs is more complex. Spatial verbs in DGS include directional verbs like GO and spatial verbs like PUT. Both types of verbs include a classifier handshape and a local specification in space, which they agree with. In addition, transitive and intransitive spatial verbs are distinguished as well. All transitive spatial verbs show an SOV order. Intransitive verbs, however, are analyzed as SV order irrespective of the position of the local information. A closer look at the locative adjuncts (O_{loc}) show that they occupy different positions in the sentence in transitive as well as in intransitive verbs. In most of the cases (11 out of 18), they precede the verb resulting in a $SO_{loc}V$ order shown in example (1). There is only one case, in which the local information follows the verb displaying a SVO_{loc} order. In addition, local information can appear sentence initially (6 out of 18) and hence, showing an $O_{loc}SV$ order as exemplified in (2).

(1) EVENING CHILD++ BED LIE$_{CL}$
'The children lie in the bed in the evening.'

(2) GARDEN FAMILY TOGETHER SIT$_{CL}$
'The family is sitting together in the garden.'

Conclusion: In this paper, I present first results of a SRT study investigating the basic word order in declarative sentences of DGS. The data confirms the claim of Glück & Pfau (1998) that signers overall favor an SOV structure but also shows that different verb classes may lead to word order variations. In line with the literature (Kimmelman 2012, Pavlič 2016), plain verbs in the data seem to allow for a more flexible word order as well as spatial verbs and locative constructions, which usually follow semantic principles.

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Semiotic strategies in nonmanual signals: A study on the actions of the signer's head and body in Finnish Sign Language

Anna Puupponen

Saturday, 3.21

This presentation reports a study of the actions of the signer's head and body in Finnish Sign Language (FinSL). The study draws on work reported in Puupponen et al. (2015, 2016) and Puupponen (2018), and expands the findings made in these studies by applying Peircean (1903) and post-Peircean (e.g. Kockelman 2005; Enfield 2009) semiotics to the study of different signals produced by the head and body. The study is built around the following questions: (i) How do head and body movements signify?; (ii) How are these signals connected to signals from other parts of the signer's body?; and (iii) Are there differences in the central semiotic features of actions of different parts of the signer's body? The study discusses these questions together with examples from FinSL data consisting of corpus narratives (12 signed stories from 12 FinSL signers) and dialogues (6 dialogues between 12 signers), as well as synchronized motion capture and video recordings of continuous dialogues (2 dialogues between 2 signers). The duration of the whole set of data is 1 hour and 52 minutes and it has been annotated for signs and sentences.

To answer question (i), the study presents the following semiotic typology of head and body movements: *enacting movements*; *time-metaphor movements*; *movements indicating referents*: pointing and placing; *movements indicating discourse structure*: binding, separating and emphatic; *movements indicating/depicting reactions*: inclusion/exclusion; *more conventional type-for-tokens*: negative headshake and affirmative nod(ding). According to the study, these different types of signals – some of which have been traditionally defined as linguistically significant (e.g. Wilbur 2000; Pfau & Quer 2010; Herrmann & Pendzich 2014) – all show different proportions of the semiotic strategies of *iconicity*, *indexicality*, and *symbolicity* (see e.g. Peirce 1903; Kockelman 2005). It is argued that indexical strategies are central in all head and body movements while iconic strategies are prominent in enacting movements of the head and body, as well as in movements visualizing time-related metaphors. Symbolic type-for-tokens are rare, although some movements have become more conventionalized. Furthermore, it is suggested that different types of signals involve different degrees of *control* (see Enfield 2009) in their production and interpretation. The semiotic typology is demonstrated in Figures 1 and 2a in relation to the actions of the head (visualization in Figure 2a from Capirci 2018).

In addressing question (ii), the study argues that the actions of the signer's head and body are always more or less connected to signals produced with the signer's face and hands. That is, in signed utterances, individual signals are always part of semiotically complex bundles of co-occurring signals produced with different sign mediums (here: hands, face, head, and the upper body), which are connected through a unified communicative action in which contextual association is significant (see also Enfield 2009). Although always connected, the functions of some signals are more dependent than others on other co-occurring signals, and the relations between the functions of co-occurring signals may be emphasizing, complementary, or merely connected. The nature of these different connections is discussed further in the presentation.

As a response to question (iii), the study suggests that the distribution of iconic, indexical, and symbolic strategies is different in the signification of the hands, face, head, and upper body: iconicity and indexicality are important in all mediums, but conventionalized symbolic signs are mostly produced with the hands. It is suggested that the differences between the centralities in signification with different sign mediums can be visualized with the same method used in Figure 2a, from Capirci (2018). In Figure 2b this is demonstrated in relation to the actions of the head. Furthermore, it is argued that the semiotic centralities in the signals from different parts of the signer's body can be traced back to the physical characteristics and affordances of the human body.

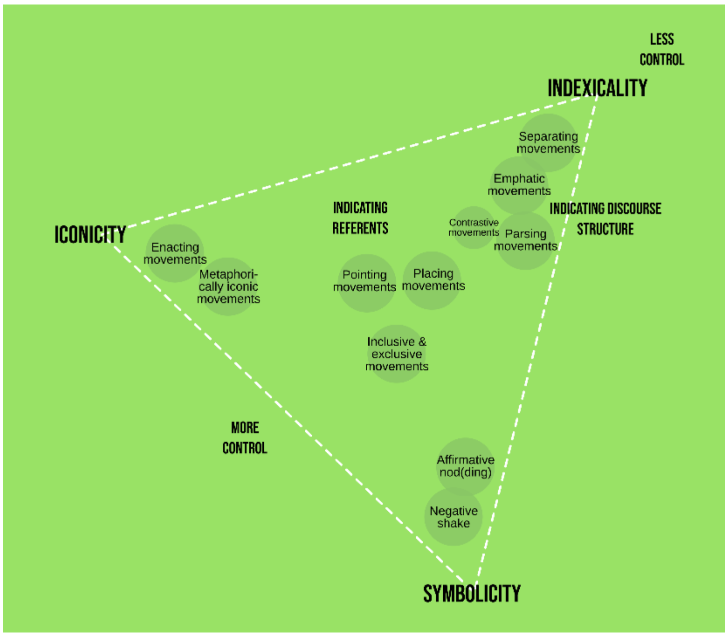

Figure 1. A typology of actions of the signer's head according to semiotic strategies.

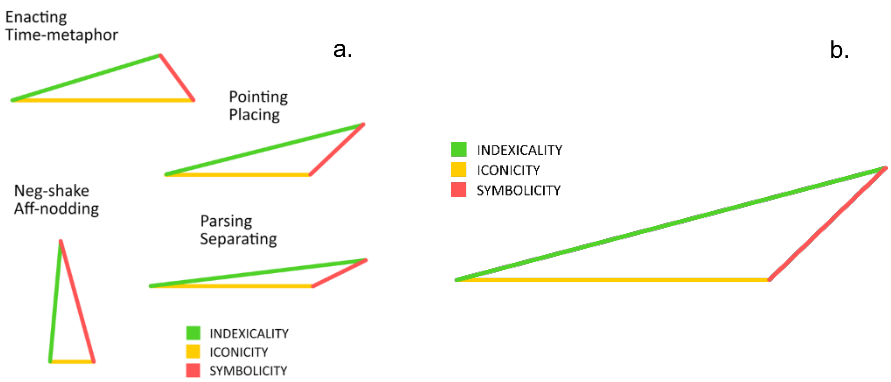

Figure 2. Different proportions of semiotic strategies in different head movements (a), and the overall proportions of semiotic strategies in the signals of the head (b). (See also Capirci 2018.)

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A sociolinguistic sketch of the Port Moresby deaf community and Papua New Guinea Sign Language

Lauren Reed

Saturday, 3.22

This paper is a sociolinguistic description of the Port Moresby deaf community, and a historical and linguistic sketch of Papua New Guinea Sign Language (PNGSL), a new urban deaf community sign language (Meir et al 2010). It is grounded in fieldwork by the author with deaf people in Moresby, the national capital. The paper sketches PNGSL's history, its community of users, and some linguistic features of the language. It presents the emic perspectives of deaf Papua New Guineans on sign languages (SLs) in Papua New Guinea (PNG), with specific reference to language attitudes. It closes with how the SL situation in Moresby is of interest to theoretical sign linguistics.

The author is a hearing native user of Auslan and conducted four weeks of language documentation in Moresby in collaboration with the Papua New Guinea Deaf Association and the Moresby deaf community. This included filming of unstructured, free conversation between deaf signers, which was then reviewed by the signers and the researcher. The conversations were translated by the participants and the translation process recorded. The resultant corpus comprises around 15 hours of unstructured conversation between 26 deaf people. While in the field, the author took a linguistic ethnographic approach (Hou & Kusters 2019), spending time with the community as a participant observer and taking notes from unstructured interviews on language attitudes.

In 1990, Australasian Signed English ('Signed English') was imported for use in deaf education in PNG. Signed English is an "artificial sign system" (Johnston & Schembri 2007:32) intended to exactly represent English in signed form. Its lexicon draws heavily from Auslan and includes contrived signs for English function words (Johnston & Schembri 2007:32-33). A 'Melanesian Sign Language' dictionary was published in 1994, which was essentially rebranded Signed English. Also in 1994, a change in government policy led to dedicated deaf schools closing and deaf children being placed in hearing classrooms. The Red Cross School in Moresby is unique as it continues to teach deaf children up to Grade 8.

The deaf community in Moresby call their language Papua New Guinea Sign Language or PNGSL. PNGSL has grown out of the exposure of deaf people to Signed English, but PNGSL is not an artificial sign system. Rather, it is a natural SL with features commonly found in other deaf community SLs, such as subject-object verbal agreement (Sandler & Lillo-Martin 2001). Lexical comparison reveals that PNGSL has a high proportion of cognates with other BANZSL (British, Australian and New Zealand SL) languages (cf. Johnston 2003). There is influence from local ambient spoken language Tok Pisin on PNGSL's structure. For example, a sign that is cognate with Auslan NOTHING is used following a verb phrase to express "just [doing]". This is a calque of Tok Pisin "[do] nating", which translates to "just [doing]".

The Moresby deaf community comprises around 100 deaf people who are part of various communities of practice (cf. Lave & Wenger 1991). Most are linked by their shared experience of having attended or currently attending Red Cross School in Moresby. Others have joined the community via their membership of two churches in Moresby that offer signed services, or by participation in deaf rugby games. Others have arrived from other provinces and, upon being encountered by Moresby deaf community members in markets or on public transport, have been invited to join the community. Another key community of practice is participation in the activities of the Papua New Guinea Deaf Association. PNGSL signing status is not a prerequisite to being part of the deaf community, but being deaf is.

The emic perspective among deaf people in Moresby is that deaf people have two languages: PNGSL and DEAF CULTURE. DEAF CULTURE or 'culture sign' is explained as the way deaf people communicate with hearing people and with other deaf people who do not know PNGSL. Deaf people see culture sign as both unique to each individual but also fundamentally the same. Thus, each individual and their hearing network (e.g. their hearing family) have an idiolectal culture sign variety, but deaf people also talk about being able to communicate using culture sign, even if they do not know each other's distinct idiolects.

In this second sense of culture sign, there is a high degree of "linguistic commensuration", which is "the process whereby signers actively try to produce linguistic forms that signers of other languages can make sense of, and to understand their utterances in return" (Green 2014:447). Communicating in culture sign is both a recruitment of typical culture sign lexical items (such as articulating WOMAN on the breast, a commonly shared culture sign across PNG) and a way of packaging information clearly and visually so that another culture signer will understand it. The deaf community in Moresby are protective of culture sign. They express pride in their bilingualism in these two varieties and regularly use a 'switching-hats' metaphorical sign to express how they code-switch between PNGSL and culture sign depending on their interlocutor.

There are a number of facets of the situation in Moresby that are of interest to SL theory. PNGSL has its roots in an English-based sign system, but it has been influenced by ambient Tok Pisin and the culture sign varieties of its users. Hence, it provides an opportunity to examine contact phenomena and language evolution in a SL. There are no native PNGSL signers, all having acquired the SL either when schooling commenced or in adulthood. With deaf-deaf marriages now the preferred form of partnership in the community, it is a matter of time before the first native PNGSL-signing deaf child is born, providing an opportunity to observe SL acquisition in a very young sign language. Finally, this work offers an opportunity for deep investigation of language attitudes in bilingual signing communities, building on work by Kusters (2014) and Bayley, Hill, McCaskill, & Lucas (2017).

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Co-expression of past and future in Kailge Sign Language, Papua New Guinea

Lauren Reed

Friday, 2.56

Most sign languages (SLs) do not have grammatical tense, but rather express time with adverbials (Velupillai 2012:223-226). Many SLs situate these adverbials on body-oriented timelines (e.g. Johnston & Schembri 2007:241 [Auslan]; Yano & Matsuoka 2018:653-654 [Japanese SL]; Nyst 2007:110 [Adamorobe SL]), with a common metaphor being back oriented to past and front to future.

Kailge Sign Language (KaiSL) is a small SL of Papua New Guinea. It is two generations old. It is centred on one deaf individual in the community of Kailge, Western Highlands Province. There are around 15 fluent hearing users of KaiSL, while others of the ca. 1500 residents at Kailge have varying levels of competency.

KaiSL does not utilise a body-oriented timeline to express time. Rather, it co-expresses past and future using temporal markers (figures 1 and 2). Although these two markers have different forms, they perform the same function; that is, each of them is used for expressing either future or past. The degree of remoteness is expressed by the size of articulation of both the manual and nonmanual features of the signs.

The use of a single sign for both past and future is explained by consultants on the basis that both past and future events occur many sleep-wake cycles from now. The ambient spoken language, Ku Waru, has grammatical tense and there is no corresponding co-expressed ‘future/past time’ lexeme.

This is strikingly similar to what has been reported for two other rural SLs. In Kata Kolok, the sign PIDAN indicates “temporal displacement: not in the present” (de Vos 2012:217, 219-228). It gains its specific past or future meaning depending on pragmatic context (de Vos 2012:220). Likewise, in Yucatec Maya Sign Language (YMSL), there are two temporal adverbs: NOW and REMOTE.TIME, with the latter denoting past or future (Le Guen 2012:230).

Like most SLs, KaiSL does not have grammatical tense. While some spoken languages lack grammatical tense, they may express it with temporal adverbs or mood distinctions such as realis/irrealis (Comrie 1985:50-53). KaiSL, however, supplements its co-expressed past/future temporal adverb and its lack of grammatical tense with the large amounts of common background knowledge that is shared by all its users. KaiSL is used most fluently within a small, intimate network of interlocutors who have been in daily contact for most of their lives. Hence, it is maximally adjusted to its user community (cf. Nyst 2012:567).

KaiSL’s time-marking strategy is an example of how the study of rural SL varieties can add to our understanding of possible SL structures (cf. de Vos & Pfau 2015). Given the typological rarity in spoken language of a lack of grammatical tense combined with a co-expressed past/future temporal adverb, this example also serves to demonstrate the richness that SLs can bring to linguistic typology more generally. Finally, given the fact that this co-expressed past/future adverb has been observed in now at least three SLs in rural areas, this may be a candidate for a common feature of shared SLs, such as those suggested by Nyst (2012). A shared sociodemographic feature of many shared SL communities is a small user community in regular daily contact, which may explain the recruitment of background knowledge in the way the KaiSL time-marking system works. This reinforces why it is crucial to study language and its social context contemporaneously in order to understand how language works.

Figure 1: FUTURE.PAST.1 (Archival ref: 20180419_Canon01_001, 00:07:24-00:07:26)

Figure 2: FUTURE.PAST.2 (Archival ref: 20181115_Sony_015, 00:08:22-00:08:25)

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Kailge Sign Language: A ‘network-based’ sign language and its significance for sign language typology

Lauren Reed, Alan Rumsey & Francesca Merlan

Thursday, 1.59

This paper presents a case study of a small sign language of Papua New Guinea (PNG), which we call Kailge Sign Language (KaiSL). It describes the social dynamics of KaiSL, explains why it does not fit any of the existing commonly cited categories of sign language such as deaf community, village/rural, or homesign, and argues for the recognition of a new typological category to take account of KaiSL and comparable cases from elsewhere.

KaiSL is used in the community of Kailge in rural Western Highlands Province, PNG. There is one deaf person among the ca. 1500 inhabitants of Kailge, named Kakuyl. He is at the centre of KaiSL’s network of users. He has six children who are all acquiring the sign language (SL); thus, the language is two generations old. This study is based on sign-specific fieldwork carried out in Western Highlands, grounded by the second two authors’ 38 years of anthropological research at Kailge. The authors spent one month in 2018 working with 12 deaf people across the rural lower Nebilyer and Kaugel Valleys in Western Highlands, recording sociolinguistic interviews and wordlist elicitation. During this month, the authors also worked intensively with Kakuyl and his network of signers at Kailge, recording around six hours of unstructured conversation and narratives, which were then translated by the participants and the translation process recorded. The corpus is now partially annotated.

KaiSL exists within and is sustained by a *sign network*. This must be understood within the wider social setting of PNG’s western highlands. In this region the *talapi* or tribe/clan is the core social unit (Strathern 1972). Tribes have areas of land; Kailge is within the land of the Kopia tribe. Within each tribe are various clans and sub-clans, who in turn have areas of land within the overall tribal one (Merlan & Rumsey 1991:34-56). Traditionally, men live most of their lives on their clan land, while most women marry out.

Kakuyl belongs to the Kopia tribe, and to the No Peng clan within it. Surrounding him is a core group of fluent hearing signers, most of whom are male and of No Peng clan. We define ‘fluent’ as those whom Kakuyl self-reports as ONE-TO-ONE with him in terms of signing proficiency, and also from the clear levels of mutual understanding that are achieved among the most fluent core group of the sign network, as evinced by their confident translation of signed conversations, their speed, and the precision of turn-taking in their conversations. Making up the core group are Kakuyl’s father, two brothers, and four close childhood friends. The network also includes Kakuyl’s mother and wife, who are not No Peng but in-married women who have lived on No Peng land for many years. In addition, Kakuyl’s six children belong to this core group within the network. The relationships within this group are strong, intimate and – among its adult members – have endured for several decades.

The No Peng clan as a whole forms a more inclusive level of the sign network. Given their near-daily interaction with Kakuyl since childhood, all members of No Peng have some level of sign competency, although less than signers within Kakuyl's immediate circle of family and friends. At the more inclusive level of tribe, many other Kopia also have sign competency, although less than No Peng people within it. Hence we argue that social networks (Milroy 1987) are crucial for understanding the social ecology of KaiSL.

The KaiSL sign network is a community of practice (Lave & Wenger 1991) based on its shared use of KaiSL. It is cross-cut by other communities of practice that exist on other bases. Other ones that Kakuyl belongs to (e.g., his church, local card-playing circles, building crews) have more interaction with him and hence better signing skills than other Kopia who interact less with him. KaiSL as a discrete entity is limited to Kakuyl's sign network.

In terms of linguistic features, despite its very young age, this language is striking for its very fast conversational turns; incorporation of number handshapes into lexical signs; and stacking of signs articulated on the mouth with separate signs articulated on the hands. While homesign may show quite sophisticated structure, a hallmark of this SL type is that the complexity is not adopted by the central individual's interlocutors (Goldin-Meadow, 2003:153-161; Carrigan & Coppola, 2017). This does not apply to KaiSL, whose core signers show equivalent SL complexity. KaiSL seems to be as much their co-creation as that of the deaf man. In our work with 11 other deaf people in the area, we did not find another SL that matched KaiSL's complexity. It is unclear why such a SL has emerged at Kailge, and not at other nearby communities where one deaf person resides. A key factor has certainly been Kakuyl's life history, with two brothers close in age and a cohort of four close childhood friends who have interacted extensively in sign over a long period.

KaiSL cannot be classified as a deaf community sign language because there is no deaf community or deaf sociality at Kailge (cf. Woll & Ladd 2003; Friedner 2011). Village and rural sign languages arise in communities with a high incidence of deafness (de Vos & Nyst 2018). With one deaf person born in over 40 years at Kailge, this is no such community. We argue that KaiSL also does not fit the existing homesign category, due to its relatively large user community of fluent adult hearing signers and cross-generational transmission (cf. (Frishberg, 1987; Goldin-Meadow, 2003). In terms of the above typology, KaiSL falls within Nyst's (2010:568) "grey area". Based on our explication of its social dynamics, and comparison with other recently described signing communities in Mali (Nyst, Sylla & Magassouba 2012), San Juan Quiahije (Hou 2016) and Yucatan (Safar 2017), we argue that KaiSL is not as unusual as the existing typological paradigm would suggest, and that such cases call for a new category of *network-based sign languages*.

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SPEAK SIGN SAME-TIME?!: Code-blending patterns of school-aged bimodal bilingual children

Wanette Reynolds & Kari Spector

Saturday, 3.23

The current study examines the code-blending practices in the English and ASL narratives of two elementary school-aged bimodal bilinguals who can hear, referred to as Koda, at two points in time (T1 ages both 6;09 & T2 ages 8;01 and 8;02). We examine the semantic propositions and frequency of code-blending developmentally by applying language synthesis model in which two languages contribute to a single proposition (Koulidobrova, 2013; Quadros, et al. 2015).

Using a quasi-experimental design, narratives were elicited in both of the child's languages using a non-verbal video stimulus. For the purposes of this study, we focus on the *Lollipop* retelling that was elicited first in ASL to a Deaf researcher and then retold in English to an adult Coda researcher. The English target elicitation provided a bimodal bilingual context by pairing the Koda child with a Coda adult they knew well through the larger longitudinal study on bimodal bilingualism. The ASL target narratives are compared to the literature on code-blending patterns of Koda toddlers engaged in spontaneous conversation with Deaf interlocuters (van de Bogaerde & Baker, 2004; Petitto, 2001; Quadros, Lillo-Martin, & Chen Pichler, 2015), while the English target narratives are compared to adult Codas in a narrative retelling task with Coda interlocuters (Emmorey et al., 2008).

A total of eight narratives were transcribed, coded, using Elan transcription software and analyzed which yields a total of 187 utterances and 124 code-blended utterances. An utterance was coded as code-blended when the target language was accompanied by the non-target language (either signed or verbalized), otherwise known as a 'bimodal utterance.' Utterances were also coded for full or partial code-blending and semantic equivalency. For both target language contexts, a code-blend was analyzed as *partial* if some but not all of the semantic information in the non-target language was conveyed simultaneously with target language, as seen in (1) & (2). A partial blend may constitute either a single word/sign (2) or multiple (1) as long as the entire semantic meaning was not fully represented in the non-target language. A code-blend was analyzed as *full* if all of the semantic information in the target language was fully expressed in the non-target language (3) & (4). A full blend can take many forms, e.g. one depictive verb that encompasses all of the semantic information in the English utterance (4) or each ASL target sign accompanied by an English word (3). Finally, both partial and full code-blends were deemed translation equivalents if any of the accompanying non-target language corresponded to the meaning in the target utterance as seen in (1) (2) & (3) while in (4) the depicting verb adds additional meaning not found in the English target language.

Ben T1, ASL target, utterance 30, partial, equivalent code-blend
(1) THEN **BLACK SPIDER** COME-TO TAKE
black spider
Then the black spider came over and got the stick.

Tom, T1, ASL target, utterance 4, full blend equivalent blend
(3) **IX(flies) SEE IX(ants) FS(aXs) HAVE FS(a) LOLLIPOP**
they see the a// ants have a// a popsicle
They see the ants have a popsicle.

Ben T2, English target, utterance 9, partial, equivalent code-blend
(2) **and then they threw** the stick
THROW
And then [the flies] threw the stick.

Tom, T2, English target, utterance 17, full non-equivalent blend
(4) **and then they sw// do it up like this**
DV(flies-pull-up-lollipop-stick)
And then they [flies] pulled up the lollipop by the stick like this.

The ASL target narrative results in Table 1 below, show the frequency of code-blending by Tom and Ben at both T1 and T2. Tom overwhelmingly produces more code-blended utterances in the ASL target narrative session at T1 (96%) than Ben (48%). However, at T2, Ben increases his code-blend utterances to 89% approaching Tom's production levels at T1 (where the majority of his utterances were blended). The results seem to echo findings on bimodal bilingual toddlers—as the children increase in age, the amount of code-blended utterances increase as well (Petitto et al. 2001; Van den Bogaerde & Baker, 2008). Additionally, in an earlier study including Ben (2;0-2;06), his combined use of code-blended utterances in both sign and speech target sessions made up only 17% of his utterances combined (de Quadros et al., 2015), which points to his increasing use of code-blending over time in the current study. Like previous studies of younger bimodal bilingual children (Petitto et al. 2001; Van den Bogaerde & Baker, 2008; de Quadros et al., 2015), both Ben and Tom provide translation equivalents for all of their code-blended utterances in the ASL target narrative session. The data in this current study revealed a difference in code-blend type amounts by Ben and Tom. Ben, in both times, preferred partial code-blending while Tom preferred fully code-blended utterances.

Table 1: ASL target narrative code blending patterns for bimodal bilingual children in two times shown by utterance occurrence and percent, n (%)

ASL Target					
	Total utterances	**Code-blended**	**Fully blended**	**Partial blended**	**Translation equivalents**
Time 1					
Ben 06;09	31	15 (48)	5 (33)	10 (67)	15 (100)
Tom 06;09	28	27 (96)	27 (100)	0 (0)	27 (100)
Time 2					
Ben 08;02	19	17 (89)	6 (35)	11 (65)	17 (100)
Tom 08;01	16	16 (100)	14 (88)	2 (13)	16 (100)

Table 2: English target narrative code blending patterns for bimodal bilingual children in two times shown by utterance occurrence and percent, n (%)

English Target					
Time 1	**Total utterances**	**Code-blended**	**Fully blended**	**Partial blended**	**Translation equivalents**
Ben 06;09	22	15 (68)	14 (93)	1 (6)	14 (93)
Tom 06;09	26	12 (46)	4 (33)	8 (67)	12 (100)
Time 2					
Ben 08;02	19	10 (53)	3 (30)	7 (70)	10 (100)
Tom 08;01	26	12 (46)	8 (67)	4 (33)	11 (92)

In the English target narrative results, as shown in Table 2, Ben slightly decreased his frequency of code-blended utterances (T1, 68% vs. T2, 53%). While Tom, much like the ASL target narrative, was consistent in the amount of code-blending at both times at 46%. Ben and Tom at both times produced more code-blending when conversing with an adult Coda than has been previously found in adult Codas in a narrative retelling task with other adult Codas, 29% (Emmorey et al., 2008). However, like the Coda adults in the Emmorey study, the Koda children in the current study rarely code-switched, with Ben at T1 only producing three instances of code-switching in the English target narrative. Another similarity between the Coda adults is the prevalence of semantic equivalents in code-blended utterances. Lastly, Ben and Tom each showed different code-blend type preferences in their ASL and English target narratives. Ben at T1 preferred fully blended utterances (93%) in the English target, while at T2 he shifted to a partial code-blend preference (70%). Conversely, at T1 Tom preferred partially blended utterances (67%) and shifted to a fully code-blended preference (67%).

The language synthesis model predicts four types of code-mixed utterances: fully bimodal, sign base, speech base, and complementary (Quadros, et al. 2015). The ASL narratives for both children show an increasing preference to fully bimodal utterances. Ben at T1 showed a slight preference for expressing the narrative in ASL (sign base) and shifts to a majority of bimodal utterances in T2, whereas Tom overwhelmingly preferred bimodal utterances in T1 and fully produced bimodal utterances at T2. Differently, the English narratives show an increasing preference for speech base utterances. These findings seem to suggest that there is a difference in the ability to suppress one language over the other during the developmental trajectory of bimodal bilinguals. Our findings, albeit from a small number of participants, fill a gap in the code-blending literature between toddlerhood and adulthood.

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Manual and non-manual components: Acquisition and mastery in deaf and hearing signers

Pasquale Rinaldi, Maria Cristina Caselli, Luca Lamano, Tommaso Lucioli & Virginia Volterra

Saturday, 3.24

BACKGROUND: In sign languages manual components (the configuration, orientation, movement, and location of the hand) and non-manual components (gaze direction, facial behavior, mouthing/mouth gestures, and body movements) occur simultaneously conveying many different types of linguistic information. For example, a non-manual component such as a mouth gesture can indicate the size of an object identified by a manual sign. A facial expression could also add semantic information about the way an agent is performing an action. The signing modality also allows the two hands to convey two different meanings at the same time. For example, the dominant hand can execute a lexicalized sign, at the same time the non-dominant hand executes another kind of sign (a “classifier form”) which refers to the same referent but additionally locates it in the signing space. As for sign language acquisition, several studies have addressed the mastery of the manual components of execution reporting that signing children make errors in handshape until ages 5 or 6 (Meier, 2016). Few studies have analyzed the acquisition and mastery of non-manual components (i.e., eye-gaze, facial expression, mouth gestures, and body movements). Emmorey and Reilly (1998) reported that deaf children aged 3–7 years master manual lexical signs before non-manual components. Cormier and colleagues (2013) also found that 6-year old deaf children were not yet able to produce non-manual articulators characterizing constructed actions simultaneously with production of manual signs. Studies on sign language have reported that individual variability observed in linguistic skills is strongly related to the child’s age of exposure to SL (Pizzuto et al., 2001), as well as to the contexts in which the language is used (Tomasuolo et al., 2013). Studies on spoken languages demonstrated that Sentence Repetition Tasks (SRT) reflect language knowledge at many different levels and can give information on both lexical and grammatical skills (Klem et al., 2015). Some studies have demonstrated that SRTs are sensitive to the differences in signing skills among signers of varying ages and fluency (Hauser et al., 2008; Supalla et al., 2014). In the present study, competencies in Italian sign language (LIS) in four groups of deaf and hearing participants were investigated using a Sentence Reproduction Task (LIS SRT, Rinaldi et al., 2018). Similarities and differences among groups in reproductions of sentences and in the number and type of errors were analyzed. Chronological age, deaf/hearing status, age of acquisition of LIS, and contexts in which the language is used have been considered as possible factors affecting performance in the task.

METHODS: Eight sentences (35 sign units) of different length and degree of linguistic complexity from the LIS SRT have been used. Each participant was instructed by a deaf signing experimenter to exactly reproduce the signed sentence shown on a computer screen. Participants’ productions were video recorded for later scoring. The following aspects have been considered: number of sentences correctly reproduced, number of signs correctly reproduced and number and types of errors. As for errors, the following typologies have been considered: (i) manual components of execution (handshape, movement, location and orientation); (ii) agreement and/or use of space; (iii) use and or maintenance of the non-dominant hand; (iv) non-manual components (facial expression, eye-gaze, mouthing/mouth gestures, body movement/role taking). Forty-eight signing participants were involved: twelve deaf children, twelve hearing children attending the same bilingual bimodal school as deaf children, twelve deaf adults, and twelve hearing adults from deaf families. The age range of children was 8–11 years; the age range of adults was 25-51 years. A corpus of 384 signed sentences (1680 sign units) has been collected and analyzed.

RESULTS: The number of sentences as well as the number of sign units correctly reproduced and the number of errors made were significantly different among groups ($F(3,44) = 16.353$; $p <.001$; $F(3,44) = 29.142$; $p <.001$; $F(3,44) = 21.529$; $p <.001$, for sentences, sign units and errors, respectively) with deaf adults performing better than the other three groups and deaf children and hearing adults performing better than hearing children. No significant difference between deaf children and hearing adults was found in these measures. Hearing children made more errors than the remaining three groups ($F(3,44) = 9.845$; $p <.001$), while these latter did not significantly differ among them. No difference among groups emerged in errors involving the use of space and the non-dominant hand. Hearing children made a significantly higher number of errors involving non-manual components than the remaining three groups. Deaf children significantly differed in this measure only with respect to deaf adults ($F(3,44) = 19.046$; $p <.001$).

CONCLUSIONS: The four groups differed in all the measures considered, with deaf adults performing better that the other three groups and with deaf children and hearing adult performing similarly in several measures. The general picture that emerged provides interesting insights for sign language acquisition processes and clearly shows that linguistic skills appear to be related to all the factors we considered and that difficulties of children in mastering non-manual components appeared to be affected by developmental factors. Our data suggest that non- manual components would be among the most difficult aspects to be mastered for deaf and hearing children, as correct reproduction requires simultaneous processing of several linguistic aspects resulting in a potential cognitive overload.

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Pointing gestures and personal references in Seychelles Sign Language and Creole Seychellois

Annie Risler

Saturday, 3.25

There are 3 main Islands in the Seychelles (Mahé, Praslin, La Digue), where live less than 100 signers. Seychelles Sign Language (SSL) is a signed language from a very small community. Its lexicon comprises signs/words shared by the signers of the major Islands, as well as a specific lexicon in the island of La Digue, where live two families with deaf-adults siblings. A few signs are borrowed from other sign languages, mainly French Sign Language and American Sign Language, due to occasional contacts at sports events or educational exchanges with deaf people from La Réunion as well as with deaf tourists.

Meir (2010) claims that sign languages emerge from natural gestures and cultural gestuality used in the surrounding hearing community. Among gestures that complement speech, we want to investigate forms and functions of pointing gestures, as ubiquitous features which involve language, cognition and culture (Kita, 2003). This presentation focuses on the relations between pointing gestures used by speakers of Creole Seychellois (CS) and by signers of SSL, and the integration of pointing gestures in SSL. Speakers as well as signers widely use pointing gestures in association with personal and spatial references. Can we argue for the existence of pointing signs in SSL? At what level are they influenced by gestures in CS?

A research conducted in the hearing community of the Seychelles (Brueck 2016) highlighted that 80% of referential gestures are produced simultaneously with an utterance of a referent in speech (personal or spatial). Among these gestures, 42% are iconic gestures, and 58% are pointing gestures: direct pointings (to a present person when one refers to him/her vocally, or to a real place when one refers to it vocally) ; metonymical pointings (to a real place associated with a person when one refers to that person vocally) and metaphorical pointings (to an abstract place in association with a reference by speech to a person or a place). Brueck makes the hypothesis, that pronominal clitic or deictic particles widely presents in the creole syntactic structure could explain the high frequency of associated deictic gestures.
SSL research was conducted as part of a project called ‘SSL development’, funded by the government of the Seychelles from 2010 to 2018. Data where collected from about thirty deaf adult signers, during video recorded interviews or exchange workshops. (Gebert &Risler 2009 - 2017).

There are similarities and differences in the use of deictic gestures in CS and in SSL:
SSL’s Signers use the same set of 5 major hand-shapes as hearing people do. A same ‘purse’ hand-shape (all fingertips touch each other, and point toward the chest) is specifically used by hearing or deaf people to refer to themselves.

But in SSL, concerning the other hand-shapes each one has its own specific use. This is not the case in CS. While the pointing gesture with the index finger in CS only represents 10% of deictic gestures, it represents the great majority of pointing gestures in SSL. It is widely and exclusively used after a personal or spatial reference expressed by a noun-phrase. Concerning the B hand-shape, it is reserved for the expression of path in SSL.

As in CS, personal references in SSL are accompanied by an index pointing which occurs after the nominal reference. These pointing signs correspond either:

- to deictic reference, with a direct index to a present person

Ex: MADAM PT-IX (that woman) PETI GARSON POSEDE (trad : *This woman has a boy)*

- to a spatial reference, with an index to a real place associated with the person or to a seemly abstract place in relation with a transposed perspective (Haviland 2000)

Ex: MON RAPPEL DALON PT-IX (toward the real place her friend lives) (trad : *I remember a friend*)

- Or to a future possible anaphoric reference, with an index to an abstract place, in front of the signer (a reduced form of metaphorical pointing gesture).

Ex: LENDYEN Pt-Ix (reduced, in front of the signer) TIP (trad : *the Indian types on the keyboard)*

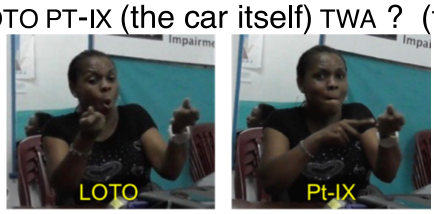
The direct pointing toward a real place is characteristic and common in the Seychelles to hearing and deaf people as well, due to the fact that they live in a very small area. This is also the case for other small communities (DeVos 2015, Le Guen to appear, Nyst 2007).

Furthermore, SSL's signers systematized and complicated the use of metaphorical pointings with the index finger. Deictic gestures are clearly part of SSL expression. They are integrated in SSL, following a lexicalization or a grammaticalization process: New personal references in SSL are systematically accompanied by a pointing gesture.

Signers use digital pointing gestures (for numeration) as speakers do. These gestures are still lexicalized for the days of the week.

Signers point their index finger toward a hand-shape too, as a classifier. That is a specific grammatical use of digital pointing gesture.

Ex: LOTO PT-IX (the car itself) TWA ? (trad : *have you got a car ?)*



In conclusion similarities in the use of deictic gestures in CS and in SSL suggest that gestures in CS have an influence on the form, number and function of some pointing signs :

- same hand-shapes in the pointing gesture accompanying first person references ;
- same current association of personal and spatial references, in vocal and signed language;
- possible influence of the syntactic structure of CS in the addition of indexical pointings after or before a personal reference in SSL;

Nevertheless, significant differences limit this influence, in particular the specialization of hand-shapes for deictic gestures in SSL. The systematic use of the indexical hand-shape could appear to be a unique feature of signed languages. Lexicalization and reduction argue for the existence of pointing signs in SSL.

A comprehensive review of differential use of index pointings and opened-hand pointings in CS and in SSL will be undertaken.

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The emergence of the adversative conjunction BUT in Brazilian Sign Language: Grammaticalization path from gesture to grammar unit

Angelica Rodrigues

Saturday, 3.26

Background. Ever since the seminal work of Meillet (1915), the grammaticalization of conjunctions has received considerable attention in the linguistic literature on spoken languages. The author states that the disappearance or renewing of conjunctions is triggered by repetition, which leads to the weakening of their expressive value, and to the loss of "phonetic volume" (Meillet 1915: 15-17), and he refers to this process as 'grammaticalization'. The grammaticalization of conjunctions is also discussed by Hopper & Traugott (2003: 184), who point out that, in spoken languages, conjunctions grammaticalized notably from sources like nouns, verbs and adverbs. Although conjunctions and complementizers are often not obligatory in sign languages (Tang & Lau 2012), Pfau & Steinbach (2011) found evidence for the grammaticalization of complementizers in German Sign Language (DGS). They argue for a Noun-to-Complementizer chain, where the noun REASON has developed into a complementizer introducing adverbial (reason) clauses, as in (1):

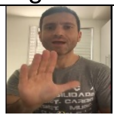
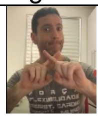
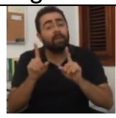
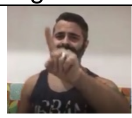
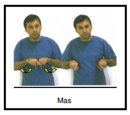
(1) INDEX$_1$ SAD **REASON** POSS$_1$ DOG DIE
'I'm sad because my dog died.'

Besides this modality-independent path, the authors argue, following Wilcox (2004), that gestures can also undergo grammaticalization in sign languages. Wilcox proposes that gestures can enter the grammatical system through grammaticalization in two different routes, where in the first route, "a gesture that is not a conventional unit in the relevant linguistic system [...] becomes incorporated into a signed language as a lexical item" acquiring over time a grammatical function (Wilcox, 2004: 48).

Goal. The aim of this paper is to present a first description of the grammaticalization of the conjunction BUT in Brazilian Sign Language – Libras. The original contribution of this research is to present the grammaticalization of the adversative conjunction BUT, which has never been described for any sign language, from a gesture.

Methodology. For this research, we utilize naturalistic data extracted from two sources: the Libras Corpus of Federal University of Santa Catarina (http://www.corpuslibras.ufsc.br) and videos from signing blogs available on Facebook and Youtube. The results are based on the analysis of 50 sentences with BUT extracted from the total amount of 50 videos. All the data are annotated in ELAN and analyzed with the help of a deaf student and a Libras interpreter.

Results – grammaticalization from gesture to conjunction. The data display multiple variants of BUT as illustrated by Figures 1-5, however, to demonstrate the second case of grammaticalization we focus on BUT1 (two handed) and BUT1'(one handed) (Figures 1 and 2)

Figure 1	Figure 2	Figure 3	Figure 4	Figure 4	Figure 5
 BUT1	 BUT1'	 BUT2	 BUT3	 BUT3'	 BUT4

In (2), there is an example of BUT1 used to connect two sentences conveying an adversative meaning, specifically a meaning of denying of expectation: the fact that the signer does not use the two different signs for Libras could lead to the conclusion that she would not know them; however, the sentence introduced by BUT undoes this interpretation:

(2) LIBRAS1 IX_1 NO-USE LIBRAS2 IX_1 NO-USE **BUT** IX_1 KNOW
‘I don’t use these different signs for Libras but I know them.’

We will state that the source of BUT1 (and BUT2) is what Kendon (2004) identifies as Open Hand Prone (OHP) gestures and the changing involved in this process suggested a modality-specific grammaticalization path (Wilcox 2004, Pfau & Steinbach 2011) from gesture to conjunction. Therefore, in the grammaticalization *cline* proposed here, between the OHP gestures and the adversative use of BUT1 and BUT1', we identified the use of the same sign, which is frequently translated as WAIT/STOP for deaf informants, is related to temporal/logical (sequential) meaning, and cannot be categorized as either lexical or grammatical unit, as in (3). This development is aligned with Hopper & Traugott (2003) and Traugott (2011) proposal that enhancing of pragmatic factors associated with contextual inferences are crucial to grammaticalization process and explain how new grammatical forms arise.

(3) IX1 BARRIER HAVE PROBLEM DEFECT SEE 'WAIT' WORRY HOW TO RESOLVE
'I see a problem and/so I'm worry about how to resolve this"

Conclusion. This study confirms, based on naturalistic data, the modality specific grammaticalization path and is the first one to describe the grammaticalization of an adversative conjunction from a gesture.

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The relationships between lower-level and higher-level comprehension skills in ASL

Patrick Rosenburg & Adam Stone

Saturday, 3.27

Text comprehension is an important cognitive skill for classroom learning as well as future academic and career advancement (Silva & Cain, 2015). To comprehend a text entails different language skills and cognitive processes (Oakhill & Cain, 2012). Research studies on reading revealed the importance of decoding, vocabulary knowledge, syntactic knowledge as lower-level skills and literal and inferential skills as higher-level skills for overall text comprehension (Silva & Cain, 2015). Therefore, assessing children's lower-level and higher-level skills is necessary (Hogan, Bridges, Justice, & Cain, 2011). Further, there are several cross-linguistic studies to date that examined such relationships between lower-level and higher-level comprehension skills in L1 and their roles in L2 (Nassaji, 2003; Edele & Stanat, 2015), thus expanding new insights about bilingual learners who speak or read two languages. However, when we look at Deaf children who use both languages ASL and English, there are no studies in place that examine such relationships between lower-level skills and literal and inferential comprehension skills in ASL (Haug, 2008). Consequently, our understanding of Deaf children's higher-level skills in ASL remains limited. From bilingual viewpoint, this study is critical as it will not only offer a better understanding of ASL, whether it parallels to spoken/written languages or not, but also to expand the current theoretical understanding of the relationship between ASL proficiency and English comprehension skills. 303 Deaf children from 8 to 18 years old from 4 Deaf bilingual schools across the United States participated in this study. Their ASL vocabulary and syntax knowledge (lower-level skills) relative to literal and inferential comprehension (higher-level skills) were examined. The aim of this study was to investigate the contributions of ASL vocabulary knowledge and syntax knowledge as potential sources of literal and inferential comprehension in ASL. All of these measures were from American Sign Language Assessment Instrument (ASLAI) (Hoffmeister, Fish, Benedict, Henner, Novogrodsky, & Rosenburg, 2013). First, we conducted a correlational analysis to determine the interrelations between the following measures: age, vocabulary knowledge (Two different measures: 1. Synonym and Antonym tasks; and, 2. Vocabulary Difficulty task), syntax knowledge, literal comprehension, and inferential comprehension. They all were correlated (all ps $< .05$). Secondly, multiple regression analysis was conducted to examine whether or not each variable predicted literal comprehension and inferential comprehension. Results yielded that for both literal and inferential skills as two separate dependent variables, only vocabulary knowledge and syntax knowledge demonstrated significant variance in both higher level comprehension skills. These findings are in line with other studies in spoken/written languages (Silva & Cain, 2015; Tompkins, Guo, & Justice, 2013; Lepola, Lynch, Laakkonen, Silven, & Niemi, 2012) and ASL (Henner, Novogrodsky, Caldwell-Harris, & Hoffmeister, 2018), which indicated that language skills are more important for higher-level comprehension skills. Much of what we know about Deaf children's higher-level comprehension skills has been informed through reading comprehension in English; therefore, it is possible that much of the variance in Deaf children's reading comprehension can be explained by a lack of lower-level and higher-level comprehension skills in L1. Without such skills in the L1, Deaf children do not have the foundation with which to transfer knowledge to their L2. Thus instead of focusing on English as the basis for Deaf children's reading challenges, this study signifies the need for more studies on understanding the relationships between lower-level and higher-level comprehension skills in ASL, which may reveal a significant gap in Deaf children's linguistic knowledge.

Metalinguistic awareness of regional variation in BSL

Katherine Rowley, Jordan Fenlon & Kearsy Cormier

Saturday, 3.28

Recent studies based on the BSL Corpus (Schembri et al., 2014) have found that different social factors such as region have an influence on accommodation, fingerspelling, mouthing, and phonological variation in BSL (e.g. Fenlon et al., 2013; Stamp et al., 2016; Proctor, 2016; Brown & Cormier, 2017). However, it is unclear how closely BSL users' metalinguistic knowledge aligns with the findings of these corpus-based studies. We explore whether BSL users in the corpus are aware of how different aspects of BSL vary according to region. As part of an interview on language attitudes, BSL Corpus participants from 8 different regions in the U.K. were asked several questions about language use including questions on variations linked to region, gender, age, family background (deaf or hearing) and hearing status (deaf or hearing). Here we report on findings in relation to beliefs and attitudes towards regional variation in BSL – specifically relating to noticeable differences and comprehension of BSL across regions, whether signers accommodate to regional signs produced by others, and whether signers would prefer regional variation or standardisation across regions.

Data was translated from BSL to English and a thematic analysis on BSL users' knowledge of how different social factors influence language use was carried out using ELAN. Thematic analysis followed grounded theory, in which themes identified 'emerge' from the data and reflect the perspectives of those who responded. Themes were not predetermined. The data from ELAN was then exported to Excel and themes were grouped together in order to identify what respondents said about each theme collectively. Results so far, based on 160 respondents from the Belfast, Birmingham, Bristol, Cardiff, Glasgow, London, Manchester and Newcastle regions, indicate that signers are aware of how region influences language use.

In relation to language change, respondents often commented that they believed regional variations were declining due to outside influences such as the internet, increased language contact due to the ability to travel more, which is consistent with findings from several studies exploring linguistic behaviour amongst signers (Woll et al., 1991; Sutton-Spence & Woll, 1999) and more recently (Stamp et al, 2014). Respondents from Belfast, particularly, talked a lot about how 'English' signs were making their way into Northern Ireland. They believed that these influences were from English Deaf people who worked on the deaf T.V. programme, 'Vibe', which was based in Northern Ireland. Additionally, respondents explained that many deaf children went to English schools and colleges and 'brought back' English signs to Northern Ireland, which other Northern Irish people then adopted. Although, generally, respondents believed regional variation is declining, a few people in the BSL Corpus believe that younger signers use more variation in comparison to older signers. This is in contradiction to findings reported by Stamp et al. (2014) in a study focusing on signs used to describe colours, countries, numbers, and UK placenames; amongst this group of signs, dialect levelling appears to be taking place amongst younger signers with fewer sign variants being used overall.

Respondents did not only comment or give examples of how they believed lexical signs varied across regions - some also talked about mouthing, fingerspelling and signing style. BSL users reported that English mouthings were different depending on which region of the U.K. you came from and believed that BSL users in the North of England and Scotland uses less mouthing compared to BSL users in the South. Proctor (2016) found that BSL signers in the South (London and Bristol) mouthed with verbs more than people in the North (Glasgow and Belfast) - thus the interview data shows that BSL users are aware of these regional differences in mouthing. Some respondents mentioned that the use of fingerspelling differed across regions, with fingerspelling being used more extensively in Scotland and the North of England (especially Newcastle). Brown & Cormier (2017) found that older people in Scotland tended to fingerspell more, which Scottish BSL users seemed to be aware of.

Most respondents reported that they had no trouble in understanding people from other regions, just the odd sign here and there, which is easily cleared up after asking for clarification. This is largely consistent with what Stamp et al. (2016) more recently found regarding comprehension of regional signs in BSL – i.e. signers from different regions tend to both accommodate to and understand each other. In addition, Stamp (2016) found that mouthing plays a big role in comprehension, which some signers seem to be aware of by reporting that mouthing helps them understand signers from different regions.

Overall, although there are some exceptions, findings suggest that for the most part, BSL signers' attitudes and beliefs about language use in the British Deaf community relating to region tend to align with findings about linguistic behaviour – i.e. there are reasonable levels of metalinguistic awareness about region in the British Deaf community.

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Lexical frequency in the Polish Sign Language Corpus at different time points of its development

Paweł Rutkowski, Joanna Filipczak, Piotr Mostowski & Anna Kuder

Saturday, 3.29

Using corpus data is nowadays becoming an increasingly common practice in sign language linguistics. With the development of video processing and annotation technology, more and more research groups undertake the very time- and resource-consuming task of creating a corpus of the sign language they work on. Such projects result in different types of corpora, including large-scale general corpora (e.g. the German Sign Language corpus, which is expected to consist of approximately 3 million annotated sign occurrences; https://www.sign-lang.uni-hamburg.de/dgs-korpus/index.php/corpus.html) and smaller general corpora (e.g. the corpus of the Sign Language of the Netherlands – Crasborn, Sloejtes, 2008, or the British Sign Language corpus – Schembri et al., 2013), as well as more limited and more goal-oriented language archives, like the Corpus Project in Colloquial Japanese Sign Language (http://research.nii.ac.jp/jsl-corpus/public/en/index.html).

With all those different linguistic resources of different sizes, a natural question arises: how much linguistic material is enough to obtain reliable results of the research conducted on the basis thereof? Does the size of the inspected sample impact the conclusions of the analyses carried out with the use of sign language corpus data and if yes, then how? In the present paper, we attempt to answer this question with the use of empirical material extracted from the Polish Sign Language (PJM) Corpus, which is currently being compiled at the University of Warsaw, Poland. Our findings relate to frequency data but we are positive that the obtained results could be extrapolated and give us important information about the size of corpus datasets needed to conduct reliable linguistic research and about plateau effects involved.

The Polish Sign Language (PJM) Corpus is a large-scale reference corpus that has been developed since 2010 by the Section for Sign Linguistics of the University of Warsaw (Rutkowski et al., 2017). Currently, the PJM Corpus consists of video recordings of 150 Deaf participants. More than 676,500 sign tokens have been anntated so far. For the purposes of the present study, we extracted data from different time points in the PJM Corpus creation process in order to check to what extent the growth of the collected dataset impacts the results of corpus-based frequency analyses. Below, we present data regarding the frequency of different sign classes in the PJM Corpus, illustrating how the analyzed sample size impacts the results obtained.

Table 1 shows how the size of the PJM Corpus (i.e. the number of identified sign types and annotated tokens) has changed over time.

Table 1. PJM Corpus size at three time points

	2015 (Mostowski et al., 2016)	2016 (Mostowski et al., 2017)	2018
Types + subtypes	approx. 14,400	approx. 18,500	approx. 21,400
Sign tokens	207,334	298,297	676,507
All tags in the corpus	173,652	253,959	1,532,680

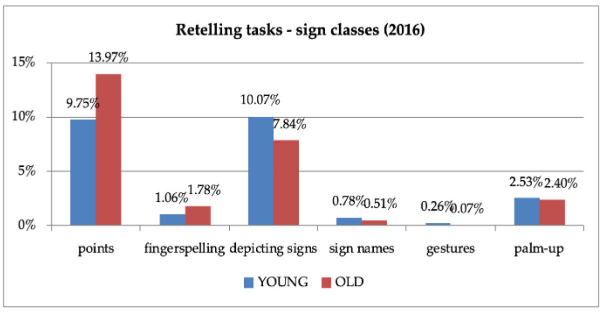
In table 2, we present data on the distribution of different sign classes (i.e. lexical signs, pointing signs, classifiers, etc.) at two time points: 2016 and 2018.

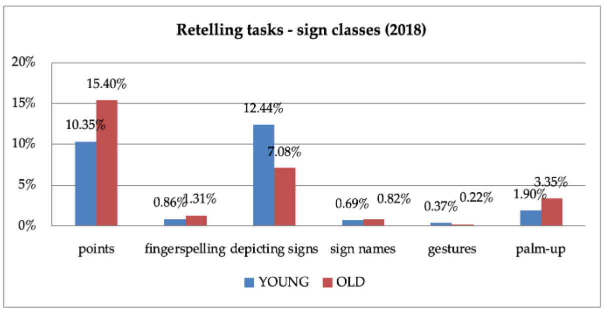
Table 2. Sign classes in the PJM Corpus

SIGN CLASS	**2016**	**2018**
lexical signs	71.1%	73%
pointing signs	13%	13%
classifiers (depicting signs)	5%	4%
palm-ups	4%	4%
signs unknown to annotators	2%	0.8%
hold-pause between signs	1%	1.2%
gestures meaning “never mind, whatever”	1%	1%
fingerspelling	1%	1%
interrupted, unfinished signs	0.7%	0.8%
other signs (including gestures and sign names)	0.7%	0.6%
phatic gestures	0.5%	0.6%

It should be noted that, even though the PJM Corpus has grown significantly over the last three years, the proportions of different sign classes have remained more or less the same. Thus, our observation is as follows: there is a clear plateau effect, which ensures the informative value of the 2016 dataset (approx. 300,000 annotated tokens). Also, the data analyzed for this study confirm that the PJM Corpus annotation methodology has been employed consistently.

In the second part of the present study, we discuss the distribution of different sign classes in retelling tasks performed by younger and older signers. The 2016 data cover material coming from 10 native signers, each of whom performed 3 retelling tasks. The total number of inspected tokens was 7815 (3477 tokens for five younger signers and 4338 for five older ones). In comparison, the 2018 data come from 50 informants and the sample consists in 40,048 tokens (21,343 for 25 younger signers and 18,705 for 25 older signers). The distribution of different sign classes is shown below:





There does not seem to be a striking difference between the two inspected time points, which confirms our previous findings: the increase from approx. 300,000 to almost

700,000 annotated tokens has not influenced lexical frequency data in any significant way. We are clearly faced with an example of the plateau effect. We will present a detailed discussion of the obtained results and their consequences for further corpus-based research in the conference paper.

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Numeral systems and their diachronic changes in Japanese Sign Language, Taiwan Sign Language and Korean Sign Language

Keiko Sagara

Saturday, 3.30

This study is on diachronic changes in the number systems of Japanese Sign Language (JSL), Taiwan Sign Language (TSL), and Korean Sign Language (KSL), which together are called the JSL family (Fischer & Gong 2011). There is an established body of research on these languages, but relatively little is known about their historical aspects because diachronic research has been minimal. This kind of research is possible for both sign languages and spoken languages, commonly through analyses of annotated corpora and historical materials. However, it is often more complex for sign languages, for example because of the multiple tiers of transcription that are required and taking into account the various parameters such as handshape, movement and placement.

In studies that have looked at the parameters of signs from languages in the JSL family (Sasaki 2007), similarities have been found but these are not necessarily due to these languages being related; often, similar signs are found across two languages because both use a similar iconic motivation for a particular concept. This can affect many domains, including that of numerals, and indeed many number signs in the JSL family are motivated by iconicity. But numerals and especially number *systems* are also abstract enough in nature that one may analyse them to determine whether there could be evidence of historical relationships between particular languages. For the JSL family, we see that there are two main systems. The first is a system based on numeral incorporation (the 'NI system'). This combines numeral handshapes, e.g. two fingers extended for '2', with distinct movements, e.g. an upward movement meaning 'hundred'. The second is a system based on iconically showing the number of zeros involved (the 'Z system'). One finger touches the thumb for the tens place, two for the hundreds place, and three for the thousands. These are used in sequential constructions. (For example, 3,400 would be articulated by extending three fingers, then touching three fingertips to the thumb for 'thousand', then extending four fingers, and then touching two fingertips to the thumb for 'hundred'.)

To look at the development of these two systems, data were elicited through game activities from participants in all three countries, and compared with historical materials. These materials include inventories of JSL signs from Osaka dated 1937 (Matsunaga 1937), and from Tokyo dated 1960s (Mishima & Kaneda 1963) The NI system influenced Taipei in Taiwan and Seoul in Korea, and the Z system influenced Tainan in Taiwan and Hakodate in northern Japan.

There are two main findings. The Tokyo signs from 1960 were evident in the signs used in Seoul and Taipei. These included two forms of the NI system; however, both of these forms used two hands in 1960, and are now one-handed only. The other main finding is that the Z system, which originated in Osaka, was taken to Hakodate and Tainan by teachers of deaf children who were sent there from Osaka. But Osaka itself has now shifted to the NI system, and in Hakodate a mixture of the two systems is used, with the NI system becoming more prevalent among younger signers. Of the six locations studied, only Tainan features exclusive use of the Z system among signers of all ages. Because the forms in the Z system take more time to articulate than those in the NI system, this pattern of findings accords with the tendency for lexical items to be shortened over time (Frishberg 1979; Wilcox & Wilcox 2012). The NI system is used in urban areas, in which language change are usually adopted more quickly than in rural areas due to their larger and more transient populations (e.g. Sagara 2014; Zeshan & De Vos 2012).

Further research is necessary to examine other questions, such as how contact with Chinese Sign Language and spoken Mandarin might influence TSL and JSL differently. More investigation of age variation among the signers of languages in the JSL family could also shed light on diachronic change in sign languages more generally.

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An emerging SELF: The copula cycle in ASL

Tory Sampson & Rachel I. Mayberry

Friday, 12:30-13:00

In modern ASL, the sign SELF has been found to be a reflexive pronoun (Baker-Shenk & Cokely 1980; Kegl 2003; Sandler & Lillo-Martin 2006), a quasi-intensifier (Koulidobrova 2009), and an emphatic (Wilkinson 2013a, b). Analyzing data from old (1910-1915) and modern ASL corpora, we find that in sentences with nominal predicates, SELF in the post-nominal position functions as a copula rather than as an emphatic as commonly observed in spoken languages. In old ASL, the sign SELF was used extensively as a third person subject pronoun. This suggests that the current sign SELF has undergone a copular cycle, that is, a grammaticalization process in which a pronoun evolves into a copula (Katz 1996). We provide evidence that SELF in ASL has evolved a new copular function for use in sentences with nominal predicates.

Typological perspective on compounds in LIS and LSF

Mirko Santoro

Saturday, 3.31

Background.

Sign languages, as spoken languages, have sequential compounds, such as *swordfish*, but differently from them they also have simultaneous compounds [6]. In addition to that, compounds in Sign Languages, can be made up by classifier and initialized signs [5]. However, while it exists a general classification on compounds [1] and a formal analysis on compounds [2], the former does not take into account simultaneous compounds and the latter has never been applied to sign language data.

Goal.

We investigate LIS and LSF compounds and we present: i) a classification based on the lexical properties of the members that compose them [5], such as core, classifier and initialized signs ii) a new proposal for the general classification of compound proposed by [1], iii) a formal analysis of compounds based on DM [2].

Data.

We found 140 compounds in LIS and 137 compounds in LSF. They can be categorized as simultaneous vs. sequential. We focalize our attention to three of the lexical categories proposed by [5]: Core, classifier and initialized signs. Some relevant compounds are shown from (1) to (8):

(1) *seq.compound:* (LIS)

(2) *sim. compound:* (LSF)

(3) *seq. coreˆcore compound:* (LIS)

(4) *sim. classifierˆclassifier compound:* (LSF)

(5) *seq. initializedˆcore compound:* (LIS)

HEARTˆEXPLODE 'heart attack'

WHOLE-ENTITY-CLˆWHOLE-ENTITY-CL 'fax'

POINTING FOREHEADˆTRASPARENT 'Psychology'

HANDLING-CLˆSASS-CL 'eggplant'

C-INITIALIZEDˆPOSSESIVE 'culture'

(6) *seq. initializedˆclassifier compound:* R-INITIALIZEDˆWHOLE-ENTITY-CL

(LSF)

(7) seq. classifier^core compound:

(LSF)

(8) sim. core^core compound:

(LSF)

(9) sim. core^initialization compound:

(LSF)

'Reims'

SASS-CL-HARD 'hard-disk'

SASS-CL-HARD 'Coffee-sign'

SPORT-H-INITIALIZED 'Handisport'

Discussion.

i) The distribution of LIS and LSF compounds show typological variation. From lexicon point of view, this is the case of simultaneous compounds in which the combination coreˆcore (8) and core^initialization (9) is productive in LSF but not allowed in LIS. In the case of sequential compounds (differently from simultaneous compound, the linear order of members are significant) combination of classifier^core (7) are found in LSF but not in LIS and viceversa, initialization^core (5) combinations are found in LIS but not in LSF. We propose that these differences are due to language specific constraints on the lexical categories of the members of the compound. Instead combination of core^initialization and classifier^initialization are not productive in both languages. In this case we propose that these combinations are not productive due the fact that linear order of these lexical category are not allowed in sign languages by their lexical property constraints.

From a syntactic and semantic point of view, sequential attributive endocentric compounds are not found in LIS, while they are attested in LSF. Here, again, we propose the existence of language specific constraints on the syntactic and semantic relationship between the members of the compound. A possible explanation is that, syntactically, in LIS adjective are always post- nominal position instead in LSF adjective are allowed to take in both places. in pre and post- nominal position.

ii) As for the general classification proposed by [1] and [7], we show that our data does not completely fit into it . To account for our data, we propose to add a new layer in which the type of spell-out (sequential vs. simultaneous) is specified.
iii) As for the formal analysis on DM, we show that the asymmetric structure proposed by [3] does not capture simultaneous compounds. We propose to implement the 'Compounding Parameter' proposal by [4] to account for our data.

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Does iconicity benefit an L2 learner's comprehension?

Emily Saunders & David Quinto-Pozos

Saturday, 3.32

Signed languages are comprised of iconic elements; from individual signs to phrasal features, the visual-gestural modality is well-suited for employing iconicity as a communication strategy.[1] Spoken languages also contain iconic elements,[2,3] although it has been suggested that iconicity may be represented more in signed languages.[4] An important question about iconicity is the extent to which it may benefit the language learner, especially for language comprehension in cases of second language acquisition.[5]

To date, the majority of studies of signed language iconicity have focused on the lexical level of form, meaning, and processing, and there have been comparably fewer studies investigating iconicity within phrasal segments, where elements such as constructed action and role shifting are used. Constructed action (CA) typically depicts aspects of an enacted action, which could refer to a preceding noun/noun phrase or information not previously communicated.[6] CA, or *enactment*, is also used by non-signers, as a way to supplement a spoken description of an action.[7] Lillo-Martin (2012) relates the enactment process to role-shifting in sign language. Role-shifting maps the presence of multiple interlocutors onto physical spaces; once set up by the signer, person A could be associated with the physical space on the signer's left and person B on the signer's right.[8] The present study asks whether iconicity contained in constructed action and role shift in signed and spoken language (e.g. co-speech gesture) provides comprehension benefits to signers and non-signers alike. We predict that both groups will be able to utilize these examples of iconicity, performing more successfully on comprehension tasks in an unfamiliar signed language than an unfamiliar spoken language.

Thus far, 14 adult signers (ASL learners, English speakers; 13 females, 1 male) and 24 non-signers (English speakers; 13 females, 10 males, 1 nonbinary individual) have participated in the study. Data collection is ongoing. All signers were in their second year of ASL instruction, and the non-signers had no prior instruction in a signed language. Participants were shown videos of two bilingual language users (a deaf signer of Norwegian Sign Language and American Sign Language and a hearing speaker of Norwegian and English) producing sentences that included action verbs to give the language models opportunities for using constructed action and multiple characters to encourage role shifting. Each participant saw a total of eight videos, two in each language. After watching each video, participants self-reported their comprehension and answered several short-answer questions about the videos; questions asked how many characters were discussed, what actions they noticed, and what emotions they noticed. Both groups were expected to reach near-ceiling performance on the comprehension of English sentences. For the signers, ASL sentences were predicted to be the next highest score, followed by NSL, with Norwegian as the lowest score. For the non-signers, ASL and NSL were predicted to show similar levels of comprehension; since the non-signers were equally unfamiliar with both languages, only the iconic items should benefit their comprehension.

The preliminary data support the predictions. Participants from both groups were particularly successful at determining the number of characters described in the sentences (see Table 2). Interestingly, in several cases, these correct answers were accompanied by participants' low self-reported comprehension scores (see Table 1). This suggests that self-reported comprehension of complete sentences may not fully align with the identification of characters in sentences. Essentially, comprehension is better than expected by the participants.

Table 1. Self-Reported Comprehension[1]

	Signers (n=14)	**Non-signers (n=24)**
English	9.96 (0.19)	9.98 (0.14)
ASL	5.08 (2.33)	1.87 (1.85)
NSL	3.92 (2.11)	2.12 (2.27)
Norwegian	1.03 (0.19)	1.51 (1.06)

Table 2. Identification of Characters[2]

	Signers (n=14)	**Non-Signers (n=24)**
English	0.96 (0.14)	0.94 (0.22)
ASL	0.77 (0.39)	0.48 (0.37)
NSL	0.77 (0.33)	0.44 (0.40)
Norwegian	0.12 (0.22)	0.33 (0.28)

Based on these preliminary data, the study supports the idea that iconicity in signed languages, including constructed action and role-shift, provides comprehension benefits to both non-signers and beginning signers. Participants with no experience in either signed language presented in the study were often able to understand parts of the signed sentences, particularly related to actions and objects when a sign is related in form to a real-world action. Both signing and non-signing participants understood more of the sentences than they realized; disparities between the participants' self-reported comprehension rates and their success at answering questions about the sentences implies that they may not be aware of the benefits afforded to them by iconic elements of the languages. Data analysis is ongoing and planned to be complete by March 2019. Statistical analyses will occur after all data have been collected, and a qualitative analysis of the participants' written responses will also occur.

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[1] Scores were reported on a scale of 1-10, 10 being full comprehension. Averages are shown, with Standard Deviation values in parentheses.

[2] Participants were assigned a score of 1 if they answered the question correctly and a score of 0 if they answered incorrectly or did not answer. Standard Deviations are shown in parentheses.

Making visual languages visible: Data and methods transparency in sign language linguistics

Adam Schembri

Friday, 16:00-16:30

The work of sign language description, given the relatively undocumented nature of sign languages, shares some practices with the broader field of language documentation and description. As Gawne et al. (2017) pointed out, there has been a growing literature in linguistics on the most appropriate methods for language documentation. This work has emphasised the importance of transparency in data collection methodology, analysis and citation, and the appropriate open-access archiving of materials. In their survey of 100 examples of language documentation literature, however, Gawne et al. (2017) found that much of the work presented fails to include key information about data collection methodologies and does not link directly to open access data. I would like to argue that such practices have direct relevance to not just the field of language documentation and description, but to how we do linguistics research in general. Given developments in the nature of methods and data in sign language linguistics, this includes sign language research. These recent developments in digital video annotation and storage has made data transparency much easier to organise. I have conducted a preliminary analysis of 51 journal articles published between 2008 and 2017 from one of the flagship publications in the field – *Sign Language and Linguistics* – to assess how many of the practices identified by Gawne et al. (2017) are regularly followed in research on sign languages. While acknowledging that journal articles represent a shorter format of data reporting than dissertations and descriptive grammars, there is much room for improvement. Out of the 51 articles surveyed, 3 are theoretical papers that do not report on the collection of significant amounts of new data, 12 make some use of sign language corpora, 12 focus only on lexical data (sometimes collected from dictionaries), and 24 involve the use of other types of datasets. This survey finds that many of these articles have methodological descriptions which meet a high standard of reporting, with 38 articles including separate sections in which methods are described in detail. Fewer articles were as transparent in their reporting the profiles of participants, with less than half (21/51) including all relevant participant metadata. Some 35 articles did not state whether data collected was archived in any way. Although 13 papers use data in corpora, not all of these were open access collections. Only 4 articles represented data in examples fully transparently, with file names and time codes that makes it possible for the data to be peer-reviewed easily. As also argued by Gawne et al. (2017), this paper concludes by proposing that sign language linguistics as a field needs to move towards a reporting culture that values greater transparency, not only to advance the standards of scholarship, but also to ensure that key stakeholders in Deaf communities can understand the nature of our work, and benefit from it.

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Frequency and distribution of signs and sign proficiency in second language (L2) signers – A longitudinal and comparative study

Krister Schönström & Johanna Mesch

Saturday, 3.33

Production of vocabulary is one of the essential components of language competence. However, no study has yet investigated the L2 acquisition of signs of any sign language in a broader sense. Such a study is motivated by the fact that vocabulary is a particularly interesting area in sign languages considering the categories of signs, i.e., sign types (see e.g. Johnston 2010). This paper examines the frequency and distribution of signs produced by L2 learners of Swedish Sign Language. In addition, we make an attempt to describe the sign proficiency and to track the development of L2 signs.

Earlier research on L2 sign acquisition has mostly focused upon phonological structures of signs (e.g. Bochner et al. 2011; Ortega & Morgan 2015; Rosen 2004), with some studies on other structures e.g. classifier constructions (Marshall & Morgan 2015). Due to our corpus-based data we are able to attempt a description of the frequency and distribution of signs, as well as L2 analysis of signs used by the learners. Our L2 analysis has included phonological, morphological and lexical analysis according to the complexity, accuracy and fluency (CAF) framework (Housen & Kuiken 2009), i.e., L2 signers' proficiency is accounted through three components: degree of complexity, degree of accuracy and degree of fluency.

Sampled longitudinal corpus data from 16 adult L2 signers from the Swedish Sign Language as an L2 Corpus (SSLC-L2) (Schönström & Mesch 2017) was analyzed. Two kinds of data were included: dialogue data based on interviews, and retellings of a movie clip. This was compared with data from 9 L1 signers.

We provide results outlining the distribution and frequency of signs in L2 signers at two different time points in their development as well a comparison with L1 signers with regard to distribution and frequency of (1) signs, (2) sign types and (3) parts of speech. For example, with regard to the verbs, it was revealed that the proportion of lexical verb signs increases with time while the proportion of depicting signs remains the same. We discuss this in light of the contributing role of gesture in L2 sign production, as the line between some depicting signs (e.g. handling handshapes) and gestures is not always crystal clear. With regard to sign proficiency according to the CAF framework, the results revealed, among other things, that phonological errors are common, and in line with results provided by earlier research which suggest a learning order in which location parameter is acquired before handshape and movement parameters.

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Native and non-native signers' performance on a sentence repetition task for Dutch Sign Language

Anique Schüller, Annika Schiefner & Ellen Ormel

Saturday, 3.34

Like for most sign languages, there is great variation in fluency amongst Deaf users of Dutch Sign Language (NGT). This relates, for example, to the age of acquisition of NGT, the type of education followed by the signer, and whether the signer grew up with hearing or deaf family members. Assessing language fluency can be important in a variety of contexts such as educational and research purposes. Given the lack of suitable language assessment tools available to tap into this variation in NGT fluency in adults (L1/L2), we developed an efficient (short and simple) NGT assessment tool. After exploring the range of existing assessment tools as described by Enns et al. (2016), we developed a sentence repetition task (SRT) for NGT, the NGT-SRT. In line with the existing SRTs (ASL-SRT, Hauser et al., 2008; BSL-SRT, Cormier et al., 2012; DSGS-SRT, Haug et al. 2015), thirty-nine sentences were created, varying in length and complexity. The different levels of complexity were developed conform a combination of guidelines for the existing SRTs in signed languages, guidelines developed by Mayberry (unpublished) for a related test, and guidelines developed in the European COST project, which focused on SRTs in spoken languages: Action IS0804, as described by Marinis and Armon-Lotem (2016). The thirty-nine sentences were equally distributed across three levels of complexity. A scoring template was created for every sentence in order to allow for easy and objective scoring of participants' production accuracy (see Figure 1 for an example). The sheet allows for a binary or composite accuracy score. In the present study, accuracy is coded as correct or incorrect for each individual sentence.

In a pilot study with L2 learners training to become sign language teachers or interpreters, the NGT-SRT was shown to successfully differentiate between groups of learners with different levels of sign language communication skills. The quantitative accuracy measurement was based on the scoring templates described above. The overall test scores are related to participants' level of NGT ($r(11) = .836$, $p < .01$) according to the Common European Framework of Reference (CEFR) (ATERK, 2013), see Figure 2, as reported by participants based on in-class assessments at the Hogeschool Utrecht (A2 = 1, B1 = 2, B2 = 3). Moreover, the test successfully differentiates between the three predetermined levels of complexity, performance in which was indicative of participants' language proficiency ($F (2,10) = 69,641$, $p < .001$, Figure 3). The pilot also revealed a correlation between participants' scores and their working memory as measured in a visual digit span test following Wechsler et al. (1997) ($r(11) = .626$, $p < .05$, Figure 4).

I have two birds

Face	^^			
Gloss L		BIRD		
Gloss R	TWO	BIRD	TO.HAVE	INDEX1
Features	topicalization			
Score (0/1)				

Figure 10 – Scoring template NGT-SRT

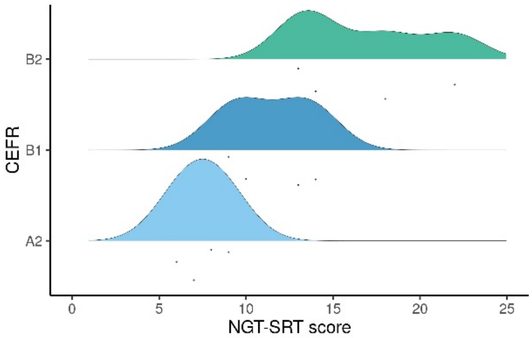

Figure 2 – Overall score by CEFR degree

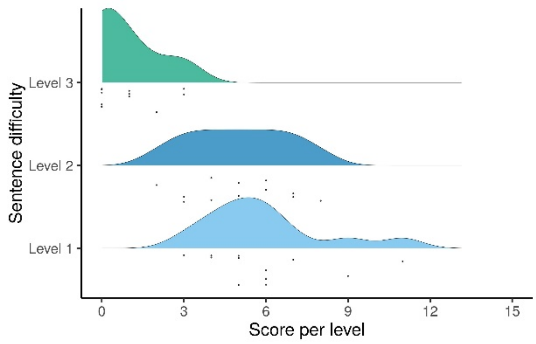

Figure 3 – Distribution of correctly repeated sentences per pre-determined level of complexity

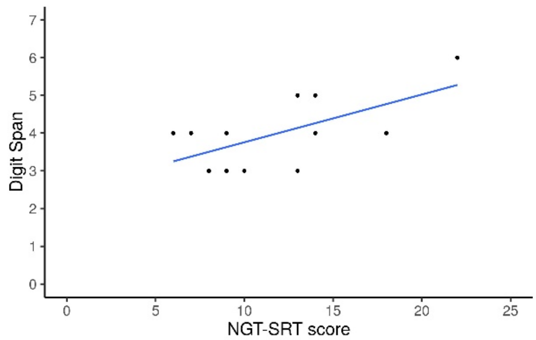

Figure 4 – Relationship between participants' working memory and NGT-SRT scores

The work we report on here establishes how the NGT-SRT differentiates levels of fluency within a population of native users of NGT and what the distribution of fluency within such a population would look like. For this purpose, we have tested native deaf adults (*N* = 25, 13 f, 22 right-handed) from a wide age-range (Range: 18 - 54 *M* = 31.84) and with a variety of educational backgrounds, ranging from secondary education through professional trainings at various levels to graduate level university education. Additionally, we show how the NGT-SRT differentiates between the pre-determined levels of sentence complexity in a population of native signers. Comparing the results of native signers to the sample of L2 learners of NGT and including demographic information in such models will give us valuable information on possible interpretations of individual scores on the NGT-SRT, linking such scores to relative fluency of the individual signer. Finally, we are interested in whether the relationship between participants' working memory and test scores found in the pilot holds for this population.

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Lexical and sublexical factors that influence sign production: Evidence from a large scale picture-naming study

Zed Sevcikova Sehyr

Saturday, 3.35

The mental lexicon exhibits structure that reflects linguistic patterns and affects language processing. Understanding and documenting these structural patterns is key to answering central linguistic and psycholinguistic questions. Picture-naming tasks have provided critical data for theories of language representation and production (Levelt, Roelofs, & Meyer, 1999), and picture-naming has been performed successfully with sign languages (Baus, Gutierrez-Sigut, Quer, & Carreiras, 2008; Emmorey, Petrich, & Gollan, 2013). However, large normative picture-naming databases suitable for use with sign languages are lacking. Moreover, the specific influences of lexical and sublexical factors on sign processing remain largely unexplored. Previous picture-naming studies with sign languages revealed effects of subjective frequency (Emmorey et al., 2013), but phonological complexity has not been found to influence naming times (Vinson, Thompson, Skinner, & Vigliocco, 2015). Sign iconicity may facilitate naming times, but only for late-learned signs (Vinson et al., 2015). However, it remains unclear how lexical or sublexical properties of signs influence naming latencies across a large set of signs and how these variables interact with each other.

The aims of this study were 1) to determine the effects of lexical and phonological properties of signs (e.g., lexical class, frequency, phonological density, sign handedness, and iconicity) on picture naming times in American Sign Language (ASL), 2) to compare our data with spoken language picture-naming databases (Bates et al., 2003; Snodgrass & Vanderwart, 1980; Szekely et al., 2003), and 3) to establish a normative database of pictures that correspond to specific signs that can be used by researchers and educators.

Twenty-one deaf ASL signers (M_{age} = 32 yrs, 13 native, 8 early-exposed signers; 12 female) named 524 black and white line drawings from Bates et al. (2003), a set of pictures with naming data from seven spoken languages. There were 252 images that depicted transitive and intransitive actions and 272 images that represented objects, and object and action pictures were blocked for naming. Participants were instructed to name the pictures as quickly as possible, using a single sign response. Signers' responses were videotaped and imported into ELAN for analysis of name agreement. Response times (RTs) were recorded as the time between a spacebar press to view the picture and its release to name the picture.

A total of 10,856 trials were recorded. Overall naming accuracy was 83%; for action naming, accuracy was significantly lower and RTs were longer (77 %; 1247 msec) than for object naming (88%, 910 msec), which parallels the pattern found for spoken languages. Pictures depicting actions yielded greater diversity of responses based on the H statistic (a measure of naming diversity) than pictures depicting objects (H = .59 and .35, respectively). This result suggests that there may be more ways to name actions than objects in ASL. We also found significant positive correlations between response diversity (*H*) and RTs for both objects ($r = .14$, $p = .03$) and actions ($r = .20$, $p = .002$). As found for spoken languages, pictures with a larger number of alternative names elicited longer RTs, pointing to lexical competition effects during sign production.

Next, we examined the effect of lexical frequency, phonological properties, and iconicity on naming times. For a preliminary regression analysis, we selected a subset of 100 action and 100 object pictures that were high in both response accuracy and name agreement. Higher lexical frequency lead to faster RTs; interestingly, the ASL lexical frequency of the participants' signed responses retrieved from ASL-LEX (Caselli et al., 2017) significantly predicted RTs ($R = .06$, $p < .001$), while the log word frequency of the English names from Bates et al. did not predict ASL RTs ($R = .02$, $p = .12$). This result emphasizes the importance of using ASL-based frequency norms to study ASL processing.

Parameter-based neighborhood density retrieved from ASL-LEX also predicted a small variance in naming RTs. We found that sign responses from denser neighborhoods resulted in longer RTs than signs from sparser neighborhoods ($R = .05$, $p = .006$). This pattern is the opposite of what has been found for spoken language production (Vitevitch, 2002). Although effects of neighborhood density on sign retrieval remain largely unclear, this result suggests that a greater number of phonological neighbors might hinder rather than facilitate sign retrieval. We also found that the handedness of signs predicted RTs, with two-handed signs resulting in longer RTs than one-handed signs ($R = .04$, $p = .007$) further suggesting that phonological complexity impacts sign retrieval. Finally, iconicity had a weak faciliatory effect on object naming RTs ($R = .02$, $p = .05$), and this result is in line with previous studies of picture-naming in sign languages (Pretato, Peressotti, Bertone, & Navarrete, 2017; Vinson et al., 2015). Future planned analyses will include LME models to further examine how these factors interact with each other, regressing out individual variation due to age or ASL exposure.

A standardized set of pictures together with the ASL normative data will be available online via an interactive database. In future work, the pictures and naming data could be used to create an ASL vocabulary assessment test for use with children or adults.

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Quantifying differences in spatial and temporal patterns between nouns and verbs in American Sign Language using Microsoft Kinect

Zed Sevcikova Sehyr & Ryan Edinger

Friday, 2.58

A widely held conjecture among linguists is that nouns and verbs are universally distinct word classes regardless of whether or not they are formally marked in a given language. Previous sign language studies suggested that nouns and verbs are often formally similar but differ in their movement. In several sign languages, nouns were found to have a relatively restrained manner of movement and/or repeated movement, while verbs were characterized by a single or repeated larger movement which could be either continuous or end in an abrupt stop (Auslan, Johnston, 2001; Russian Sign Language, Kimmelman, 2009; American Sign Language, Supalla & Newport, 1978). Verbs may also employ more distinct joints in the articulation of the movement than nouns (Supalla and Newport, 1978; 2001; Kimmelman, 2009). In Austrian Sign Language (ÖGS), verbs were systematically longer in duration than their comparable nouns in related noun-verb pairs (Hunger, 2006) and in RSL, verbs were larger in size than nouns (Kimmelman).

However, the number of morphologically-related noun-verb pairs in ASL (and possibly in other signed languages) is relatively small, which raises an important empirical question: do the movement patterns that distinguish between morphologically-related verb and noun pairs generalize to a wider comparison of unrelated verbs and nouns? That is, are distinct movement patterns constrained to a small set of related noun-verb pairs or does this pattern exist across the lexicon? Using a large-scale picture-naming study and motion capture, we quantified the differences in spatial and temporal movement patterns in ASL verbs and nouns across a large segment of ASL lexicon.

Twenty-one deaf ASL signers participated in a picture naming experiment (M age = 32 years; 13 native, 8 non-native but early exposed ASL signers; 12 female). The picture stimuli consisted of 524 black and white line drawings from Bates et al. (2003). There were 252 images that depicted transitive and intransitive actions and 272 that depicted objects. Participants were instructed to name the pictures as quickly as they could, using a single sign response. Action and object stimuli were blocked, and participants were instructed to produce either verbs or nouns respectively. Signers' responses were videotaped and imported into ELAN to verify response validity. From the motion capture recordings using Microsoft Kinect, three-dimensional spatial coordinates (x, y, z) of the wrist joints were extracted. Based on these co-ordinates we calculated three spatial properties for each sign: distance (meters), volume (meters) and velocity (m/sec). We also measured the temporal duration (msec) of the signs (including transitional movements to and from the response key). We analyzed one-handed and two-handed signs separately to verify whether handedness plays a role in the overall patterns. Only correct trials (n = 8947) were included in the analysis (overall naming accuracy was 83%). The motion data acquired in this study will be added to the publically available ASL-LEX database (http://asl-lex.org).

Preliminary results revealed marked differences in motion patterns between action names (i.e., verbs) and object names (i.e., nouns) across all trials. Verbs were significantly greater than nouns in: spatial distance (F (1, 8944) = 335, p < .001), volume (F (1, 8944) = 108, p < .001), velocity (F (1, 8944) = 27, p < .001) and duration (F (1, 8944) = 422, p < .001), including participant age as a covariate (see Figure 1). The final analysis will take into account for the interdependency among these variables. These patterns held up when one-handed and two-handed productions were analyzed separately, except velocity, which no longer exhibited a significant noun-verb difference for either one- or two-handed signs (ps ≥ .12). Furthermore, these patterns held up for a subset of 100 action and 100 object pictures that were high in both accuracy and name agreement. An individual analysis for each participant confirmed that 18 out of the 21 participants followed this general pattern. Thus, the distinct movement patterns for action and object signs are relatively robust. These findings indicate that the distinct movement patterns previously documented for morphologically-related noun-verb pairs generalize to unrelated ASL verbs and nouns. We speculate that verbs may be larger and longer (in both time and distance) in order to accommodate the spatial and temporal modulations that occur more frequently with verbs than nouns. These results are consistent with corpus studies of spoken languages showing that the phonological properties of nouns and verbs form relatively separate and coherent clusters in phonological space (e.g., Farmer, Christiansen, & Monaghan, 2006). We extend this notion of phonological typicality to our results and suggest that spatial and temporal typicality patterns can distinguish lexical class in ASL.

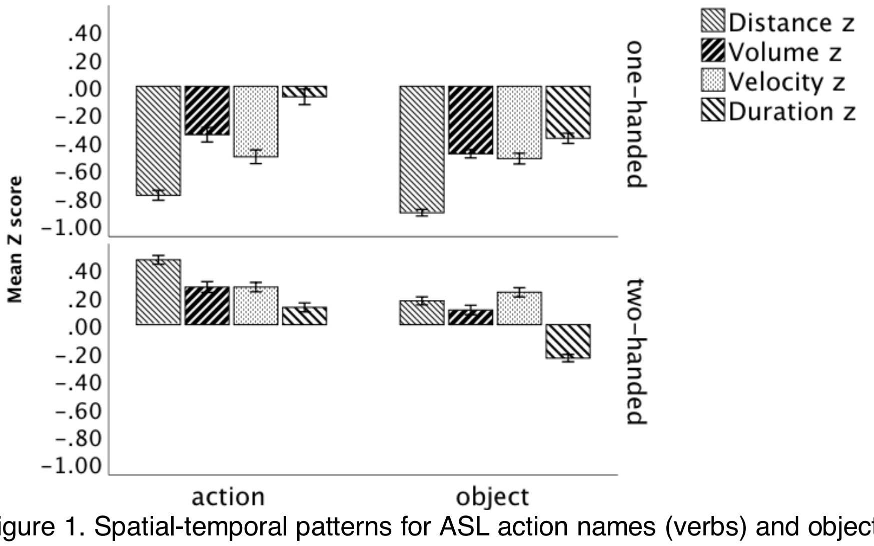

Figure 1. Spatial-temporal patterns for ASL action names (verbs) and object names (nouns) where the bars represent average distance, volume, velocity, and duration (z-transformed) for one-handed (top row) and two-handed signs (bottom row). Error bars represent 95% CI.

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Age of L1 acquisition affects automatic magnitude estimation in ASL number signs and Arabic digits

Nina Semushina & Rachel I. Mayberry

Saturday, 3.36

The ability to automatically process the quantitative values of numerals may play an important role in skilled calculation. One way to test automatic magnitude estimation is with the Number Stroop Effect (NSE) [1-4]. In the original experiment [1], participants judged which of two digits presented on a display was larger. Larger was defined by either physical size or numerical value, depending on the condition. Reaction times were faster for congruent stimuli (size dimension congruent with quantity dimension) and slower for incongruent stimuli (size dimension incongruent with quantity dimension). The fastest comparisons for the size dimension were affected by numerical information even when it was irrelevant to the task. This suggests that physical size and semantic quantity information are processed in a parallel fashion and that numerical quantity is computed automatically for Arabic numbers.

A similar experiment [5] was conducted with written orthographic representations of English numerals (such as ONE, TWO) but found neither facilitation for congruent stimuli nor interference for incongruent stimuli. The authors concluded that ideographic and orthographic encoding of the same information is processed differently. However, this doesn't answer the question of whether the difference arises from the type of information (linguistic vs mathematic), the type of encoding (orthographic vs ideographic), or whether it is a byproduct of a complicated reading mechanism *per se*. We investigate this question by comparing Arabic digits to American Sign Language numerals that do not require reading to be processed.

In the present study, we ask whether ASL numbers also automatically activate magnitude information. We developed an ASL version of the original NSE experiment and included Arabic digits. If ASL numbers and Arabic digits activate magnitude in the same way, then we should find an NSE for both kinds of numbers. If not, then this would suggest that ASL and Arabic digits access magnitude differently.

Previous studies have found evidence for a Color Stroop Effect in ASL [6]. One study found Number Stroop Effect in ASL [7]. However, in the prior NSE study, ASL proficiency was not controlled, and only iconic handshapes 1 – 5 were used with stimuli having an unusual drawing orientation. Another study [8] used handshapes 6 – 8, and did find an effect.

The stimuli for the present NSE study used iconic and non-iconic handshapes 1 – 9, with natural orientations (photographs), and controlled for language proficiency by testing native ASL signers, hearing L2 learners and late L1 learners.

Preliminary data show that the age- onset of language acquisition is an important factor that interacts with the NSE effect in ASL. Between group comparisons (L1, L2, LL1) show significant effects of AoA (regression model with RT as a continuous variable).

The LL1 group show more dispersed RTs and are significantly slower than the other groups. They also show an unexpected pattern of faster RT for incongruent stimuli. AoA also affected performance in the digit condition. Both the L1 and L2 groups showed facilitation and interference effects, but the LL1 group did not. Our results suggest that delayed L1 acquisition influences the processing of ASL numbers and mathematic conventional symbols.

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Dismantling the notion of constructed action as a metalinguistic tool: Efficient information encoding through direct representation

Anita Slonimska & Olga Capirci

Saturday, 3.37

Constructed action (CA) – linguistic strategy of a signer “becoming” the referent has been acknowledged as an integral part of signed languages (Cormier et al, 2015; Metzger 1995). Nevertheless, research stresses that mostly CA is used for metalinguistic purposes in narratives to enhance the narration by making it more expressive (e.g., Engberg-Pedersen, 1999; Mather, Winston, 1998; Hodge & Ferrara, 2014, Sandler, 2018). However, in some cases it can be considered obligatory or at least preferred strategy as it can encode information about animate entities and their actions more efficiently than depicting constructions or lexical signs (Quinto-Pozos, 2007). Moreover, given that CA can be encoded through multiple articulators (i.e., hands, torso, head, face expression and eye gaze) it can be combined with other linguistic strategies providing more information efficiently. Also, *body partitioning* (Dudis, 2004) allows not only direct encoding of a single referent and his/her actions but also encoding of more complex events involving interaction of multiple referents. Given that simultaneous encoding of multiple related elements of the event would lead to faster conceptual representation formation, similarly like reduction of dependency distances in spoken languages (Hawkins, 2004), use of CA might be advantageous in highly informative contexts.

Given that there is almost no research on CA in non-narrative context, it is not clear whether the function of CA can be limited to use for narrative purposes or indeed it can be taken advantage of in setting where the main goal is information transmission. In the present study the aim was to test whether highly proficient signers of Italian Sign Language (LIS) use CA for encoding in an informative task. We hypothesized that if CA can be recruited to encode more direct representation in order to ease processing demands it would not only be used in informative context but it would be also used more as the event that has to be encoded becomes more informatively dense.

The design for the experiment consisted of 6 sets of 5 images in each set, in which each image represents an information level from low information to very dense information:

Level 1: (two referents),
Level 2: (two referents + 1 static action of ref.1),
Level 3: (two referents + 1 static action of ref.1+ 1 active action of ref.1),
Level 4: (two referents + 1 static action of ref.1 + 1 active action of ref.2),
Level 5: (two referents + 1 static action of ref.1+ 1 active action of ref.1+ 1 active action of ref.2).

The task of the participants (n = 23, 12 female, M age = 30,5, all native or early signers of LIS) was to describe each image (presented in a semi-randomized order) to another deaf adult (a confederate). The goal of the participants was to be as informative and clear as possible to allow the confederate to choose the correct image, without the need to enhance the description for narrative purposes. Production of the participants was videotaped and annotated in software ELAN. Production stream was segmented into movement segments (MS). We then annotated the encoding linguistic strategy for each movement segment (i.e., *lexical signs, pointing*, *depicting construction*, *constructed action*, or *combination of strategies*, e.g., *lexical unit* + *constructed action*, see Fig.1). We identified encoding strategy as CA following guidelines of Cormier et al (2015). The data was analysed by means of linear mixed effect models.

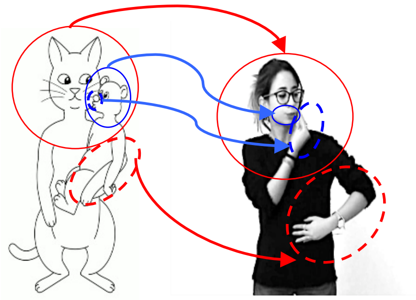

Figure 1. An example of one movement segment encoding referent 1 (a cat) and his static action (holding), referent 2 (a bear) and his active action (kissing). Annotated as Constructed action + Lexical unit.

Results revealed that signers varied the linguistic strategy based on the informative density of the images they had to encode (Fig.2). Given that combination of linguistic strategies other than CA were very scarce and used only by 3 participants we excluded them from the analyses. We found that the proportion of lexical signs diminished significantly as the information density level increased. Constructed action (also in combination with other strategies) was the prevalent strategy used in all levels except in Level 1. Note, that it is impossible to introduce referents without resorting to lexical sign first (Sümer, 2016). Indeed, the presence of lexical units in all density levels was mainly driven by the initial introduction of the referents while the rest of the content was almost exclusively encoded via CA (alone and in combination with other strategies). In line with our hypothesis, we also observed that as the event that had to be encoded became more informatively dense signers also increased the overall proportion of CA used.

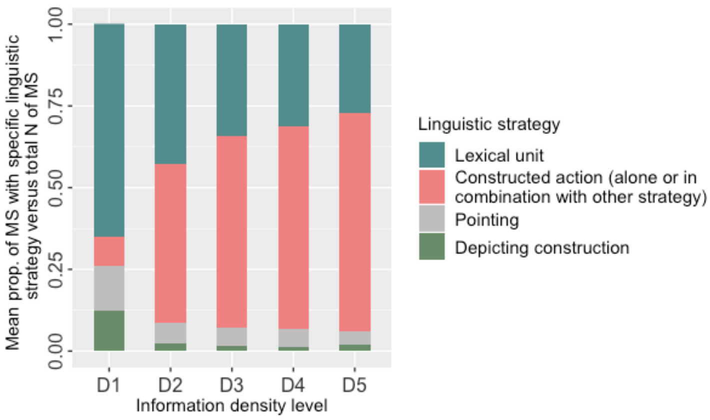

Figure 2. Mean proportions of linguistic strategies used based on the information density level.

Signers in LIS employ CA to represent the information present in the events as it is available in the real word – simultaneously – and as such they are more truthful to the meanings they are referring to. As a result, conceptual representation can be formed more directly. We conclude that CA is not simply a metalinguistic tool at signer's disposal for narrative purposes but instead is also used for efficient information transmission.

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The role of attentional focus in perspective encoding in Italian Sign Language

Anita Slonimska & Olga Capirci

Friday, 2.59

Previous studies in vocal languages have found that sentence structure for encoding transitive actions is biased by the attentional focus of an agent or a patient resulting in choice of active/passive voice forms for encoding (Tomlin, 1995). In contrast, in the past, signed languages have been predominantly described as having only active voice (Stokoe et al., 1965). This conclusion, however, stemmed from strongly spoken language biased view disregarding sign language morphology in its own merit, which is distinct from spoken languages due to multiple articulators and space used for meaning encoding. Since then the very notion of voice in signed languages has been reconsidered and was suggested to be rather viewed as perspective shift between agent and patient (Janzen et al, 2001). Agent's perspective can be achieved by the signer "becoming" the agent and performing the action directed to the locus associated with the patient. Patient's perspective is achieved by the signer "becoming" the patient and accordingly the action is directed towards the signer (i.e., the specific location of the action on the signer's body) via partitioned hand that encodes the action of the agent. Adopting patient's perspective has been acknowledged in multiple signed languages ever since (Engberg-Pedersen, 2015; Jenzen et al 2001). Furthermore, some research suggests that a specific type of transitive verbs called *AB verbs* that involve transitive action that affects a specified body part of a patient (e.g., kiss, tap, comb) requires encoding of both perspectives in order for the construction to be considered correct (BSL, Morgan et al. 2002). However, whether encoding of both perspectives of AB verbs is indeed obligatory also in other languages and what are the attentional focus features that lead to specific strategy choice has not been investigated systematically so far.

In the present study we aimed to investigate, first, whether AB verbs are obligatory encoded with both perspectives also in Italian Sign Language; second, we aimed to investigate whether and what kind of attentional focus (i.e., visual, agentive, general) would lead to use of specific perspective encoding.

Figure 1 ***a.*** An example of *One action* condition ***b.*** An example of *Two actions* condition

The material for the experiment consisted of 12 GIFs, divided into two sets in which we manipulated attentional focus. These 12 GIFs constituted a part of the stimuli for a larger study consisting 30 stimuli in total. Remaining 18 stimuli functioned as fillers in the present study. In *One action* condition we manipulated visual versus agentive focus. The GIFs represented a drawing of a larger character holding a smaller character (i.e., visual focus) and smaller character doing an action (i.e., agentive focus) on the face of the larger character e.g., licking (see Fig.1a). Only the action of the smaller character was animated by movement. In the *Two actions* condition we manipulated whether the same status of agentivity would lead to focus of generally more prominent character (see Fig.1b). The GIFs were the same with an exception that also a larger character was performing an action on the smaller referent. In these GIFs both actions were animated by movement.

Twenty-three highly proficient deaf adult signers described the GIFs presented in a semi- randomized order to another deaf adult. For the present study, we annotated whether the action of the smaller referent was encoded from agents, patients or both perspectives. Alternatively, if action was encoded by means of lexical non directional sign, it was annotated as Lexical Unit (LU).

Our hypothesis was that if visual prominence of the character is focalized we would be more likely to find patient's perspective encoding than agent's or both perspectives in both conditions. If visual prominence alone is not enough for attentional focus, we would expect patient's perspective only in *Two actions* condition. If action alone leads to focalization, we would find more encoding from agent's perspective in *One action* condition and both perspectives in *Two actions* condition.

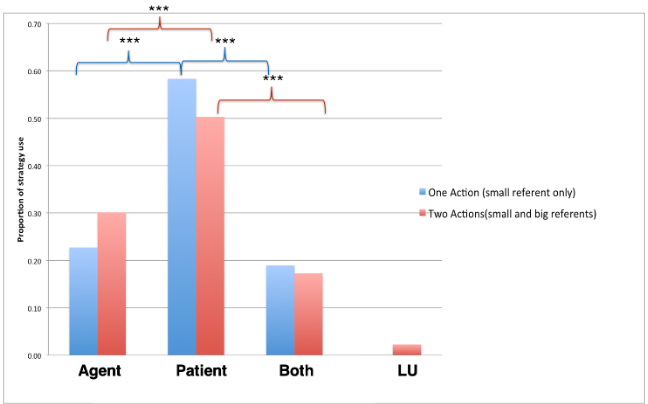

Figure 2. Mean proportions of the choice of specific strategy to encode AB verbs in the stimuli.

We found that in LIS signers encoded AB verbs by using both perspectives significantly less in comparison to patient's perspective, but comparably to encoding of agent's perspective. Thus, our results reveal that at least in LIS, there is no obligatory encoding of both perspectives for AB verbs. We also found that in both conditions signers were significantly more likely to encode the AB verbs by mapping the larger character onto their body i.e., patient's perspective (see Fig.2). Thus, in LIS, the visually more prominent character is sufficient for attentional focus allocation and action per se does not influence the encoding perspective. Moreover, encoding an action from a patient's perspective allows encoding of more fine grained information. Not only it carries information of both thematic roles but as well the location of the action which arguably makes passivizing strategy more informatively efficient. Given the principles of efficiency and informativeness (Grice, 1975) encoding an action from a patient's perspective minimizes signer's effort while informativeness is achieved also by means of under-specified A role.

We conclude that AB verbs, at least in LIS, are encoded not by following a linguistic construction rule but rather by considering the context and adapting to the context in the most efficient (economic) possible.

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A cognitive grammar view on depictive expressions in ASL

Wink Smith Jr.

Saturday, 3.38

There have been proposals made in signed language research concerning the place frozen and productive forms have in the lexicon of signed languages. A traditional account has forms within the productive lexicon lexicalized into the frozen lexicon. Cormier et al. (2012) proposes an alternative account, suggesting the existence of a continuum between lexical (i.e., frozen) forms to gestural (i.e., productive; depictive) forms, the former developing independently from, and perhaps concurrently with, the productive form. They assert that the gestural origins of the productive forms constitute evidence for this continuum. A different proposal is made by Johnston and Ferrara (2012), who modifies Langacker's (2008) Cognitive Grammar (CG) model of the lexicon by introducing "sub-atomic," gradient aspects of depiction created via real space blends (Liddell 2003). The blended structure is a "two-sided coin," with the active blend on one side, and the deactivated blend on the other. The lexicon then offers the signer the choice to use either a deactivated blended product or to reactivate the iconic structure within the same blended product.

In my paper, I propose a different CG analysis in which the cognitive process of schematization has a central role. First, frozen iconic forms and their related productive forms are both independent units within the lexicon-grammar continuum of ASL. They differ in the degree to which they are schematic. The phonological structure of a frozen iconic form is fully specified (i.e. not as schematic), and its depictive structure is backgrounded. In contrast, the phonological structure of a productive iconic form is more schematic, and its depictive structure is foregrounded. Second, I argue that another form within the lexicon-grammar continuum exists, one that is schematic to both iconically backgrounded units and the iconically foregrounded units to which they are related. The backgrounding of the depiction is another cognitive process relevant to this analysis, and the conventionalization of both the backgrounded and foregrounded forms, in which it gains unit status via usage events, are key cognitive process also relevant in the CG view of the lexicon.

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Theoretical study of phonethemas in Brazilian Sign Language: Some reflections about this approach

Charley Soares

Saturday, 3.39

The iconicity of linguistic signs is already well-known both for languages in space-visual mode and for languages in oral-auditory mode. The most well-known form of iconicity in oral languages is onomatopoeia, which they are signs with primary iconicity, since they present similarities in terms of auditory perception with the respective referents (CRUSE, 1986). There are still elements of the language, smaller than morphemes, known as sonic symbolism, which present secondary iconicity because they do not refer to any particular referent. Examples are the vowel I i I, present in many nouns and adjectives that refer the idea of "smallness" (ULLMANN, 1962). In oral languages, this secondary iconicity is represented by the Phonestheme (ABELIN, 1999), that is the synesthetic association between a sound or chain of linguistic sounds to a certain connotative content, being repeated in several words that share this notion. The similarity between oral symbolism and symbolism in signs languages consider components such as hand configuration or localization can express a common content to a certain group of signals, which we call lexical families (MORENO, 1999). Some authors highlight the role of sonic symbolism in the emergence of new signs. The main objective of this study is identify groups of phonestheme in some families of signs in the Brazilian Sign Language, describing signs that are related formally and semantically through certain phonological parameters such as: (i) hand configuration; (ii) point of articulation; (iii) movement; (iv) orientation of the palm of hands; (v) and non-manual expressions. In an initial character of research, it was identify some signs and categorize from the patterns observed in its constitution phonology and semantics: (a) FAMILY, COMMUNITY, CONGRESS, DEPARTMENT, MEETING, (b) ARTICLE-LAW, CURRICULUM, CONTENT, CHAPTER, DECREE, STATUTORY, LAW, SCHEDULE, PROJECT, PROPOSAL, REPORT, (c) POST-GRADUATION, MASTER'S, VICTIMS, (d) VIRTUAL ENVIRONMENT LEARNING, CHAT, E-MAIL, HYPERTEXT, LEGEND, ONLINE PARTICIPATION, SLIDE-POST, VIDEO-CONFERENCE, PhD. In family (a), for example, the base is a movement indicating 'group'. In family (b), the base is a hand configuration that indicates 'register'. In family (c), the base is a configuration that represents a 'linguistic unit'. In the (d) family, we detected a common basis on these signals, reflecting the idea of 'monitor' with a 'L' shaped hand configuration. And, finally, in the family v, the basis of formation by means of the closed passive hand, bringing an idea of 'formation'. For this research, we used signs gathered in the Portuguese/Brazilian Sing Language glossary of the Federal University of Santa Catarina (Brazil) in signposts of deaf people, characterizing it as a direct observation methodology. The evidences already found in this initial phase of the study point to ways that relate Libras phonological structure to its semantic dimension, widening norms for the understanding of the processes of terminological creation or neologisms of the language and also for the teaching of Brazilian Sing Language.

Do the hands have gravity? Time-series analysis of gaze behavior during sign language comprehension

Adam Stone & Rain Bosworth

Saturday, 3.40

Introduction: In reading research, much is known about how (1) the linguistic (e.g., syntactic complexity) characteristics of text and (2) the linguistic expertise of the reader both instantaneously influence eye movements during reading (Rayner, 1998). However, comparatively little is understood about how these same factors, present in sign language, influence eye movements during sign-watching. Sign language differs from print in that it contains several dynamic, moving elements that compete for attention, including each hand, the mouth, and the eyes/eyebrows. How do signers mediate their attention across these moving physical elements? Would active gaze control also depend on the linguistic content, such as its complexity or use of particular grammatical constructions?

Despite having many competing elements to fixate upon, generally sign watchers hold a steady gaze on the face--and not on the hands--during discourse in order to efficiently perceive signed content (c.f. Agrafiotis et al., 2003; Emmorey et al., 2008; Muir & Richardson, 2005; Siple, 1978). One limitation in the literature is that analyses of sign-watching collapsed eye gaze data across the time dimension, providing only global information about *where* people look, and not about the dynamic, moment-to-moment changes in eye gaze. Do the physical positions of the signers' hands, or the grammatical function being produced, trigger instantaneous changes in the sign watcher's gaze? Would such changes be modulated by the watcher's language experience? To answer these questions, we used eye tracking to measure gaze in deaf and hearing signers as they watched ASL video narratives.

Methods: We collected gaze data using a Tobii eyetracker (120 Hz) from 29 deaf and 23 hearing adult signers with a wide range of age of ASL acquisition while they watched ASL narratives. Gaze data were horizontal and vertical spatial coordinates of each eye as a function of time (See example data in Figure 1). We recorded the physical positions of the narrator's hands throughout each narrative, and the onset and durations of the following linguistic features: spatial anaphora, pointing gestures, depicting verbs (classifiers), and changes in the narrator's head position and eye gaze. We calculated looking times and global heat maps which indicated concentrations of eye gaze across participant subsets (e.g., deaf native signers, hearing novice signers). Next, we visualized the moment-to-moment changes in eye gaze across these populations (see Figures 1 & 2). Time-series and cross-correlational analyses comparing gaze data to the positions of the narrator's hands and identified linguistic features will be presented.

Results: Spatial analysis showed that all deaf signers, regardless of when they learned ASL, tended to fixate on or near the mouth, suggesting that once a certain level of ASL proficiency is achieved, eye gaze no longer is impacted by age of ASL acquisition or years of signing experience. However, novice ASL signers were much more likely to distribute their eye gaze behavior downward nearer the hands. We hypothesize this behavior is due to their relative unfamiliarity with various sign linguistic features, necessitating more fixations closer to the manual articulators as to place them within their foveal instead of parafoveal vision. We will present our analyses of these downward shifts and how they correlate with hand location and/or language features (e.g., spatial anaphora, syntactic complexity).

Discussion: This study represents one of the first characterizations of moment-to-moment eye gaze behavior during sign-watching. Furthermore, we show first-time evidence for what appears to be "efficient" eye gaze behavior among fluent signers, and conversely, what "inefficient" sign-watching looks like among new signers. These findings will further inform the growing body of research on deaf and signing people's visual capabilities and how they differ from those of hearing non-signers (Dye & Pascalis, 2017).

Figure 1. Vertical Eye Gaze Position Across One ASL Narrative

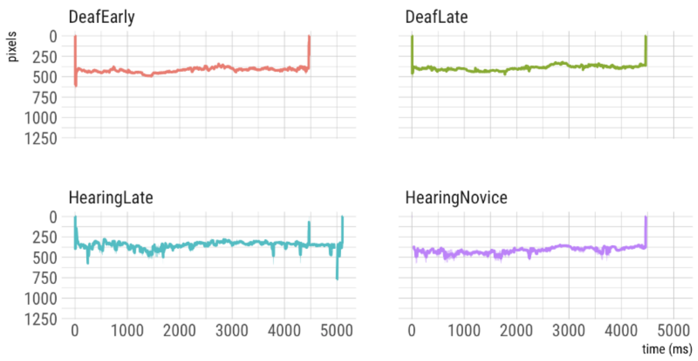
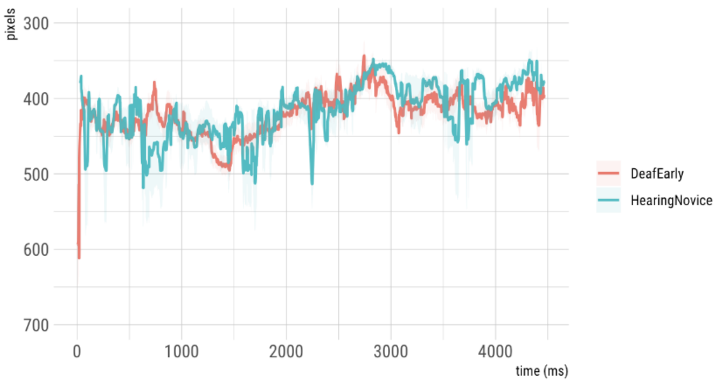


Figure 2. Deaf Early Signers vs. Hearing Novice Signers



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Terminology and linguistics of corpus in Libras (Brazilian Sign Language): Recognition of specificities of terms

Marianne Rossi Stumpf

Saturday, 3.41

Work on terminology in Libras has been ongoing since 2009, supported by Brazilian legislation in 2002 which recognizes the language and allows deaf people greater access to Brazilian Universities. With greater participation, they increasingly need to know terms in Libras, when working with interpreters and classes with bilingual teachers (Libras and Portuguese), especially in the context of distance learning Libras. As most academics are deaf, they have expanded terminological signs for the Brazilian deaf academic community and defined the characteristics of terminology studies from the early years to the present.

Terminology plays an important role in the modern world, with its many scientific and technological innovations, since these scientific and technological advances need to have appropriate names and terms. Thus, terminological repertoires systematized or harmonized - through Terminology - contribute to make communication between specialists more effective, and above all, to be concise, precise and appropriate (Cabré, 1996). How should we deal with gaps in specialised lexicons in Libras? How have the general lexicon and the specialized lexicon in Libras already been recorded in Brazil? Creating specialised lexicons does not only imply that there is a one-to-one correspondence between words and signs in Portuguese, and it is probable that the resulting collection of signs is not very representative of the lexicon of sign language.

This research is based on the theoretical and methodological structure of corpus linguistics. The methodology for developing the corpus project includes the following steps: (I) corpus project; (II) construction of the corpus; (III) corpus processing; (IV) data analysis; (V) validation of candidates for new terms; (VI) preparation of the terminology sheet. The first step, the corpus project, is the description of corpora. The study corpus is formed of videos in Libras. The e-book "Sign Language Acquisition by Deaf and Hearing Children" has 11 chapters in Libras and slides with topics in Portuguese, from which Chapter 2 on L1 Input Development was chosen, which are the comparable ones in Libras and the slides in Portuguese language. The data collected is composed of slides. The video duration in Chapter 2 is 49:38, and 4,456 signs were recorded in the video. The main term selected from this chapter is *Input*, with three signs referring to *Input* taken from videos on the "YouTube" platform used by the deaf community. Nine signs for *Input* were identified in differentiated contexts of production in Libras.

The second step, the construction of the corpus, consists of the compilation of data, preparation, organization and alignment of the video. In the third phase, that is, for this research, we used data available in Libras, using the ELAN videos program, a video transcription system, to contribute, find and extract from the corpus a list of differentiated signs, in addition to identifying where the problems are pointed out within

the context. We first collected the data for observation, descriptive analysis and interpretation, to present the results of each sign of the term *Input*.
The fourth stage of the research is based on the validation of candidate signs for terms, which is accomplished through data extraction and cross-referencing of the corpora of video in Libras and Portuguese. The last stage of the work consists in the cataloguing of the signs and their specificities in the terminology sheet adapted in Libras by Lima, 2014.

The analysis presents a sample of the research that aims to understand how the specificity of a lexical unit is configured, in relation to the development of Libras and semantic research, associated with progress in the field of linguistic theory and analysis according to the morphological constitution of the sign term. We make the distinction between sign-term and term, according to the modalities of the languages involved, and the morphological processes of sign formation by composition recorded in the sign. With this aim, we analyzed empirical data and arrived at results that can lead the applied research closer to the recognition of the specificities of the terminologies.

The results allowed us to design standards from the morphological, syntactic and semantic perspective, and to identify thematic traits. To prove that such traits construct the specificity of the term in the area, the analysis was replicated in corpora of non-specialized texts. The comparison of results showed differences between the patterns of use in both types of corpora and demonstrated that the traits revealed in the specialized language are peculiar to the thematic area and characterize its extralinguistic context of communication for the annotation process. As a conclusion, the project can be extended to other areas of knowledge, providing terminological dictionaries in Libras for teachers, interpreters and especially for deaf academics.

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Signers have better memory than speakers for object locations displayed on a lateral versus sagittal axis

Beyza Sümer, Francie Manhardt, Kimberley Mulder, Dilay Karadöller & Aslı Özyürek

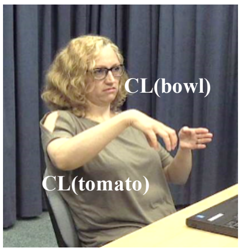
Friday, 2.57 – **CANCELLED**

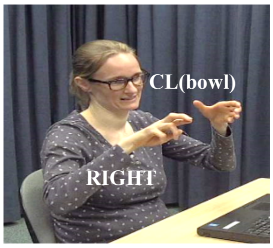
Sign languages differ from spoken languages in how spatial relations are linguistically marked. Unlike in spoken languages, where arbitrary spatial terms are employed, the visual-spatial modality of sign languages allows for iconic expression of object locations [1], mostly through classifier constructions [2] (1a and 2a) or relational lexemes [3] (1b and 2b). There has been mixed evidence about whether the visual-spatial affordances of sign languages in encoding spatial relations facilitate spatial memory in signers compared to speakers. While some studies report an advantage for signers for spatial working memory tasks [4], others fail to report such a sign language advantage [5]. Almost no study has investigated recognition memory for object locations. The current study investigates the link between linguistic encoding of object locations and non-linguistic spatial representations in memory of signers compared to that of speakers.

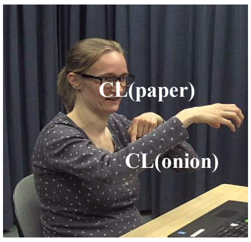
We presented deaf native signers of the Sign Language of the Netherlands (NGT) [N=18] and hearing adult speakers of Dutch [N=20] with visual displays of four pictures. They were asked to describe target picture (indicated by an arrow) to a Deaf or hearing addressee depending on the language condition. The target pictures show an object (i.e., Figure) located with respect to a reference object (i.e., Ground) on the lateral (N=28) or sagittal axis (N=28) (see pictures in 1 and 2 below). All the Ground objects in the stimuli were non-intrinsic, and none of the Figures were occluded. The Filler pictures (N=28) depicted objects in containment or support (e.g., pen in cup; pen on paper). After the linguistic description task, the participants were given a surprise recognition memory task. Here, participants received a subset of displays (20 for lateral axis; 20 for sagittal axis; 18 “containment and support” as filler items) in a random order (locations of the 4 pictures in each display were also randomized) and asked to indicate the picture that they described with a mouse click.

In order to understand whether the language modality (sign versus speech) and axis type (lateral versus sagittal) predict the accuracy in memory scores, we conducted logistic linear mixed effects models in which items and participants were entered as random factors. As a result, we did not find an overall effect of language modality β=0.28, SE=0.21, z=1.30, p>0.5. However, we observed an overall effect of axis type β=0.53, SE=0.18, z=3.00, p<0.01 interacting with language modality β=0.59, SE=0.18, z=3.21, p<0.01. Memory accuracy scores for the items located on the lateral axis were higher than the ones located on the sagittal axis, and this effect was stronger for NGT signers compared to Dutch speakers (see Figure 1).

These results show that regardless of language modality, objects on the lateral axis are remembered better than on the sagittal axis. However, this was modulated by the language modality. Signers have better memory for objects on lateral axis than those on sagittal axis compared to speakers. This might not be related to the better working memory skills in signers in general [5], otherwise we would see this effect for both axis types. We suggest that the enhanced split in the memory scores for different axis types might be related to the way the locative forms to encode the spatial relations are anchored to the body coordinates of the signer (i.e., signers' left, right, front and back). For the lateral axis, the locative forms are directly anchored to the left and right body coordinates of signers. When they use classifier constructions to depict objects on lateral axis, NGT signers put their hands representing the tomato to a location which corresponds to their right-side (1a), or when they use a relational lexeme, they use their right hand to produce the NGT lexical sign RIGHT (1b). However, the mapping of spatial relations to the front or back of the ground object in sign space (2a and 2b) does not map directly to their own front and back in spatial language used for objects locations on the sagittal axis. Thus, the way space is mapped onto the bodily coordinates of the signers might modulate memory encodings of spatial locations differently for signers than for speakers.

(1)  (a) 

(b) 

(2)  (a) 

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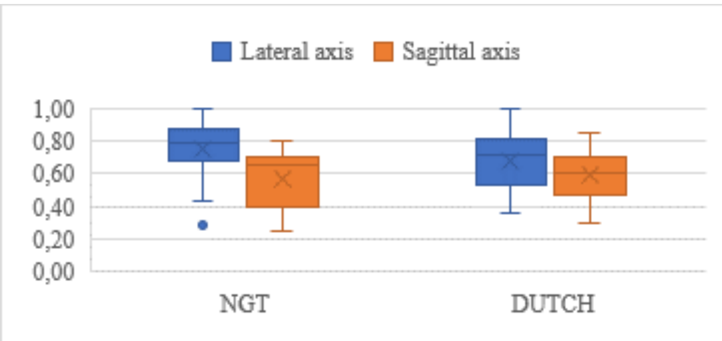

Figure 1. Mean proportions of memory accuracy scores for lateral and sagittal axis locations in NGT and Dutch.

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Giezen, M.R., Petrich, J.A.F., Spurgeon, E., & O'Grady Farnady, L. (2017). The relation between working memory and language comprehension in signers and speakers. *Acta Psychologica, 177*, 69-77.

Child-directed spatial language input in sign language: Modality specific and general patterns

Beyza Sümer, Veerle Schoon & Aslı Özyürek

Saturday, 3.42 **– NEW 2.57**

Deaf parents modify their language productions while interacting with their children [1]. For example, they emphasize the iconic features of the objects [2], and prefer action-based type of iconicity in using lexical signs [3]. Also, their productions with deaf children tend to have simplified syntax [4]. However, we do not know which type of modification (more simplified vs more iconic) is preferred in child-directed signing. Here we pursue this question in the domain of spatial language for which sign languages afford different locative forms that differ in their linguistic complexity and iconicity.

While encoding spatial relations, (e.g., pen on paper), signers mostly use classifier constructions, which are morphologically complex since signers need to choose the correct classifier handshape for the entities involved and locate their hands in signing space simultaneously [5]. Despite their morphological complexity, they have visually-motivated links to the spatial configuration they refer to since signers' hands represent the size and shape of the entities, and the location of their hands in signing space is analogue to the location of the objects in the real space (1a). Albeit less frequently, signers also use other language forms such as relational lexemes (1b) [6]. These are less iconic because they lack information about the object shape and size of the objects, yet linguistically simpler forms than classifier constructions since signers are not required to choose the correct classifier handshape for different objects and localize them simultaneously.

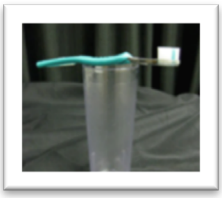

(1a)

(1b)


(Turkish Sign Language, TİD) [5]

We examined the spatial descriptions in Turkish Sign Language (Türk İşaret Dili, TİD) elicited from deaf parents of preschool deaf children (M_{age} = 5 years 2 months, SD=13 months) (N=9) and deaf parents of school-age deaf children (M_{age} = 8 years 3 months, SD=9 months) (N=9) interacting with their deaf children. We compared them to those elicited from native signing TİD adults (N=10) interacting with another deaf adult. All participants were shown 22 picture sets, each of which included four different pictures. These pictures depicted an object situated in relation to another object (e.g., ball in cup). The participants described the target picture as indicated with a red frame to their addressee, who had a booklet with the same picture sets. The task of the addressee was to find the picture described by the interlocutor. If deaf parents prefer linguistically simpler forms rather than iconic forms, relational lexemes should be used more than classifier constructions in parent-child dyads compared to adult-to-adult dyads.

Our results showed that, compared to adult signers, deaf parents preferred classifier constructions less frequently, *F (1, 527) = 16,95, p < .000*, but used more relational lexemes, *F (1, 527) = 6,14, p = .01* in their spatial descriptions (see 2a). There was no difference between two groups of deaf parents (*p > .05*) (see Figure 1). Furthermore, within a subset of spatial descriptions where they used classifier constructions, we also examined the type of classifier handshape (i.e., entity versus handling). Although none of the pictures show people acting upon objects, both groups of deaf parents still used handling classifiers more frequently than adult signers, *F (1,278) = 7,58, p = .006* (see 2b & Figure 2).



(2a)

(2b)

The use of relational lexemes by deaf parents suggests that they prefer language forms that are simpler in their structure. Grammatically simplified input is also commonly observed by hearing mothers [7]. Thus, using simplified language forms seems to be a general characteristic of child-directed speech regardless of the language modality. Furthermore, as evident in deaf parents' increased tendency to use handling classifiers in their interactions with their children, modulating the type of iconicity (i.e., preference for action-based forms) also seems to be a parental input strategy specific to sign languages [3]. Thus, spatial language input to deaf children is characterized by both modality specific as well as general principles.

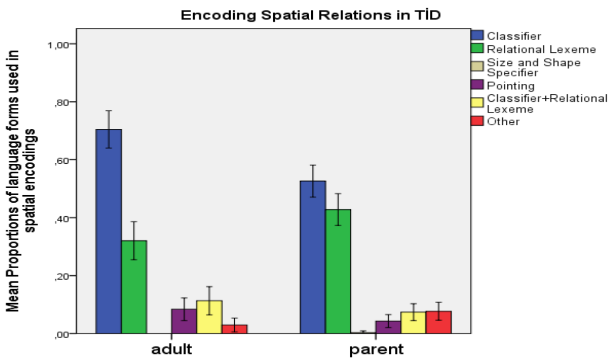


Figure 1. Different spatial relation encoding strategies in TİD

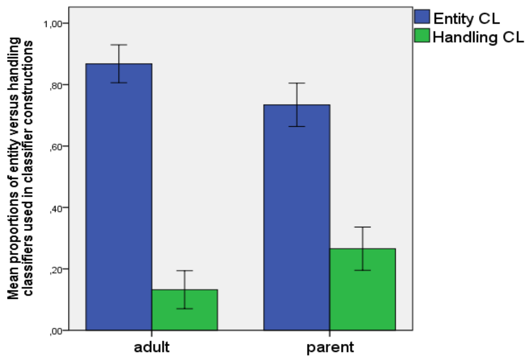


Figure 2. Use of entity and handling classifiers.

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What are norms of sign language poetry? Studies from sign language poetry anthologies and collections

Rachel Sutton-Spence & Johanna Mesch

Saturday, 3.43

This research uses recent developments in online, digital collections and anthologies of sign language poetry to describe the poetic norms that govern the expectations of sign language poets and their audiences. We follow Toury's idea of norms, as "the general values or ideas shared by a community […] appropriate for and applicable to particular situations, specifying what is prescribed and forbidden as well as what is tolerated and permitted in a certain behavioural dimension." (1995: 55). Norms are particularly important to avoid prescriptivism, enabling researchers of sign language literature and poetry to describe what is currently considered good, and what has been considered good in different times and different communities, without prescribing how sign language poetry should be done. We draw on sign language poetry anthologies from three different sign languages to look at the language, literary and cultural norms underlying the poetry, in search of what may be considered "the best" in each culture. We find similarities and differences across the anthologies and their languages.

Anthologies of literary productions in sign languages are needed as a resource for research and teaching in sign language literary and linguistics and for translators and poets to develop their work. Early research on sign language poetry focused on the work of a small selection of poets, simply because that was all that was available for research purposes (for example Christie and Wilkins, 2007; Sutton-Spence, 2005, Crasborn 2006; Rose, 2006). Such limited materials enabled researchers to perform in-depth analyses of signed poetry and afforded great insights into the art form but could not give broader overviews of the range of norms existing in the poets' communities.

Anthologies pre-suppose that their selected content is "the best" (Hopkins 2008), as considered by the community's "expectancy norms" (Pym, 2010). Di Leo (2004) has noted that traditional views of anthologies require them to include work that has been published previously and has "stood the test of time". Sign language anthologies rarely follow this maxim because of the recency of the art-form, and the collections used for this research include new material as well as previously published works. The relationship between canons and anthologies is also well-recognised (Guillory, 1993; Finke 2004), as anthologies reflect and create canons of literature.

We investigated the poems and literary performances in four online anthologies and collections of sign language literature in three countries (two in Brazilian Sign language, one in British Sign Language, and one in Swedish Sign Language). Although our primary interest was sign language poetry, we note (along with Peters 2000) that there is no watertight definition of a poem in sign language (or possibly in any language). One Brazilian anthology contains 35 poems by 21 poets, and the other contains 20 poems by 19 poets. There is no overlap in the content of poems, although several poets are represented in both. The British anthology contained 100 poems.

The majority were by 9 individual poets, although three poems, being Renga poems were composed and performed by an additional 25 people. The Swedish collection contains 25 poems by 14 individual poets and also some collective Renga poems.

In our study, we find that the accepted and valued forms of sign language poetry are diverse, with a range of genres. Analysis of the poems found that some norms for sign language poems arise from within the wider literary world (for example signed haiku and renga), with varying degrees of adaptations (including duets and lyric poems), but some are specific to sign languages (such as multiple perspective poems, classifier poems and Visual Vernacular pieces). Basic concepts, such as how closely the poetry fits sign language grammar may be seen within the poems in the anthologies.

As Pym (2010) acknowledges, however, norms have a prescriptive undertone, given that work that does not adhere to the current norms may not be considered "good". Difficult work (Shetley 1993) may be seen as deviating from the norm and thus risks not being included in anthologies and not being considered as material for research (which promotes poetic work considerably). Anthologies are traditionally seen as conservative phenomena (Gilbert and Guber, 1979). Knowing that norm-breaking leads to innovation and that poetry's business is innovation, norms are in constant tension with the games that poets play, as new trends emerge. In the anthologies studied, we see evidence of new forms developing, and more established forms being created.

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Evaluating the effectiveness of the Hong Kong Sign Language Sentence Recall Test (HKSL-SRT) in differentiating three groups of Deaf signers

Felix Sze, Monica Wei Xiao & David Lam

Thursday, 16:00-16:30

This paper aims at evaluating the manual and non-manual components of the newly developed Hong Kong Sign Language Sentence Recall Test (HKSL-SRT) to find out whether they are effective in differentiating three groups of Deaf signers – native signers born to signing parents, early learners with age of acquisition before the age of 8, and late learners who first got exposed to sign language after eight. Unlike the ASL and BSL sign language recall tests, the HKSL-SRT incorporates non-manuals (NMF) in the design of the sentence stimuli and the scoring scheme. Statistical analysis of data from 25 Deaf signers show that the scores of exact repetition of sentences alone show a significant negative correlation with the signers' age of acquisition, and can differentiate the three groups of Deaf signers basing on ANOVA and post-hoc test. Including exact repetition of non-manual signals in the scoring further increases the sensitivity of the HKSL-SRT across all statistical measures, including item reliability and person reliability in Rasch Analysis. It will be argued that non-manuals, being an integral part of sign language grammar, should be included in a sentence recall test for measuring overall signing proficiency. The simple sentence content and straight-forward coding scheme of the HKSL-SRT offer test administers the flexibility to conduct either a quick evaluation or detailed error analysis for both Deaf and hearing signers depending on their research needs.

The newly developed HKSL-SRT is an adaptation of the American Sign Language Sentence Reproduction Test (ASL-SRT, Hauser et al., 2008), which includes 40 pre-recorded sentences of increasing length and grammatical complexity. The test participants are asked to watch these sentences and repeat them verbatim, and any deviation from the original sentence is counted as an error, except for the non-manuals. Non-manuals are not included in the scoring scheme of ASL-SRT because one main purpose of ASL-SRT was developing a quick proficiency test to be scored by testers who may not be well-trained in linguistics and presumably non-manuals need to be scored by individuals with prior linguistic training. For a similar reason, the scoring in the British Sign Language Sentence Reproduction Test, which was modelled after ASL-SRT, was based on the manual production, and the signing models were told to minimize constructed actions (probably to avoid the associated non-manuals) and focus their gaze at the camera when recording the stimuli (Cormier et al. 2012).

This exclusion of non-manuals from the testing scope runs counter to general consensus in the literature that non-manuals are essential in sign language grammar. Furthermore, findings from first language acquisition suggest that non-manuals are mastered at a later stage of development. Theoretically speaking, their mastery should be more sensitive to the age of acquisition, thus serving as a more reliable index of the overall sign language proficiency. The HKSL-SRT was developed with these assumptions in mind: the stimuli include non-manuals that are commonly found in

HKSL, and the scoring scheme covers both the manual and non-manual production. Forty sentence stimuli were designed, with a total of 223 signs (3 to 9 signs in a sentence) and 209 tokens of non-manuals (1 to 11 NMFs in a sentence). The sentence contents concern general topics that do not require specific knowledge or a high level of intellectual maturity of the test participants. Following the ASL and BSL SRT, if all signs in a sentence are repeated correctly (i.e., Exact Sign Repetition, full score: 40), 1 point will be given. Otherwise the score is 0. A similar scoring method is used for the repetition of NMFs (i.e., Exact NMF Repetition, full score: 40). In this pilot study, the number of correctly repeated signs and non-manuals for each sentence are noted as well. Twenty-five Deaf signers were invited to participate in the test (8 native signers, 9 early learners and 8 late learners).

The data from these Deaf signers show that Exact Sign Repetition significantly correlated with the signers' age of acquisition (r=0.712**, n=25, p=0.000). A one-way analysis of variance was conducted to evaluate the relationship between the scores of Exact Sign Repetition and the types of signers. The ANOVA is significant at the .01 level (F(2, 22)=27.747). Post hoc comparisons using the Turkey HSD test show that the mean scores of Deaf native signers were significantly higher than early learners (p=0.030) and late learners (p= 0.000). In addition, early learners scored higher than late learners as well (p=0.000). A Rasch analysis of the scores of Exact Sign Repetition yields a high item reliability (0.88) and person reliability (0.94). If the scores of Exact Sign Repetition and Exact NMF Repetition are combined for each sentence, the sensitivity of the HKSL-SRT increases, as reflected in the combined scores' correlation with age of acquisition (r=0.770**, n=25, p=0.000), ANOVA (F(2, 22)=36.382, p=.000), post hoc test (the p-value for the mean difference between native signers and early learners decreases from p=0.03 to p=0.018), item reliability (0.92) as well as person reliability (0.95). Neither the Exact Sign Repetition and the combined scores correlate with the signers' visual memory and sequential memory scores. These statistical results suggest that Exact Sign Repetition is a reliable measure of signing proficiency, and inclusion of non-manual scores improves the sensitivity of the HKSL-SRT further. As the scoring scheme of Exact Sign Repetition and Exact NMF Repetition is rather simple (either 1 or 0 for each sentence), the HKSL-SRT can serve as a handy assessment tool for measuring signing proficiency of both Deaf and hearing signers.

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Lexical co-activation in bimodal-bilinguals during spoken language comprehension: An eye-tracking study of Hong Kong Sign Language and Cantonese

Felix Sze, Yang Chin-lung, Monica Wei Xiao & David Lam

Saturday, 3.44

This eye-tracking study investigates whether hearing bimodal-bilinguals of Cantonese and Hong Kong Sign Language (HKSL) subconsciously activate their sign language phonological knowledge when performing a Cantonese picture-identification task which does not explicitly involve sign language use. Preliminary evidence from 20 hearing signers show that such automatic co-activation occurs in only some of the bimodal bilinguals. This inconsistent finding provides partial support to the proposal by Shook and Marian (2012) that bimodal bilingual lexical processing involves top-down and possibly lateral connections apart from the bottom-up mode evident in bilingual studies involving spoken languages. In addition, it offers evidence to the recent claims that individual differences do exist in bilingual and second language processing in the literature (e.g., Granena et al. 2016, Nichols 2017).

Previous studies in spoken languages (e.g., Blumenfeld & Marian 2007) suggest that when bilinguals process speech signals in one of the languages, the other language may also be activated even though the task at hand does not require knowledge of the latter. Such automatic co-activation is mainly attributed to the overlap in input between the two languages. For example, when an English-Russian bilingual listens to the English word "marker", the Russian word "marka" (which means *stamp*) is also co-activated because of the phonological similarity of these two words. Evidence of co-activation can be found in a visual world paradigm eye-tracking experiment where the bilingual participant is asked to choose the right picture among several that matches the auditory prompt. In this setting, an English-Russian bilingual is more likely than an English monolingual to take a quick glance of the picture of a stamp before looking at the picture of a marker upon hearing the English word "marker". If this kind of co-activation is triggered mainly by phonological similarity in the input, it should not be found in bimodal bilinguals because sign and spoken languages employ different linguistic modality and do not share any phonological similarity. To address this issue, Shook and Marian (2012) conducted an eye-tracking experiment with hearing bimodal bilinguals who are proficient in English and American Sign Language. They found that when hearing bimodal bilinguals listen to English prompts they are more likely than English monolinguals to be distracted by pictures of which the ASL signs share phonological similarity with the ASL counterpart of the target English words.

This study is an attempt to replicate Shook and Marian (2012) using Cantonese and HKSL as the target language pair with hearing signers. The eye-tracking system we used is EyeLink 1000+. Twenty-four minimal sign pairs (target and competitor) in HKSL were selected to form the critical trials. The target and the competitor differ in one of the four major phonological parameters (i.e., handshape, location, movement, orientation), and their corresponding Cantonese words share no phonetic similarity in the initial syllable. For example, BOOK (syu1) and SHELL (bui3 hok3) in HKSL differ only in handshape. For each trial, the participants are asked to fixate their gaze at the cross in the centre of the screen. This is followed by the projection of four black-and-white line-drawings in the corners of a 3x3 grid. Each critical trial consists of the target, its competitor, and two distractors. Each time the participants would hear an auditory instruction in Cantonese, 'Please click ________', and they need to move the mouse to the target picture and select it by left-clicking the mouse. Apart from the critical trials, there were 48 filler trials each consisting of the target and three distractors. There were four sets of trial orders following the Latin Square design to ensure that each target item would appear on all four corners. Twenty bimodal bilinguals and 35 hearing unimodal speakers of Cantonese participated in this study.

Preliminary analysis of the combined data show that bimodal bilinguals (Fig. 1) are more likely than the unimodal speakers (Fig. 2) to look at the distractor pictures during the 250 – 500 ms post-stimulus (represented by the red line). A closer look at individual bimodal speakers, however, reveal a significant degree of individual differences. While some bimodals were obviously distracted by the competitors (Fig. 3), some were not (Fig. 4).

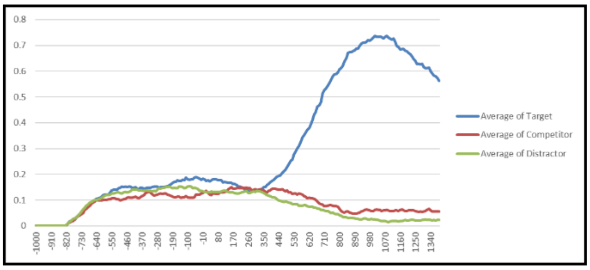

Fig. 1) Averages of looks of bimodal speakers

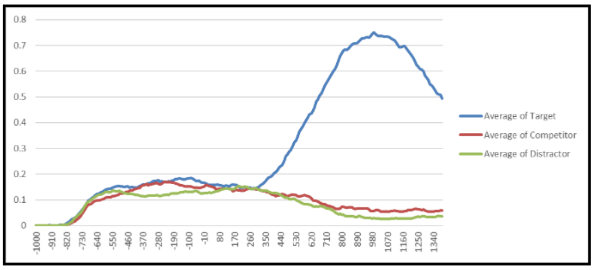

Fig. 2) Averages of looks of all unimodal speakers

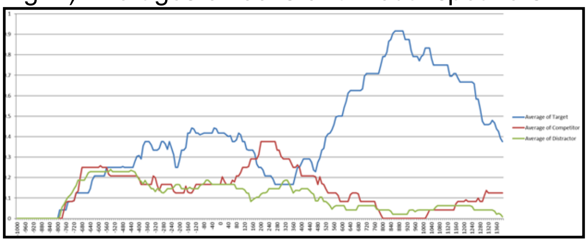
Fig. 3) Bimodal subject distracted by competitors

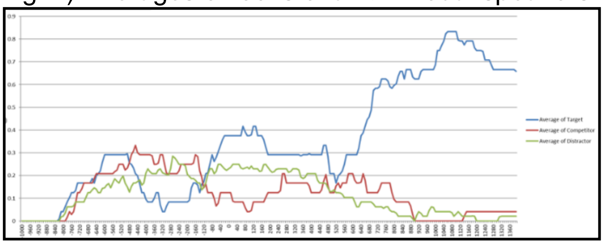
Fig. 4) Bimodal subject not distracted by competitors

We would like to argue that while cross-modal lexical co-activation does occur in bimodal bilinguals, such effect varies across individuals. This finding is not surprising given that bimodal bilinguals differ widely in aspects such as age of acquisition, degree of exposure, and level of proficiency. Further study is definitely warranted to probe into possible factors that affect language processing in this unique group of cross-modal bilinguals.

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The semantic network based on conceptual metaphor and negation: The case of UNDERSTAND in Japanese Sign Language

Yufuko Takashima & Nami Arimitsu

Saturday, 3.45

In this paper, we examine three negative counterparts of a frequently used sign UNDERSTAND (tapping on the chest) in Japanese Sign Language: DON'T-UNDERSTAND (touch on nose with middle finger of open B handshape), CANNOT-UNDERSTAND (chest: flat-C: upward), and DISSATISFACTION (tapping and flipping B handshape to the front). While the first one does not seem to be phonologically related to UNDERSTAND, the latter two seem to show reversal movement of UNDERSTAND. Therefore, the latter can be analyzed as similar cases of negative incorporation which is classically defined as "a bound outward twisting movement of the moving hand(s) from the place where the sign is made" (Woodward and DeSantis 1977: 381). The movement of positive signs in JSL, however, has downward and the signs of the opposite meaning are articulated upward.

UNDERSTAND is articulated with B handshape or A handshape tapping on the signer's chest. Some synonyms articulated with B handshape have downward movement. For example, CONVINCE, one of the synonyms of UNDERSTAND, is articulated with downward movement of a pointing handshape or flat-O handshape from the chin to the chest. Native signers consider that CONVINCE depicts swallowing based on a conceptual metaphor UNDERSTANDING IS CONSUMING FOOD (cf. Wilcox 2007). So, we can observe the mapping from consuming food on the body to understanding an idea. Returning to UNDERSTAND, it is conceived based on TO UNDERSTAND IS TO POSSESS THE IDEA IN THE BODY, and it is the result of consuming food. So, even if it is articulated without downward movement but just tapped on the chest, it immanently contains downward direction. This sign literally means 'I know it' and 'I understood.' It is frequently used as an interlocutor's backchanneling 'okay, I understood, you can talk without any additional explanation.'

DON'T UNDERSTAND (touch on nose with middle finger of open B handshape) is articulated with open B (5) handshape touched on the nose with the middle finger which shows a contrast with the positive sign in both location and handshape. The negative sign indicates that the signer does not have the idea in the body but the idea is still floating in the air which the signer cannot even catch the smell of. This sign is categorized into "negative suppletion"; the form is only slightly related to the positive sign. But when we take the conceptual metaphor TO UNDERSTAND IS TO POSSESS THE IDEA IN THE BODY into consideration, it is not randomly selected.

CANNOT-UNDERSTAND is articulated with a flat-C handshape with fingertips oriented towards the chest, the hand is located on the dominant side near the shoulder, and moved upwards several times with contact to the shoulder. This sign means simply 'I cannot understand it' or 'I don't know' which is opposite of the literal meaning of UNDERSTAND.

DISSATISFACTION (tapping and flipping B handshape to the front) is articulated with B handshape starting with palm touching the chest and rubbing it upwards with outward twist; the ending location is neutral space with the palm upwards. This sign means 'I am dissatisfied with it" and 'I cannot agree to it', contrary to UNDERSTAND which can also mean 'I am okay, I agree with your opinion.'

Although the movements of the two antonyms of UNDERSTAND are articulated upward from the chest which is counter to Wilbur and others' analysis of negation as movement downward (or away from the signer in CANNOT-UNDERSTAND), this sign can be analyzed as negative incorporation. Because the positive sign UNDERSTAND with the underlying metaphor UNDERSTANDING IS CONSUMING FOOD contains immanently inward and downward movement on the chest, the upward movements of CANNOT-UNDERSTAND and DISSATISFACTION indicate the opposite orientation.

Thus, as originally noted by Wilbur (1987), negative incorporation exhibits a type of metaphor. The specific form of the metaphor, however, depends on the positive sign. When other languages are considered in which the underlying metaphors and thus forms are different, we find that we must describe negative incorporation in a more abstract of schematic way. Bembridge (2016), for example, characterizes negative incorporation as reversal of movement. We see that all types of negation in JSL, including negative incorporation and negative suppletion, can be accounted for with conceptual metaphor.

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Functions of sign language classifiers

Gladys Tang

Friday, 9:00-10:00

Sign language classifiers refer to the handshape component of signs that are commonly known as classifier predicates. In this presentation, I will discuss the functions of this handshape component. The motivation behind this research stems from the controversy regarding whether this handshape component could legitimately be ascribed with the linguistic status of classifier, on par with classifiers in spoken languages. There have been cautionary notes against this proposal, as signs involving classifiers have a strong gestural orientation and the handshape component is depictive in nature, in the sense that it may represent an object by depicting either a part or whole of it, or how it is handled or manipulated. For researchers who adopt a linguistic analysis of this component, they generally agree that it belongs to the verbal classifier subtype in the world's typology of classifiers; it is affixed to the verb root and has the semantic functions of *classification* and *referent tracking* (Zwitserlood 2012). Given the premise that this handshape component is linguistically a classifier in natural languages, I will argue that there are more semantic functions than the two just mentioned. In the literature, there are two types of classification: nominal and verbal classification (Bisang 2018). By definition, sign language classifiers may be subsumed under nominal rather than verbal classification. While occurring in the verbal domain, sign language classifiers represent subject or object arguments and identification is mediated by the salient properties of the noun referents like size and shape, animacy,.. etc., thus satisfying the classification function (Grinevald 2003). Yet, there is a fundamental function of classifiers in natural languages that is seldom discussed in the context sign language classifiers. In this presentation, I will argue that sign language classifiers may serve the semantic function of individuation hence a counting function. Following Borer (2005), I assume nouns are mass by default and the verbal classifier in HKSL has the function of portioning out nouns into individuable, counting units. As a counting unit, the classifier merges with a movement root in various modulations to reflect the quantification of objects and events.

Deaf parents and their hearing children gestures and signs in expression of negation: Case of rural and urban deaf families of Côte d’Ivoire

Angoua Tano

Saturday, 3.46 **– CANCELLED**

Negation in sign languages is mostly expressed by manual and non-manual marks (Pfau and Quer 2002; Pfau 2015). Headshake is a non-manual negation which is originally the opposite of bowing to somebody symbolizing obedience (Jakobson 1972). Thus, according to Pfau and Steinbach (2013), the movement of the head to express negation in sign languages is a grammaticalized linguistic element from a gestural input. This paper examines the acquisition and expression of negation by children in Bouakako Sign Language (LaSiBo) and the variety of American Sign Language used for deaf education in Côte d'Ivoire (ASL-CI).

LaSiBo is used by seven deaf people in the village of Bouakako (in South West of Côte d’Ivoire) and where considerable number of hearing people use sign supported speech. The deaf signers are not in school, have family ties and are the first generation identified. A descriptive analysis of LaSiBo is presented in Tano (2016). ASL-CI, on the other hand, is mostly used in urban cities by educated deaf people. This language was introduced in Côte d’Ivoire in 1974 by Andrew Foster for deaf education.

This study on negation is an analysis of gestures related to semantics. There is a lack of studies on language socialization in Africa, especially on children with deaf parents. Bilingualism within families and sign language acquisition/development for children born to these families are still understudied; hearing children of deaf parents are even less studied. For children born to deaf parents, a semantic aspect like the expression of negation is interesting to observe. Bloom (1970) suggests three types of negative meanings in the early speech of children learning English. These categories are rejection (negations are those in which “the referent actually existed or was imminent within the contextual space of the speech event and was rejected or opposed by the child,”); denial (the negation “asserted that an actual predication was not the case) and nonexistence (“the referent was not manifest in the context, where there was an expectation of its existence, and was correspondingly negated in the linguistic expression,”) (Bloom, 1970:173) Are the negation markers such as shaking the index finger and the head or shaking the body (trunk)? fit in the categories proposed by Bloom (1970)? As the target families live in different environments, are there any differences that can be observed in the construction of negation? What about the position of the negation particle within a sentence? Is the grammaticalization of the gesture effective in this context? These were some of the questions that motivated this study.

Six young children less than five years from five families were recorded. At least one of the parents is deaf and uses different sign languages. Three families live in a rural area, in the village of Bouakako, where children are mainly exposed to Dida (the surrounding spoken language) and LaSiBo. The remaining two families live in Abidjan, an urban area and the most important town of Côte d'Ivoire, and use ASL-CI. The three parents of rural area are composed by a couple deaf-hearing while those of urban area are deaf-deaf. The children in Abidjan are exposed to French. All target children for this study are hearing so they are developing bilingually and bimodally. The corpus is composed of 30 minutes recordings of interactions between children and their deaf parents through a series of home visits taking place once every six weeks from July 2017 to July 2018 with a total of approximately 840 minutes of recording. Deaf parents were asked to discuss any topic with the target child as they would daily.

Our first results show that in both Bouakako and Abidjan, negation is expressed in the same way by adults and their respective children as well as in the gestures of hearing non-signing people in the community they belong to. Gestures of hearing non-signer have been observed on the field of research during the session of recording. The signs to express negation lie in a continuum of gestures used by the hearing community in general and introduced into sign languages. In most cases, we have a shaking index finger, a shaking head or a shaking body. For the latter, it has been noticed that it is exclusively used by children (Figure 1). The meanings of these signs are mostly in the category of rejection and nonexistence. However, in a family in Abidjan, we also notice the use of an ASL-CI sign 'NOT' by both parents and the child because ASL-CI is the main language of communication between them. The target child already has noticeable knowledge of ASL-CI thanks to her age. According to the position of negation particle within a sentence, few words can be says about it as did not start yet a deep analysis. But we observe that in most cases, the negation appears consecutively in context like a question

Father: YOU SLEEP '' do you want to sleep?''
Child: NO (headshake)

We can conclude that to express the notion of negation, children use gestures which have been grammaticalized in the signing community. It may due to the fact that these structures are common and frequently used in their environment by non-signers people.

Figure 1: Side-to-side body movement for negation by child in LaSiBo

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Revisiting the past to understand the present: The impact of linguistic colonialism on the singapore Deaf community and the evolution of Singapore Sign Language (SgSL)

Phoebe Tay

Saturday, 3.47

Fontana, et al. (2017, 363) refer to the case of Italian Sign Language as “an example of how sign language change is driven not only by language-internal factors but also by changes in language perception, as well as in the changing groups of users and the contexts of use”. Research into the origins of ASL show how ASL developed from a simple signed pidgin to a creole and then a language through a variety of diverse influences such as French Sign Language, Manual French, Early Manual English, Martha's Vineyard Sign, Old Kent Sign Language, American Indian Sign Language, Mexican Sign Language, Black ASL, as well as home signs (Fox 2007, Davis 2001; McCaskill et al., 2011; Quinto-Pozos 2004). Singapore Sign Language (SgSL) appears to have undergone similar phenomena. SgSL is a blend of Shanghainese Sign Language (SSL), American Sign Language (ASL), Signing Exact English (SEE-II) and signs that have been developed locally (Singapore Sign Language 2018). The evolution of SgSL seems akin to what ASL experienced. So what are the factors that influenced the development of SgSL to be where it is now?

Historical records examined thus far do not mention Deaf persons in Singapore before or during the Japanese Occupation in World War II. The first recorded deaf person that surfaced in the early 1950s is Peng Tsu Ying, a Chinese deaf immigrant from Shanghai. He established the first deaf school and named it the Singapore Chinese Sign School for the Deaf. Mr. Peng introduced Shanghainese Sign Language (SSL) as the language of instruction in the school (Singapore School for the Deaf 50th Anniversary Celebration 1963-2013 2013). The Red Cross Society also provided an education for deaf children using oral communication modes. In 1963, the Singapore Chinese Sign School merged with the oral school for the deaf. This became the Singapore School for the Deaf (SSD) which had a Chinese sign section and an oral section. Mr Peng became its first deaf principal. Since SSD’s inception, there have been changes in deaf education programming, largely influenced by trends in Deaf education in the USA.

The changes began in 1975 when Mr Lim Chin Heng, a former pupil of Mr Peng, introduced SEE-II and ASL to the SSD after graduating from Gallaudet College (DPA's Treasurer Named "Outstanding Deaf Citizen" for the Year 1995; Parsons 2005). In the following year, Ms Frances M Parsons, known as the global ambassador of total communication (TC) from Gallaudet College, came to Singapore. She trained educators of the Deaf in Singapore how to use TC by demonstrating the combined method where sign and speech were used simultaneously (Parsons 2005). During the teachers’ meeting, Ms Parsons compared unstructured signs (natural gestures) from SSL used at SSD with SEE-II, perceived as structured signs that represented English grammar, tense and syntax (Parsons 1976; Parsons 2005). Consequently, Mr Peng decided to do away with SSL and implemented the use of SEE-II since English was

Singapore's official written language. Observations that the students were using unstructured signing constantly but had a limited few hours of classes involving reading and writing in Chinese at school led to this decision. Therefore, SSD began to incorporate SEE-II signs with spoken English in 1977, and they phased out the Chinese Sign Section by 1978 (Gertz and Boudreault 2015).

Kusters and Sahasrabudhe (2018, 44) discuss their findings on "academic and everyday perspectives on the differences between gesture and sign" in India and Europe. There appears to be a nexus between the researchers' findings on language ideologies concerning sign and gesture, and the preconceived attitudes and beliefs of what constitutes a language, sign and gesture evident in the primary historical sources written by Mr Peng, Mr Lim and Frances Parsons. Fontana, et al. (2017, 363) stated that "changes in language attitude have influenced new linguistic practices." The term Singapore Sign Language (SgSL) was officially coined in 2007 (Project Proposal: Singapore Sign Language (SgSL) Sign Bank and Community Engagement Project (Phase II): Development of Singapore Sign Language (SgSL) Sign Bank Project 2014). Some deaf individuals felt that SEE-II was not natural deaf language and pushed for SEE-II classes to be replaced with SgSL classes. The first SgSL Level 1 and 2 classes commenced in April 2015 at SADeaf and have been running since then (Project Proposal: Singapore Sign Language (SgSL) Sign Bank and Community Engagement Project (Phase II): Development of Singapore Sign Language (SgSL) Sign Bank Project 2014). Based on Tay's (2018) autoethnographic research, such changes have resulted in the emergence of an SgSL versus SEE-II debate and shifting identities today among deaf individuals in Singapore.

With reference to historical and autoethnographic sources, this presentation will expound on the origins of SgSL by giving the audience a road map on key issues and moments in this history. The language attrition of SSL by SEE-II and ASL, seen through links between Gallaudet and Singapore, will be explored through a colonialism lens. Lastly, this presentation will discuss the linguistic ecology of Singapore by exploring the status of SgSL against the backdrop of the country's four official languages - English, Mandarin, Bahasa Melayu and Tamil; and also Singlish, a colloquial Singaporean English.

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Body anchoring and iconic anchoring: Biomechanical and semantic motivation of signs' locations

Oksana Tkachman, Bryan Gick & Kathleen Currie Hall

Saturday, 3.48

Body-anchored signs, that is, signs articulated with a body contact, are known to have special phonetic properties: they are resistant to coarticulation, for example, (see Russell et al. 2011 and Mauk et al., 2008 for American Sign Language; Ormel et al., 2012 for the Sign language of the Netherlands), and can even influence surrounding signs to be signed closer to them (Mauk 2003). Not only that, but body-anchored signs articulated in higher signing space resist lowering historically, even though the overall tendency of signs in the higher signing space is to be lowered (Frishberg 1975). We explain this interesting resistance of body-anchored signs to change on biomechanical grounds, by explaining body-anchored signs as *biomechanical endpoints*, here a particular type of "biomechanical quantal region" (see Moisik & Gick 2017). Endpoints are motorically easy targets, in that signs involving contact with other surfaces such as the signer's body, arm or the nondominant hand are robust to muscle activation overshoot errors. As motorically easy targets, such signs will be easy to acquire and will resist change.

Not all signs that resist change such as historic lowering are body-anchored, however; iconic signs whose location is iconic do so, too. This is not surprising, if the sign derives its meaning from its location. For example, the sign EAT needs to be articulated at the mouth, as this is where the eating is done (Meir 2010). In fact, studies show that some body locations are much more prominent than others within certain semantic domains (Börstell & Östling 2017, Östling, Börstell, & Courtaux 2018). For example, in numerous sign languages, sensory and body-part related meanings tend to be iconically articulated at their associated locations on the body (Östling et al. 2018). We call this tendency *iconic anchoring*, or anchoring to a specific location not physically but iconically (without body contact). Again, the sign EAT is articulated at the mouth to mean what it means, but it does not make a contact with the mouth itself; it is anchored there iconically. Can the two types of signs, body-anchored and iconically anchored, account for distributional tendencies of sign lexicons? For example, can they account for why some signs in the higher signing space stay there and do not descend to more articulatorily easy lower-body locations such as neutral space?

We explore the relationship between these two types of anchoring in ASL using the ASL-Lex database (a free online corpus of ~1,000 sign[1] of American Sign Language, Caselli et al., 2017). We coded the signs for the presence vs. absence of any body contact. We also re-coded the included iconicity ratings binarily, treating signs ranked 3.5 and above on a scale of 1-7 as "high" iconicity and those below 3.5 as "low" iconicity. We first considered the overall proportional distributions of anchoring types across the ASL-Lex database; approximately 75% of all signs are anchored in some

[1] For technical reasons beyond the scope of this paper, only 691 signs were actually included in the analysis. Signs were removed if their associated video was clipped, they were coded as compounds, or they were coded as having "unusual" values for their primary parameters.

way, using body-anchoring, iconic-anchoring, or both. We then examined how the two anchoring types interact with each other, as shown in Figure 1.

As can be seen, the distribution of body anchoring types is different across the two iconic anchoring types, and a chi-square test confirms that the distributions are statistically significantly different [$\chi^2(1) = 16$, $p < 0.001$]. In other words, while signs that iconically anchored may or may not be body anchored (the split is 50-50), signs that are not iconically anchored have a tendency to be body anchored.

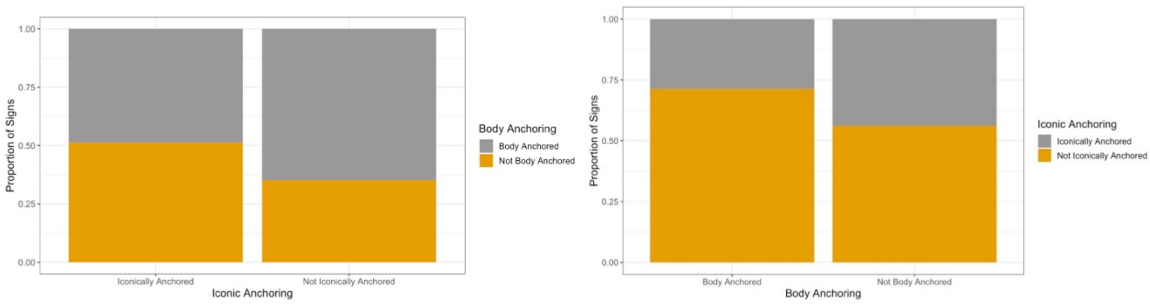

Figure 1. The proportional distribution of body anchoring types across iconic anchoring types.

Taken together, these results show that less iconic signs have a stronger tendency for body contact (body anchoring). This supports the view that if a sign is not anchored in one way, it is more likely to be anchored in another way. The study demonstrates how two different forces can lead to similar outcome in a sign language. It also raises interesting questions about other consequences, such as double-anchored signs and anchor-free signs. For example, some signs are both body-anchored and iconically anchored (e.g., the ASL sign HORSE). Interestingly, in ASL this sign is one-handed, even though horses have ears on both sides of their heads, and a quick look at a multi-sign-language corpus such as spreadthesign.org shows that many other sign languages use two-handed forms of this sign. We propose that, as this sign is double-anchored, the only phonological reduction it could undergo historically was reduction of the number of hands employed. Anchor-free signs are expected other biomechanical motivations, such as movement stability. We will discuss these possibilities in the presentation.

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The case of negative prefix in Polish Sign Language (PJM)

Piotr Tomaszewski

Saturday, 10:30-11:00

Introduction

Research conducted on the sequential morphology of sign languages to date shows that processes of affixation also take place in other sign languages (Sandler, Lillo-Martin 2006; Meir, 2012; Mathur, Rathmann, 2014). In previous research more suffixes than prefixes have been identified in sign languages. Nevertheless, Aronoff, Meir and Sandler (2005) have shown that Israeli Sign Language (ISL) has sensory prefixes. Polish Sign Language (PJM) has one negative prefix NEG- which appears to be indigenous to the language (Tomaszewski 2015), which is of interest given the relative rarity of prefixes in sign languages (Sandler, Lillo-Martin 2006; Zeshan 2004; also see Aronoff et al. 2005).

This paper focuses on the following research questions, which have the potential to reveal more about morphological structure and change within sign languages:

(a) What is the process by which NEG- and lexical morphemes are linked together to form prefixed words?
(b) What is the nature of the variation in this morphological process?

To address these questions, material from a corpus of original signed texts produced by **10** Deaf native signers was analyzed.

Analysis

By way of illustration, we focus on one of the frequently used prefixed words: the negated verb NEG+ZGADZAĆ-SIĘ ‘not agree’ (Figure 1a), wherein the first morpheme is the negative prefix NEG- , and the other morpheme is ZGADZAĆ-SIĘ ‘to agree’. As it turns out, this prefixed word has four optional variants that reveal more about the process of prefixation as well as a gradual change in the phonological form of the prefix.
The NEG- prefix is derived from the fingerspelled form #NIE ‘not’, which is an independent morpheme. This morpheme, when combined with the phrase ZGADZAĆ-SIĘ, has undergone the process of grammaticalisation to become the derivational (and bound) morpheme NEG-. In variants (1) and (2) of NEG+ZGADZAĆ-SIĘ, the handshape of the negation prefix NEG- is assimilated to the hand configuration of the lexical item to which the prefix is attached. This assimilation occurs partially in variant 1 (Figure 1a) since the initial handshape of the NEG-prefix (extended thumb, index and middle fingers) is still visible, but the final handshape (thumb contacting extended index and middle fingers) is no longer present. In variant 2 (Figure 1b), the assimilation of handshape is complete, since neither the initial nor the final handshape of the NEG-prefix is visible. Moreover, the NEG- morpheme involves a [convex arc] path movement, along with a change in hand orientation. As variants (3) and (4) (Figure 1c,d) show, the NEG- prefix has a strong tendency to be phonologically fused with the lexical item:

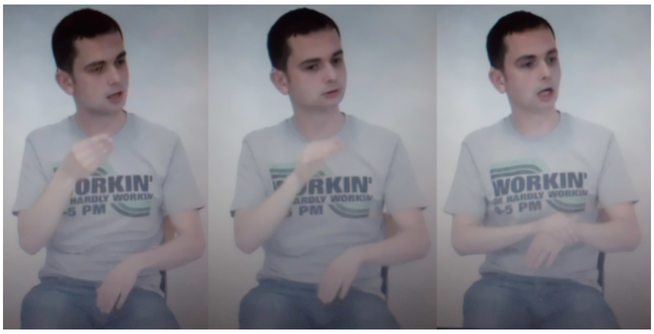
variant (3) of NEG- loses path movement but retains the change in hand orientation as internal movement; variant (4), in contrast, drops internal movement in the NEG-morpheme, but this internal movement instead appears simultaneously with the path movement of the second morpheme (ZGADZAĆ-SIĘ). Variants (1), (2) and (3) are bimorphemic and disyllabic words, while variant (4) is also bimorphemic but has monosyllabic structure.

Conclusion

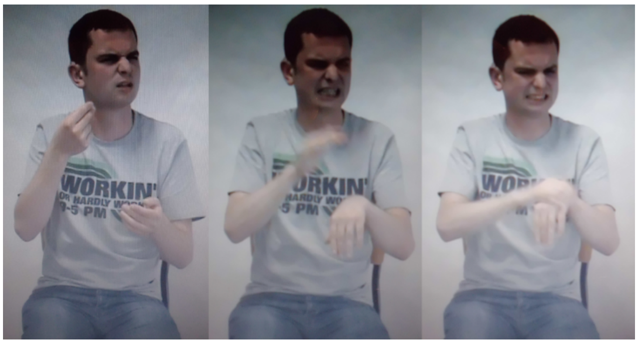
The study of change across the variants of prefixed words like NEG+ZGADZAĆ-SIĘ points to a conspiracy of monosyllabicity, in line with Brentari (1998) and Sandler (1989). However, there are other prefixed words in PJM which do not display the same range of variation as the example discussed here, suggesting that the connection between morphophonological constraints and grammatical change is complex. This study of the prefix NEG- shows the occurrence of morphophonological constraints on syllable sequences in prefixed signs which indicate that the movement and change of orientation must not be too similar in each syllable. The research results can enrich models for describing processes of grammaticalization in the context of the visual-gestural modality that forms the basis for sign language structure.

a. Variant (1) of prefixed word with partial assimilation of hand configuration of NEG- prefix

b. Variant (2) of prefixed word with full assimilation of hand configuration of NEG- prefix



c. Variant (3) of prefixed word with loss path movement segment of NEG- prefix



d. Variant (4) of prefixed word with gradual loss internal movement segment of NEG- prefix

Figure 1. Process of grammaticalisation of prefixed word NEG+ZGADZAĆ-SIĘ ‘not agree’

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Critical period hypothesis and sign language acquisition by Polish Deaf people under different linguistic stimulation conditions

Piotr Tomaszewski, Piotr Krzysztofiak & Marta Majewska

Saturday, 3.49

The study focuses on the relationships between the age of acquisition of Polish Sign Language (PJM) by deaf individuals and their receptive language skills (at the phonological, morphological and syntactic levels). The purpose of this study is to determine the level of PJM comprehension by deaf individuals with different ages of PJM acquisition and to verify the correctness of deaf individuals' responses to PJM utterances. Our sample (N=60) was split into three equal groups (n=20): 1) group of PJM native signers (DIDP); 2) group of early learners of PJM (reported age of acquisition between 4 and 8 years of age) (DIHP1); 3) group of late learners of PJM (reported age of acquisition between 9 and 13 years of age) (DIHP2).For the measurement of variables, the "PJM Perception/Comprehension Test" was used. It covered three aspects of the language structure: phonological, morphological and syntactic. The analysis additionally included three types of words at the lexical level, sequential and simultaneous sequence morphology, and three syntactic properties. Our general results show that the age of PJM acquisition has a significant impact on the acquisition of this language during the later stages of development. A similar result was obtained for the phonological features. However, at the morphological and syntactic levels of PJM, the only significant differences were between DIDP and DIHP1 and between DIDP and DIHP2. The effect of the age of PJM acquisition was also apparent for the other variables under study except for sentences with non-manual signals. The above results confirm Boudreault and Mayberry (2006) studies on ASL that showed the onset of first language acquisition affects the ultimate outcome of linguistic knowledge for later language usage.

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The neural basis of sign language processing in deaf signers: An Activation Likelihood Estimation meta-analysis

Patrick C. Trettenbrein, Giorgio Papitto, Emiliano Zaccarella & Angela D. Friederici

Saturday, 3.50

The neurophysiological response during processing of sign language (SL) has been studied since the advent of Positron Emission Tomography (PET) and functional Magnetic Resonance Imaging (fMRI). Nevertheless, the neural substrates of SL remain subject to debate, especially with regard to involvement and relative lateralization of SL processing without production in (left) inferior frontal gyrus (IFG; e.g., Campbell, MacSweeney, & Waters, 2007; Emmorey, 2006, 2015). Our present contribution is the first to address these questions meta-analytically, by exploring functional convergence on the whole-brain level using previous fMRI and PET studies of SL processing in deaf signers.

We screened 163 records in PubMed and Web of Science to identify studies of SL processing in deaf signers conducted with fMRI or PET that reported foci data for one of the two whole-brain contrasts: (1) “SL processing vs. control” or (2) “SL processing vs. low-level baseline”. This resulted in a total of 21 studies reporting 23 experiments matching our selection criteria. We manually extracted foci data and performed a coordinate-based Activation Likelihood Estimation (ALE) analysis using GingerALE (Eickhoff et al., 2009). Our selection criteria and the ALE method allow us to identify regions that are consistently involved in processing SL across studies and tasks.

Our analysis reveals that processing of SL stimuli of varying linguistic complexity engages widely distributed bilateral fronto-occipito-temporal networks in deaf signers. We find significant clusters in both hemispheres, with the largest cluster (5240 mm^3) being located in left IFG, spanning Broca’s region (posterior BA 45 and the dorsal portion of BA 44). Other clusters are located in right middle and inferior temporal gyrus (BA 37), right IFG (BA 45), left middle occipital gyrus (BA 19), right superior temporal gyrus (BA 22), left precentral and middle frontal gyrus (BA 6 and 8), as well as left insula (BA 13). On these clusters, we calculated lateralization indices using hemispheric and anatomical masks: SL comprehension is slightly left-lateralized globally, and strongly left-lateralized in Broca’s region. Sub-regionally, left-lateralization is strongest in BA 44 (Table 1).

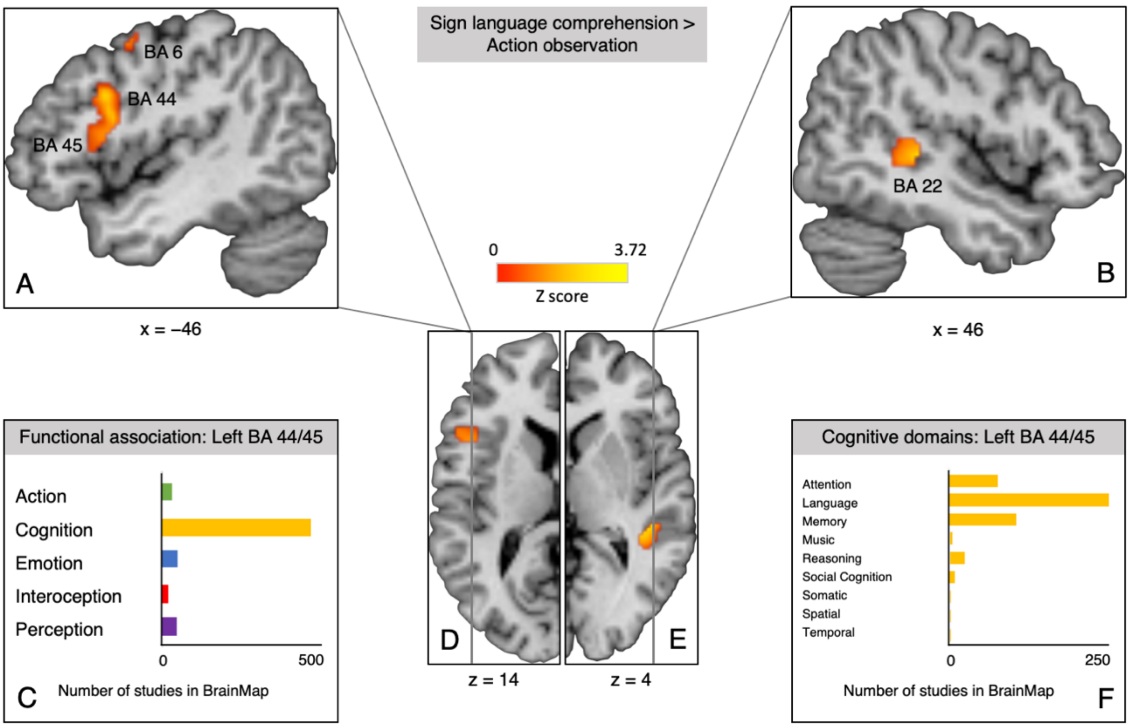
Next, we performed a contrast analysis between SL and an independent dataset of action observation in hearing non-signers (Papitto, Friederici, & Zaccarella, 2019) to determine which regions are associated with processing of human actions and movements irrespective of the presence of linguistic information. Only studies of observation of non-linguistic manual actions were included in the final set (n = 26), for example, excluding the handling of objects. Significant clusters involved in the linguistic aspects of SL comprehension were found in left Broca’s region (centered in dorsal BA 44), right superior temporal gyrus (BA 22), and left middle frontal and precentral gyrus (BA 6 and 8; Figure 1A, B, D and E). Meta-analytic connectivity modelling for the surviving cluster in Broca’s region using the BrainMap database then revealed that it is co-activated with the classical language network and functionally primarily associated with cognition and language processing (Figure 1C and D).

In line with studies of spoken and written language processing (Zaccarella, Schell, & Friederici, 2017; Friederici, Chomsky, Berwick, Moro, & Bolhuis, 2017), our meta-analysis points to Broca's region and especially left BA 44 as a hub in the language network that is involved in language processing independent of modality. Right IFG activity is not language-specific but may be specific to the visuo-gestural modality (Campbell et al., 2007).

Table 2: Lateralisation indices (AveLI, baseLI; Matsuo et al., 2012) and total number of active voxels in anatomical ROIs (maximum probability maps from Amunts et al., 1999) in left and right hemisphere (LH/RH).

Mask	AveLI	baseLI	Number of voxels LH	Number of voxels RH
BA 44	0.78	0.65	549	131
BA 45	0.54	0.25	389	282
Broca's region / BA 44 and BA 45	0.68	0.46	645	282
Entire hemisphere	0.24	0.20	1196	808

Figure 12: Significant clusters of sign language comprehension > action observation contrast and functional attributions in the BrainMap database. (A) Sagittal plane at x = –46 showing the largest cluster (2336 mm3) in left IFG spanning BA 44 and BA 45, as well as parts of another smaller cluster (616 mm3) in precentral gyrus (BA 6). (B) Sagittal plane at x = 46 showing the cluster in right STG (BA 22). (C) Number of studies in the BrainMap database that report peaks in voxels of the cluster in left IFG (BA 44 and 45) organized by behavioral domain. (D) Transverse plane of the left hemisphere at z = –14. (E) Transverse plane of the right hemisphere at z = 4. (F) Number of studies in the BrainMap database that report peaks in voxels of the cluster in left IFG (BA 44 and 45) organized by behavioral sub-domain within the domain of cognition.



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Psycholinguistic norms for more than 300 lexical manual signs in German Sign Language (DGS)

Patrick C. Trettenbrein, Nina-Kristin Pendzich, Jens-Michael Cramer, Simon Kollien, Angela D. Friederici & Emiliano Zaccarella

Friday, 2.60

Sign languages provide researchers with an opportunity to ask empirical questions about the human language faculty that go beyond considerations specific to speech and writing. Whereas psycholinguists working with spoken and written language stimuli routinely control their materials for parameters such as lexical frequency and age of acquisition (AoA), no such information or normed stimulus sets are currently available to researchers working with German Sign Language (DGS). Our contribution presents the first norms for iconicity, familiarity, AoA, and transparency for DGS.

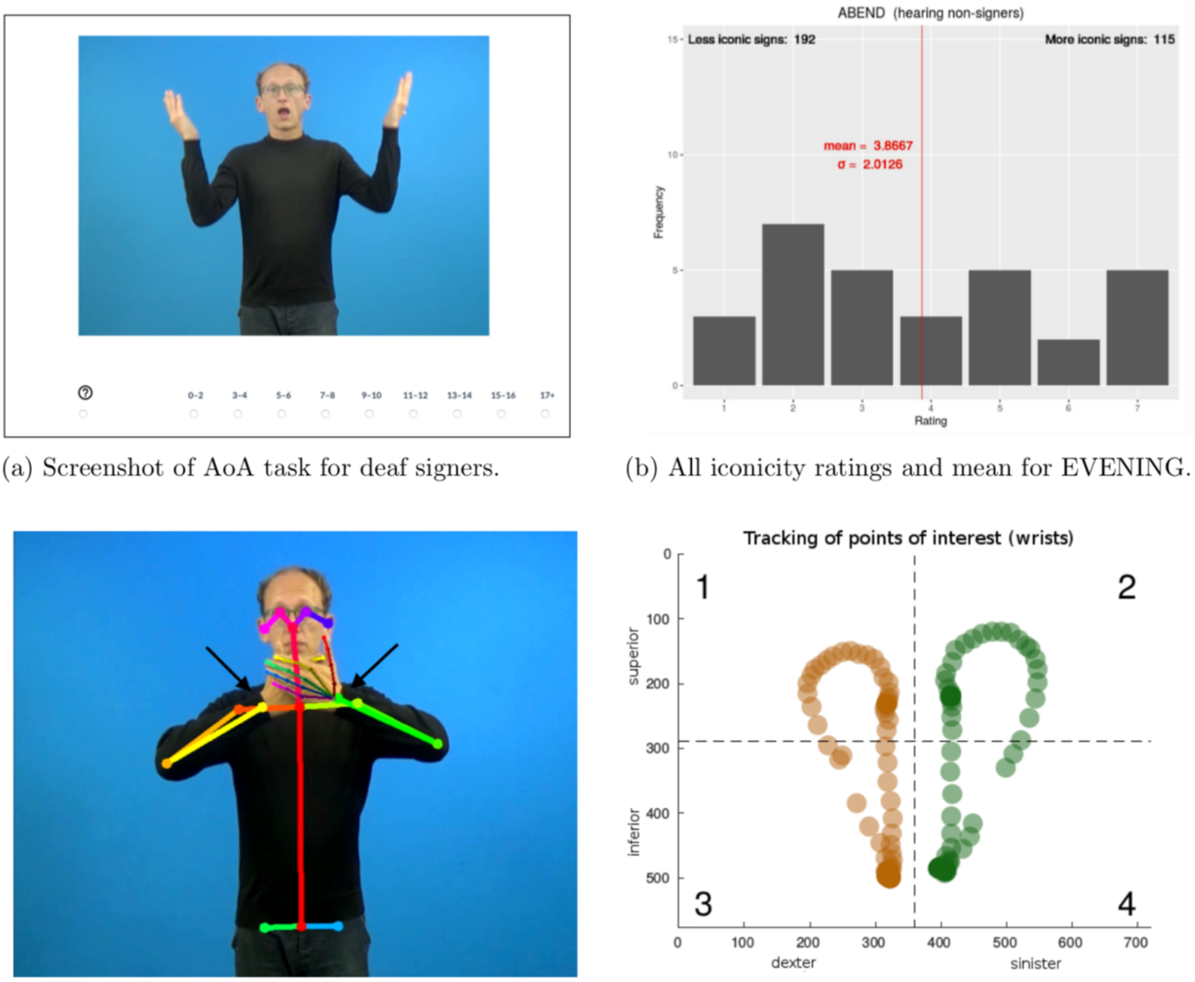
The normed stimulus set consists of more than 300 clips of manual DGS signs accompanied by mouthings and non-manual components. Norms for the signs in the clips are derived from ratings by a total of 30 deaf signers in Leipzig, Göttingen, and Hamburg, as well as 30 hearing non-signers and native speakers of German in Leipzig. The rating procedure was implemented in a browser to ensure functionality and a similar procedure across locations and participants (Figure 1a), yet all participants performed the ratings on site in the presence of an experimenter. Deaf signers performed a total of three tasks in which they rated stimulus clips for iconicity, AoA, and familiarity. Such subjective measures of AoA and familiarity have been shown to be good proxies for corpus measures in studies of other spoken and sign languages (Vinson, Cormier, Denmark, Schembri, & Vigliocco, 2008). Hearing non-signers performed two tasks in which they first guessed the meaning of the signs in the clips to determine transparency and in the second task rated iconicity given the meaning.

In addition to empirical norming data (e.g., Figure 1b), we provide information about German and English correspondences of signs. The stimulus set has been annotated in machine-readable form with regard to lexico-semantic as well as phonological properties of signs: one-handed vs. two-handed, place of articulation, path movement, symmetry, most likely lexical class, animacy, verb type, (potential) homonymy, and potential dialectal variation. Information about sign on- and offset for all stimulus clips and a number of quantitative measures of movement are also available. These were derived from automated motion tracking by fitting a pose-estimation model (Figure 1c) to the clips using OpenPose (Wei, Ramakrishna, Kanade, & Sheikh, 2016) which allows us to quantify and automatically track movement (velocity and acceleration) beyond annotation (Figure 1d).

In this presentation, we will focus on providing an overview of the derived norms and attempt to put them in perspective of published empirical norms for other sign languages, for example, ASL and BSL (Vinson et al., 2008; Caselli, Sehyr, Cohen-Goldberg, & Emmorey, 2017), as well as comparable information for spoken languages. This includes a comparison of our subjective rating data with regard to frequency and AoA obtained using DGS signs with norms for other sign languages as well as with similar measures for German and English. We also discuss the relationship of mean iconicity ratings between deaf signers and hearing non-signers, as well as the relation of iconicity and transparency.

Our norms and stimulus set are intended to control for psychologically relevant parameters in future psycho- and neurolinguistic studies of DGS beyond the work of our own labs. Consequently, the norms, stimulus clips, cleaned raw data, and the R scripts used for analysis will be made available for download through the Open Science Framework.

Figure 13: Example stimulus EVENING. (a) Screenshot of AoA task for deaf signers. (b) Iconicity ratings for this stimulus by hearing non-signers (1 "not iconic" – 7 "very iconic"). Mean and σ in red. (c) Automated motion tracking provides quantitative information about movements in every clip. Arrows indicate points of interest used for the plot. (d) Movement of manual articulators in the clip as revealed by motion tracking (darker colours indicate lower velocity, i.e. holds).



(a) Screenshot of AoA task for deaf signers.

(b) All iconicity ratings and mean for EVENING.

(c) Fitted pose-estimation model.

(d) Symmetry of manual articulators revealed.

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Signing space is reduced at faster signing rates in American Sign Language

Martha E. Tyrone & Claude E. Mauk

Saturday, 3.51

Over the last couple of decades, multiple instrumented studies of sign phonetics have shown that sign production is affected by phonetic context and production rate, in much the same ways that speech production is (cf. Ormel et al., 2013; Mauk & Tyrone, 2012; Cheek, 2001). In fast speech, articulatory trajectories, and by extension, formant transitions are reduced (cf. Moon & Lindblom, 1994; Mauk, 2003). Indeed, phonetic reduction in particular has been documented in both spoken and signed languages (Mauk, 2003; Tyrone & Mauk, 2010). This study aims to analyze differences in overall size of the signing space in ASL when signing rate increases.

The participants were three Deaf native signers of ASL. Motion capture data were collected with a six-camera Vicon system as signers produced scripted utterances, which were presented as an English gloss with an accompanying illustration. A native Deaf research assistant acted as an interlocutor and presented the scripted utterances one by one. Reflective markers were attached to the participants' hands, arms, head, and torso (Figure 1). The data analyzed here are from the right hand.

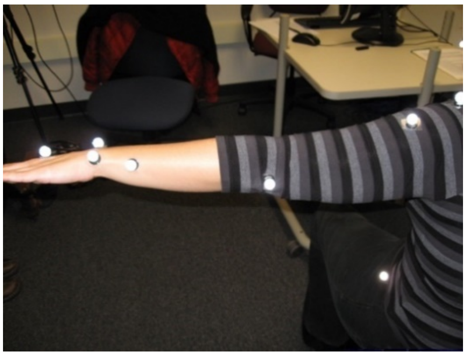

Figure 1: Marker placement on left arm

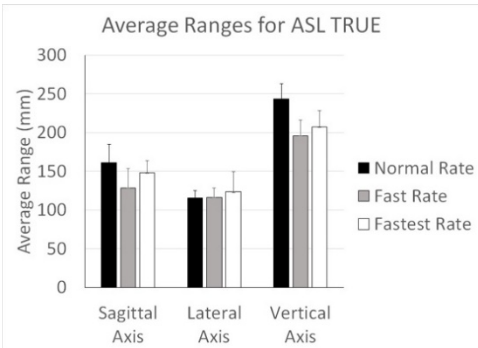

Figure 2: Average total displacement along each axis

Preliminary analyses suggest that the signing space is reduced as signing rate increases. In addition, reduction is mostly along the sagittal (or front-back) plane of the signing space. An example of this occurs in production of the utterance, "KNOW BOOK TRUE NOT. MADE-UP." Figure 2 shows the average total displacement of the right hand on the vertical, lateral and sagittal planes at normal, fast, and fastest signing rates for the signer TE. Figure 3 shows a side view of the hand's trajectory over the course of one token of the phrase at each of those rates.

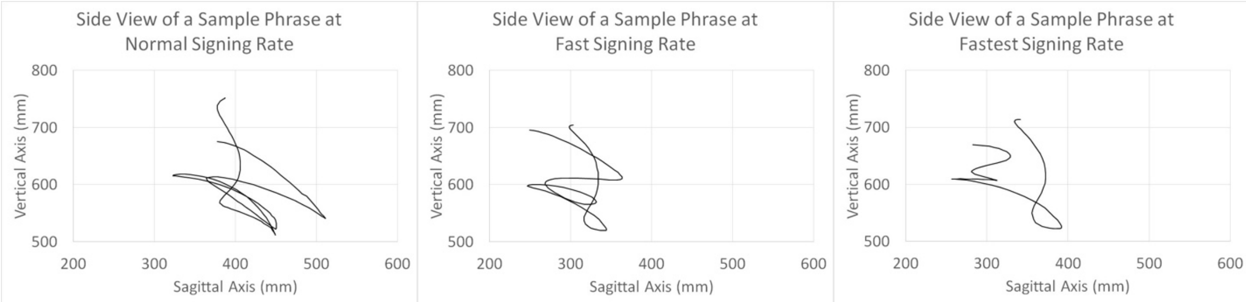

Figure 3: Hand's movement over the entire utterance at three signing rates

Even at the level of phonetics, the organizational principles of signed languages are quite similar to those of spoken languages. While speech movements are reduced at faster speech rates, some research has shown that speech movements are less variable at faster rates (Wohlert & Smith, 1998). Preliminary data from the current study suggest that this might be a modality difference between sign and speech. Additional research is needed to probe this possibility, because it is difficult to generalize from the current study given its small sample size. If the current results are valid, it is predicted that the same pattern would be observable in other signed languages, since phonetic reduction is best explained as a broader phenomenon of motor control. For the same reason, it is predicted that native and non-native signers would not reduce the signing space in the same way, given that it reflects a practiced motor skill in one group but not in the other.

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NMM for [eyegaze] and [mouth]: Grammatical functions in Motion Predicates in LSCu (Sign Language of Cuba).

Alicia Calderón Verde, Donny Wilson Limonta, Gilma Cervantes Soliño, Ariel Hernández Hernández & Elena E. Benedicto

Saturday, 3.52

This paper explores the role of NMM in LSC-u (Sign Language of Cuba), in particular [eyegaze] and [mouth] in their interaction with motion predicates. Data were obtained from 3 adult native signers, fluent users of LSCu. The instrument used was Benedicto (2017), a self-paced application with 175 video animations divided in 7 blocks. The application encodes variables for several parameters related to Motion Predicates; in this paper we focus on Path (encoding the event`s *process*) and Telicity and examine the morphological correlates associated with the non-manual markers of eyegaze and mouth gestures. Each signer produced 2 different renderings for each video animation with a total of 1050 productions; qualitative follow-up with the signers was obtained as needed. Two cameras with frontal and side angles were used and recordings were clipped and processed in ELAN, with coding tiers for dominant and non-dominant hands (H1 and H2), eyegaze and mouth NMM; spatial coding for Figure, Endpoint and Movement vectorization was used according to the categorical specifications of Benedicto-Branchini-Mantovan (2015).
Initial results indicate the following correlations:

(1) a. a [u] NMM mouth gesture with optional release of air co-timed with the Path of the motion event; semantically, this corresponds to the *process* sub-event.
 b. a bilabial stop [p] NMM mouth gesture co-timed with the Endpoint of the motion vector; semantically, this corresponds to the *telic* sub-event.
 c. an [eyegaze] NMM on the Figure at the beginning of the Path articulation
 d. an [eyegaze] NMM on the Endpoint location of the motion vector

The following examples illustrate these points:

(2) [0111LSCglm-a]

[eg]						[x]	[x]	
[m]						[uuu]		[p]
H1.	PÁJARO.b	ÁRBOL.l	ÁRBOL.r	RIO.c	PÁJARO.b	F+IR-VOLAR--------------		F+ARRIVE.l
H2.		ÁRBOL.l	ÁRBOL.r		5.r+ESTAR		5.l+ESTAR ----------------	

‘There is a bird, a tree on the left, a tree on the right, a river in the middle; the bird flies across the river all the way up to the tree on the left’

(3) [0125LSCglm-b]

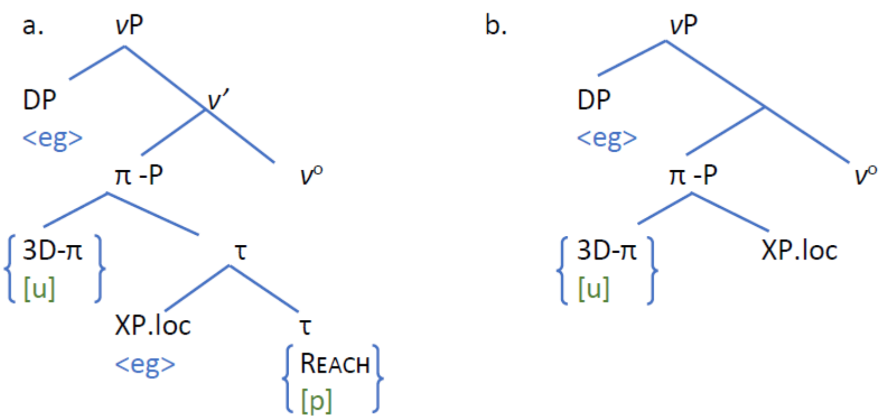
[eg]				[x]			[x]
[m]							[uuu]---------------------------
H1.	NIÑA.a	PÁJARO.b	SOLTAR	F+IR-VOLAR			F+IR-VOLAR ------------------
H2.			SOLTAR		RIO.c	4.d+ESTAR --------------------------------	

‘The girl releases the bird; (it) flies across the river in the direction of the fence’

In (2), corresponding to a telic prompt, we can observe two mouth NMMs: a [u]-shaped gesture co-articulated with the path of the motion, and a [p] gesture co-articulated with the end of the path and the reaching of the endpoint of the displacement. We can also observe two points where the eyegaze fixates on a spatial point different than the addressee: the Figure at the beginning of the path, and the spatial identification of the Endpoint location. It is interesting to point out that at the time of articulation of arrival at the Endpoint, the eyegaze has returned to the addressee.

In (3), on the other hand, corresponding to a non-telic prompt (there is a potential endpoint, a fence, 4.d+ESTAR, but it is not reached), we again observe a [u]-shaped mouth gesture coarticulated with the path, as well as an absence of the [p] mouth gesture. The eyegaze is directed to the Figure at the beginning of the path and is crucially absent on the potential Endpoint, the fence, which never materializes as the endpoint.

For the analysis, we adopt the analysis of NMM–eyegaze as an Agreement morpheme (originally, Neidle et al.'s (2000)), and Benedicto-Branchini-Mantovan's (2015) analysis of motion predicates as larsonian serial constructions with recursive sub-eventive structures under *v*, corresponding to the *process* (the articulation of the 3DPath, π) and to Telicity, τ, (the articulation of the arrival or REACHing of the Endpoint), as in (4a). Along these lines, we analyze the [u]-shaped NMM gesture as the morpheme for the *process/path* π substructure and the [p] NMM as the morphemic realization of the Telic head τ. We further analyze the [eyegaze] as the morphological realization of Agreement on the internal argument DP (the Figure) and on the Endpoint XP locative argument.

(4)


Absence of the Telic sub-eventive structure in (4b) predicts the absence of the <eg> Agreement marker on the XP locative argument that cannot be interpreted as the Endpoint (the Rheme in Ramchand 2008). Presence of <eg> Agreement on the Figure DP is predicted, as it is the internal argument in Spec-vP, both in telic and atelic cases. The presence of a *process* NMM [u] in both telic and atelic cases confirms the status of atelicity as the absence of a telic sub-eventive structure as defended in Borer (2005).

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Connected, but not confused: Deaf middle school students co-activate English print and American Sign Language in a monolingual semantic judgment task

Agnes Villwock, Erin Wilkinson, Brianne Amador, Pilar Piñar & Jill P. Morford

Saturday, 3.53

Studies on hearing bilinguals have consistently revealed that during lexical processing, the non-target language is not fully inhibited, but rather simultaneously activated with the target language (Dijkstra & Van Heuven, 2002; Marian & Spivey, 2003; Van Hell & Dijkstra, 2002).

Previous research on this phenomenon of cross-language activation has shown that – despite the fact that signed and spoken languages do not share the same modality – deaf and hearing bilingual adults activate signs when reading printed words in a monolingual semantic judgment task (Morford et al., 2011; 2014; Kubus et al., 2015). However, to date, the time-point in development at which signers experience cross-language activation of a signed and a spoken language remains unknown. In order to address this gap in the literature, we investigated the processing of written words in deaf middle school students who were bilingual in American Sign Language (ASL) and English. Following the implicit priming paradigm by Morford et al. (2011; adapted from Thierry & Wu, 2007), participants completed a monolingual English semantic judgment task. Half of the English word pairs had phonologically related translation equivalents in ASL (*dumb-stupid*), whereas half had unrelated translation equivalents (*simple-easy*). Phonologically related translation equivalents shared two of three phonological parameters (handshape, location and/or movement). The experimental group consisted of 39 deaf ASL-English bilingual children (age range = 11–15 years). As a control group, we tested 26 hearing English monolinguals (age range = 11–14 years).

Two hypotheses were investigated:

- Hypothesis 1: Deaf bilingual middle schoolers *already have* connections between signs and print words (Hermans et al. 2008; Ormel et al. 2012), and will show an effect of ASL phonology in their response times during a monolingual English semantic judgment task.
- Hypothesis 2: Deaf bilingual middle schoolers *have not yet developed* connections between signs and print words – hence, our participants will not show any effect of ASL co-activation on a monolingual English semantic judgment task.

Responses were analyzed for semantically related and unrelated pairs separately using mixed effects linear regression with fixed effects of group and phonology, and random effects of participants and items. Results revealed that the deaf group, but not the hearing controls, displayed an effect of cross-language activation in the response time data. More precisely, the deaf children showed a facilitation effect – that is, they responded significantly faster to two semantically related English words that had phonologically related ASL translation equivalents than to semantically related words with phonologically unrelated ASL translations ($p < 0.001$; see *Figure 1*). Furthermore, in all conditions, the response times of deaf children were significantly shorter than those of hearing controls ($p < 0.001$). Importantly, the groups did not differ in accuracy scores ($p > 0.1$).

Therefore, our findings support Hypothesis 1: Deaf middle school students who are learning ASL and English seem to already have developed connections between signs and printed words. In sum, the present study provides evidence that being bilingual in two languages, which differ in modality, does not cause confusion in deaf children. On the contrary, despite more limited exposure to English print and restricted access to English phonology relative to their hearing peers, deaf bilingual middle school students display an advantage in processing the semantics of written English words.

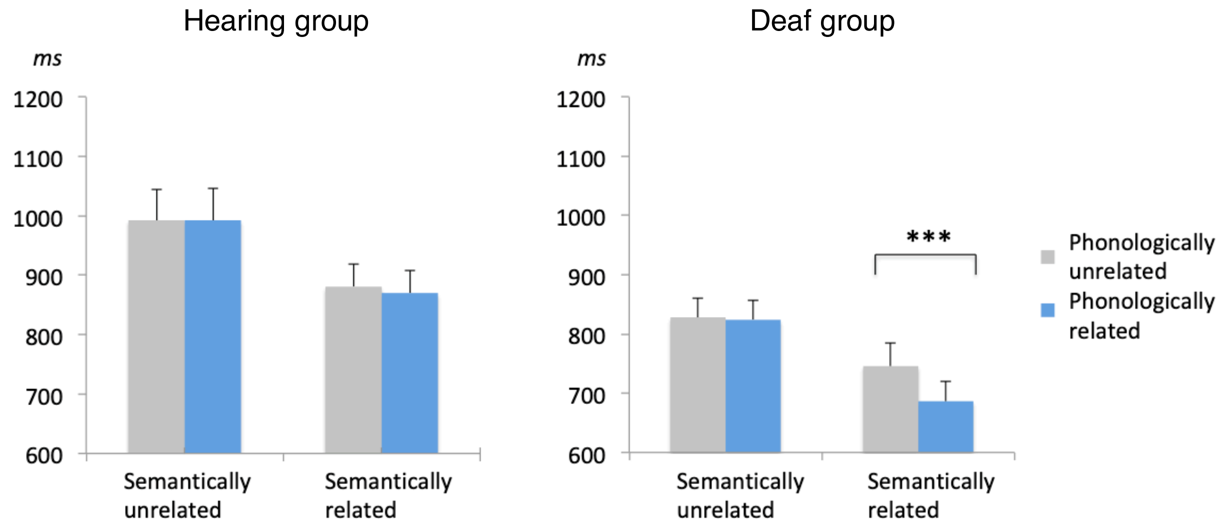

Figure 1. Response times to semantically unrelated and related English word pairs with and without phonologically unrelated and related ASL translations for hearing controls (left) and deaf middle schoolers (right). Deaf children show a facilitation effect in the semantically related/phonologically related condition.

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The role of movement in the memory for signs

Kayla Vodacek, Laurie Lawyer, Todd LaMarr & David Corina

Saturday, 3.54

Classic studies of recognition memory for language have shown that rather than storing a veridical representation of a linguistic signal, language users often discard surface properties and remember the gist of a message (Bransford & Franks, 1971, McKoon & Ratcliff, 1992). In the present study, we were interested in whether subjects store veridical representations of individual signs or discard particular surface properties. In particular, we examined the memory for path movement in sign recognition. Subjects studied and performed a recognition memory task for signs that were displayed in two formats, moving sign forms or static representations of signs (similar to what one might see in a pictorial dictionary of signs). To avoid recalling signs based upon their semantic content, we chose to create pseudosigns that conformed to linguistic properties of ASL. All stimuli were equated for length of presentation based on the duration of the moving pseudosigns. Using a within-subjects design (n = 44; 34 hearing non-signers, 10 deaf signers), subjects participated in a self-paced study phase in which subjects viewed 18 pseudosigns (9 moving, 9 static), followed by a distractor period in which they performed ten mental math problems. During the recognition phase, subjects saw 36 pseudosigns probes. These recognition probes included the 18 pseudosigns that were previously studied and 18 new previously unseen pseudosigns. Subjects indicated whether each of these sign stimuli had been previously studied or were new forms. We scored responses to probe signs as hits, misses, correct rejections and false alarms and calculated D' scores. D' serves as a measure of discriminability while controlling for guessing. Hearing non-signers show better discrimination for moving pseudosigns over static images (D' Moving: 2.0, D' Static: 1.63, T-test $p < .05$), while deaf subjects showed non-significant effects for movements versus static pseudosigns (D' Moving 2.6, D' Static 2.2., T-test $p > .01$). The preliminary data suggests that path movement may play a less important role in the memory for signs in proficient users of ASL, but is retained in subjects unfamiliar with signed languages. Alternatively, these results could explain that proficient signers may be more adept at inferring dynamic information from still images. We discuss these results in relation to a recent proposal (Corina, in prep.) suggesting that structural representation of ASL signs are stored as invariant static postural forms rather than fully specific dynamic events.

Pragmaticalization of gestures in German Sign Language

Elisabeth Volk

Saturday, 3.55 – **CANCELLED**

Background. All natural languages share at least one property: They change over time. Although language is passed from one generation to the next, each generation contributes to both the erosion and the innovation of existing structures. One force, among others, that contributes to language change is grammaticalization, i.e. a process that turns a lexical or grammatical form into a (more) grammatical form. Crucially, research on grammaticalization in sign languages demonstrates that also gestures may become integrated into the grammar, possibly skipping the lexical stage and directly taking over grammatical functions (cf. Wilcox 2004). One prominent example of a functional element that may be traced back to a gestural origin is the non-manual marker *brow raise*. Beside expressing affective and communicative meaning in signers and non-signers, brow raise has been associated with several linguistic structures such as polar questions, conditionals, relative clauses, and topics across various sign languages (cf. Liddell 1980). In line with Herrmann (2010), I assume only an indirect link between syntactic structures and non-manual markers such as brow raise in German Sign Language (DGS). Accordingly, they function as part of the prosodic system indicating prosodic domains and boundaries that may, but do not need to correspond to syntactic phrases. Using a forced-choice perception task, I investigated to what degree non-manual prosodic markers as well as specific manual markers may signal the signer's intention in DGS which can be defined as the illocutionary force (or *speech act*) of an utterance. I propose that both kinds of markers contribute to the pragmatic meaning of utterances in DGS and analyze them as instances of pragmaticalization which traces the development of pragmatic forms.

Data. The stimulus set included 72 DGS stimulus items produced by two Deaf DGS signers and 24 filler items produced by a third Deaf DGS signer. Each stimulus item had the word order object-verb and consisted of two monosyllabic signs: an inanimate noun (e.g. BREAD) and a plain verb (e.g. BUY). Moreover, the stimulus items were manipulated according to three non-manual conditions (*neutral*, *brow raise*, and *brow furrow*) and three manual conditions (*none*, *pointing*, and *palm-up*) resulting in a 3x3 design (cf. Figure 1). Manual markers were produced utterance-finally with a lateral movement of the dominant hand (cf. Figure 2). Non-manual markers had scope over the full utterance. All items were video-recorded and annotated with ELAN for temporal cues (sign, hold, and transition duration) and nonmanual markers.

Fig. 1: 3x3 design of the forced-choice task

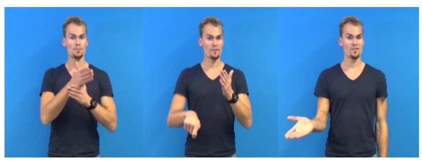

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Fig. 2: BREAD BUY PALM-UP

The stimulus set was used for a forced-choice perception study to test the accessibility of speech acts in DGS. Crucially, the stimulus items were not designed as optimal representations of specific speech acts in DGS; rather, the aim was to investigate to what extent specific non-manual and manual markers trigger a certain utterance meaning and are sufficient to distinguish between speech acts in DGS. 32 Deaf DGS signers (age 20-55) and a control group of 32 hearing non-signers (age 19-53) participated in this study. Among the group of DGS signers, there were 23 native and 9 early signers; among the group of non-signers, there were only native German speakers without knowledge of any sign language. The participants saw each item one after another in pseudo-randomized order and were then asked to choose for the utterance meaning that fit best the signer's intention. Among the options were the following six speech acts: statement, question, offer, permission, polite request, and command.

Results. The central findings of the study relate to i) the non-manual markers, ii) the interaction of non-manual and manual markers, and iii) the responses of the non-signers.

i) In case no manual marker was used, DGS signers associated neutral items most frequently with statements (77%), brow raise items with questions (52%), and brow furrow items with commands (55%) and questions (39%).
ii) DGS signers associated stimulus items combined with manual markers more often with imperative speech acts as compared to statements and questions. Accordingly, DGS signers interpreted neutral items with pointing most frequently as polite requests (36%) and commands (23%), whereas both neutral and brow raise items with palm-up most frequently resulted in offers (37% and 44%). Also, the tendency to associate brow furrow items with commands was increased in combination with pointing (68%) and palm-up (70%).
iii) There were some similarities in the responses of DGS non-signers and signers. For instance, neutral and brow raise items combined with palm-up were also associated with offers most frequently (38% and 42%) by non-signers. In contrast to the DGS signers though, statements were highly accessible across non-manual conditions. Moreover, the use of manual markers did not generally increase the chance to associate an item with an imperative speech act.

Discussion. Non-manual markers clearly helped DGS signers to identify the signer's intention, but they allowed for a considerable amount of flexibility in meaning association. Especially surprising is the association of brow raise items with questions in only half of the responses, as brow raise is understood to be the obligatory marker that automatically turns a basic declarative sentence into a polar question in DGS. The comparably high association of brow furrow items with questions is also remarkable; whereas brow furrow is reported to mark imperatives, it is supposed to occur only in questions including a wh-word or scalar adjective in DGS. I take this flexibility as further evidence for treating non-manual markers such as brow raise and brow furrow as intonational signals that are conventionalized for specific speech acts in DGS, but also allow for variability. Moreover, these non-manuals can be analyzed as only one component of the utterance meaning which is also influenced by the combination of different non-manual markers, timing patterns of signing, and discourse context (cf. Brentari et al. 2018; Cañas 2018).

The results further demonstrate that the use of manual markers influenced the signer's responses. More specifically, there was a tendency to associate pointing with imperative speech acts that can be attributed to the signer's goal (polite requests and commands), whereas palm-up rather indicated imperative speech acts of the addressee's goal (offers). Interestingly, the non-manual marker *brow furrow* seems to be incompatible with the imperative speech act *offer* which i) further strengthens the argument that brow furrow is not a syntactic imperative marker, but an intonational signal conventionalized for specific speech acts, and ii) suggests that non-manual markers can overrule manual markers in their contribution to the utterance meaning.

Conclusion. I presented first evidence that not only non-manual prosodic markers, but also specific manual markers can distinguish speech acts in DGS. I propose that both kinds of markers originate in gestures also used by non-signers, which first have been grammaticalized in DGS (non-manual markers as part of the prosodic system and manual markers as locatives) and then took on pragmatic functions as they were conventionally used with specific speech acts. I therefore analyze both markers as instances of pragmaticalized gestures in DGS.

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Personal pronouns in Norwegian Sign Language – One system of two origins

Arnfinn Muruvik Vonen

Saturday, 3.56

This presentation will present and discuss the system of personal pronouns in Norwegian Sign Language (NTS). Due to historical circumstances, several aspects of NTS grammar have been heavily influenced by the majority language of Norway, Norwegian. The claim of the presentation is that the personal pronouns in NTS, including the imported elements, are fruitfully understood as one coherent system. Its complexity involves both the grammatical categories as such and the sociolinguistic values attached to the use of certain categories and morphosyntactic features.
The categories of Case, Gender and Animacy in NTS personal pronouns are distributed and expressed in ways which witness their Norwegian origin, while the categories of Number and Person, although present in both languages, bear no evidence of non-native origin. The Number category is much richer in features and even sub-categories in NTS than the corresponding category in Norwegian. As for the Person category, the distinction between second and third person seems to have been imported, that is, the older part of the system is a two-way distinction between first and non-first person.

While both languages make a distinction between strong and weak pronouns, with differences in syntactic distribution as well as phonological form, this distinction works differently in the two languages.

The data for the presentation have been collected through observation as well as elicitation interviews with signers of NTS.

Exploring lexical variation in a growing corpus of DGS

Sabrina Wähl, Gabriele Langer, Anke Müller, Julian Bleicken, Thomas Hanke & Reiner Konrad

Saturday, 3.57

Sign language corpus data are useful to study phonological and lexical variation. The focus in studies of lexical variation has often been on the regional distribution and age variation of competing variants (e.g. McKee & McKee 2011, Stamp et al. 2014). When studying variation in corpus data, it is helpful not only to look at the distribution of each single variant candidate but to contrast all synonymous candidates of a variant cluster as well. Hanke et al. 2017 explored the possibility to detect regional and age variations in lexeme clusters that share a meaning as indicated by the same gloss name but differ in form. Clusterings on the basis of gloss names can only be a first step of analysis. The findings suggest two further directions of research that will be explored in this paper.

First, it stands out that in the same region often several variants of a seemingly synonymous lexeme cluster are used. Thus, one can take a closer look at individual regions in order to identify what conditions or reasons might determine the choice of variants within that region. As long as it is different persons using different variants, the reasons could be personal preference (including conscious choices for reasons of political correctness) and different backgrounds of signers (e.g. school, age, influence of signing parents or partners). However, cases of individual signers using several of the signs of a variant cluster require further explanation. Possible determining factors might be different syntactic behaviours, phonotactic, or iconic reasons, or pragmatic reasons such as adapting to the conversation partner's lexical choice. Also, it can be expected that seemingly synonymous signs actually differ with regard to their contextual meaning and usage and thus do not cover the same range of senses.

Corpus data can help to investigate possible conditions of variant choice more thoroughly. We identified sign clusters that seemed to be synonyms according to the rough meaning indication provided by the glosses and narrowed the search down to clusters that had several informants using several synonym candidates of the same cluster. These were the best starting point for a contrastive usage analysis. We investigated the conditions that determine the choice of variants for these individual signers. For this step further detailed annotation such as sense tagging was necessary.

The cluster 'talk, speak' consists of five basic sign types, all located at or near the mouth in their citation forms. Signers tended to use different signs when the modality of using spoken language mattered as opposed to when they referred just to the content of a statement regardless whether it was signed or spoken.

The lexeme cluster 'together' invites a further sense discrimination. There are two forms with the sense 'together, as a group' as well as two forms with the sense 'together, as two persons'. For the few informants who vary signs of the same sense, we could identify phonotactic reasons (primed by handshape of subsequent sign), stylistic reasons (two-handed form allows for enlarging, one-handed variant does not) and syntactic reasons (different semantic roles indicated).

The variant candidates investigated differed with regard to usage, i.e. the semantic and/or syntactic conditions of use. These findings reflect the fact that the gloss name as a rather rough indication of meaning can be used as a starting point but requires finer-grained analysis – as it is done for lexicographic purposes within our project.

Second, the analysis along the lines of “same concept – different form” can be complemented by an analysis of the distributional patterns of same form and different concepts (sampling polysemous signs as well as homonyms). This change of perspective is motivated by the incidental observation that two rather different meanings of a sign form (hence homonyms) greatly differed in regional distribution. It has been suggested for spoken (Gilliéron & Roques 1912:17) and also for signed languages (Boyes Braem 1981:44, Cuxac 2000:154) that the principle of avoiding homonyms may lead to a differentiation of form for differing meanings although this point of view has also been challenged (Lass 1980:75-80). So can corpus data support the theory of homonymy avoidance?

The sign form at hand ([illegible]) means ‘girl’ in Northern Germany and ‘Friday’ in the Southern part of Germany. The existence of another sign for ‘girl’, in this case [illegible], in Southern Germany might be explained as a result of homonymy avoidance. However, the analysis with regard to age and regional distribution shows that the use of the described sign forms is relatively stable over age groups and regions. That is, there is no direct diachronic evidence for homonymy avoidance (which might be due to the limited time span of approx. 50 years covered by apparent time in the DGS corpus). Another sign [illegible], with the meaning ‘woman’, seems to have its origin in the region of Berlin. This sign spreads over Germany the younger the age group, but is rarely found in the southern parts of Bavaria where that very form is used with the meaning ‘bread’. This case might be speculatively explained as homonymy avoidance being active in the apparent time span covered.

From the data, it is clear that homonymy avoidance is at least not a strong factor determining lexical selection in a region: There are also many examples of lemma pairs or clusters where homonymous signs are used in one region (e.g. [illegible] ‘class’ – ‘wood’ – ‘why’ with alternatives available, or [illegible] ‘Monday’– ‘father’ with ‘father’ used throughout Germany, but only in Bavaria the sign form also means ‘Monday’).

In the examples presented in this paper, we looked at cases of potential avoidance resulting in the selection of different lexemes, not phonological variants. In order to analyse cases of homophony restricted to specific inflected forms (cf. Baerman 2011), we expect progress once a larger part of the DGS corpus has undergone more detailed annotation.

In conclusion, when analysing the distribution and especially the regionality of polysemous signs in the context of competing variants, one should primarily take potential differences in meaning into account and ideally consider different uses or senses of a sign. However, such studies require at least some degree of sense tagging which is not part of the general annotation scope of any larger sign language corpus up to date.

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A componential analysis of constructed action in American Sign Language

James Waller & Susan Goldin-Meadow

Saturday, 3.58 – **CANCELLED**

This study gives an analysis of the use of verbs under non-quotational constructed action in American Sign Language (ASL). We follow previous work by Engberg-Pedersen (2003), Herrmann and Steinbach (2012), and others that investigate the multiple components of constructed action independently, and show that these distinct components of constructed action pattern differently across different kinds of verbs. By disassociating these markers from one another we can bring additional nuance to previous claims by Davidson (2015) and Schlenker (2017): as they note, iconicity constrains the use of verbs under constructed action, but we also show different components of constructed action pay attention to different types of iconicity.

In constructed action, the signer's body stands in for someone else's body, marked by shifting the body in space and/or re-enacting the person's actions on the body and face (Quer, 2005). We focus on non-quotational cases where the lexical material produced under constructed action is a report of the person's actions. Previous research suggests that constructed action is sensitive to iconicity: verbs that are used with (non-quotational) constructed action tend to be iconic (Davidson, 2015; Schlenker, 2017), we aim to verify this claim and identify the precise types of iconicity relevant for constructed action. We had 12 Deaf native signers describe short vignettes of various events, and analyzed 600 verb tokens for use of constructed action. We divide constructed action into three distinct markers: shift in eyegaze, shift in body, and use of facial enactment (re-enacting the person's facial expressions). We analyze how each marker patterns over three different kinds of verbs, categorized as a function of how the verb's movement maps onto properties of the referent: 1) event classifiers (the movement of the sign iconically maps onto the movement of the referent), 2) trace and location classifiers (the movement of the sign traces a property of the referent), and 3) plain lexical verbs (the movement of the sign does not necessarily map iconically onto any property of the referent's movements).

Our results for eyegaze and body shift follow Herrmann and Steinbach (2012): eyegaze shifts are more common than body shifts across all verb categories, and they display similar patterns across the verb types; they are more likely to appear on both classifier constructions and less likely to appear on lexical verbs. This is consistent with Davidson and Schlenker's observations that verbs with an iconic or demonstrative component are preferred with constructed action.

Facial expression has a different pattern: use of face is common only on event classifiers and, to some extent, lexical verbs, but is very rare on tracing/location classifiers. We argue that facial enactment pays attention to a specific iconic mapping that the other markers do not pay attention to — an iconic mapping of time. Facial enactment is compatible with event classifiers because both contain temporal iconicity: each temporal segment or subinterval of both the classifier and the facial enactment correspond to a part of the actual event itself. Tracing/location classifiers do not share this quality—the path of the tracing classifier does not refer to a change in time, but rather to the shape of an object. These classifiers lack a temporal mapping and, as a result, block the use of facial enactment, which is permissible in event classifiers.

Our data also show that some lexical verbs allow facial enactment, and we speculate that these verbs also display a version of temporal iconicity — and advance testable predictions of which kinds of lexical verbs can appear under facial enactment. For many verbs, their telicity is visible in their form (Wilbur 2003, 2008). Telic verbs like STEAL or ARRIVE, which have a natural semantic endpoint, contain some kind of change in location or handshape in their form; atelic verbs like PLAY do not. While this mapping does not apply to all verbs in ASL, we suggest that this type of mapping must apply to verbs when they are produced with facial enactment. For example, the verb SLEEP contains a clear change in handshape and location, but generally can be telic or atelic ("to fall asleep"/"to sleep"), even though Wilbur claims a verb with this phonological form would typically be telic. The prediction is that is association between path and telicity is usually optional, but required under facial enactment -- consistent with the hypothesis that facial enactment mandates the verb exhibit a kind of temporal iconicity (see also Dudis, 2011).

In summary, event classifiers and some lexical verbs allow facial enactment because they are temporally 'align-able' with their denotations. Tracing/location classifiers lack this alignment, so the use of facial enactment is blocked, although they appear with other overt markers of constructed action. This study cautions against taking either constructed action or iconicity as 'monoliths' (see discussion in Padden et al., 2013). Both can be decomposed so that we have a more precise understanding of how constructed action interacts with iconicity in the lexicon of American Sign Language.

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Libras Corpus in SignWriting: Analysis of verbs with person-number

Debora Wanderley

Saturday, 3.59

This work presents the analysis of verbs with person-number agreement after Padden's (1983) proposal on the study of sign language morphology that was classified as being three-parted. So, on my PhD research, I applied the referred framework to the Brazilian Sign Language (Libras), more specifically, to the data available in the Libras Corpus. According to Quadros (2016), the Libras Corpus project began in 1995 in Brazil, using Brazilian Sign Language footage that was transcribed through the use of words for each sign (glossing). That is different from my research methodology, which is innovative, while it transcribes signing through the use of the SignWriting system created by Sutton (1974) – an international system which makes it possible to register any sign language in its written form, approaching its iconic features. And due to its iconicity, this writing system has greater possibility of representing a visual language like Libras. Since SignWriting and Libras are not different, this writing system may work as the writing does for oral languages, which contributes to the development of researches in linguistics. Person-number agreement was identified in 44 verbs in Libras from the collected data. The results of the research and its qualitative and quantitative features of each established category as well as their verbs will be presented in the poster presentation as an important contribution to the field of sign language morphology.

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Adjectives or relative clauses? A new perspective on adjectives in American Sign Language

Shuyan Wang

Saturday, 3.60

Introduction: Adjectives in American Sign Language (ASL) have been discussed in various papers, but there remain some issues. This paper aims to comprehensively investigate ASL adjectives and to provide a unified account for various observations. I will propose that: 1) prenominal adjectives are adjuncts to the noun and follow the ordering constraints proposed by Cinque (1994); 2) postnominal adjectives are predicates of relative clauses; and 3) 'adjectives' that can be used with aspectual inflections are actually verbs.

Previous observations: First, MacLaughlin (1997) observed that prenominal adjectives in ASL follow the general word order suggested by Cinque (1994): QUALITY > SIZE > SHAPE > COLOR, as in (1). On the other hand, postnominal adjectives in ASL permit free order, as in (2).

1. a. [BIG RED BALL IX$_{adv}$]$_{DP}$ b. *[RED BIG BALL IX$_{adv}$]$_{DP}$

2. a. [BALL BIG RED IX$_{adv}$]$_{DP}$ b. [BALL RED BIG IX$_{adv}$]$_{DP}$ (MacLaughlin 1997)

Second, MacLaughlin (1997) noticed that prenominal adjectives are attributive while postnominal adjectives are predicative in nature. For example, OLD FRIEND in (3a) can mean 'a friend that has been known for a long time' or 'a friend who is old'. However, with a postnominal adjective, the phrase only means 'a friend who is old' (cf. (3b)).

3. a. [POSS$_{1p}$ OLD FRIEND]$_{DP}$ b. [POSS$_{1p}$ FRIEND OLD]$_{DP}$ (MacLaughlin 1997)

Third, non-predicative adjectives (cf. (4a)) in ASL can never occur post-nominally (cf. (4b)).

4. a. *[STUDENT IX]$_{DP}$ FORMER b. *[STUDENT FORMER]$_{DP}$ (MacLaughlin 1997)

Fourth, Klima and Bellugi (1979) suggest that in ASL aspectual inflections can apply to verbs and some adjectives (see (5a)). Inflected adjectives can only occur as a predicate of a clause (see (5b)).

5. a. ___relative clause
   MAN SICK+cont DIE YOUNG
   'A man who is continuously sick will die young.'
   b. *JOHN KNOW [SICK+cont MAN]$_{DP}$ (MacLaughlin 1997)

Fifth, Bernath (2009) suggests that postnominal adjectives cannot co-occur with prenominal ones, unless the prenominal adjectives are those non-predicative adjectives, like MAIN and FORMER, and/or unless the postnominal adjective is SICK or EXCITED (see (6)).

6. a. *BIG BALL RED b. FORMER STUDENT SMART c. TALL BOY SICK

Sixth, quantifiers but not adjectives in ASL can be stranded by the topicalization of the noun (Boster 1996). Illustrated by (7), the quantifier THREE can be left behind, but an adjective cannot.

7. a. ____t
BOOK$_i$ I WANT THREE t_i
b. ____t
BOOK$_i$ I WANT THREE RED t_i (Boster 1996)

<u>Previous analyses and problems:</u> Boster (1996) proposes that all adjectives in ASL are adjuncts base-generated either before or after the noun. It is widely assumed that only phrases, rather than segments or bar-level categories, can be elided or moved. If ASL adjectives are adjuncts (i.e., segments of an NP), they cannot be left behind. However, Boster's analysis cannot explain the differences between prenominal and postnominal adjectives in ASL (cf. (1), (2), and (3)).

MacLaughlin (1997) proposes disparate analyses for prenominal and postnominal adjectives: the former are specifiers of Modifier Phrases, as in (8); the latter are adjuncts of NP, and there is a null operator linking the AP with the NP by a rule of predication (cf. Williams 1980), as in (9).

8. [$_{ModP}$ [$_{AP}$ BIG] [$_{Mod'}$ (size) [$_{ModP}$ [$_{AP}$ RED] [$_{Mod'}$ (color) [$_{NP}$ BALL]]]]

9. [$_{NP}$ [$_{NPi}$ MAN] [$_{AdjP}$ Op$_i$ [$_{Adj'}$ OLD]]]

Bernath (2009) suggests that postnominal adjectives are resulted from NP-raising. As shown in (10), the NP originates below ModPs, but it can move up to a position higher than ModPs but always lower than the non-predicative adjectives. Bernath (2009) further proposes that the adjectives that can take aspectual inflections, like SICK, are verbs.

10. [$_{ModP}$ [$_{AP}$ FORMER [$_{XP}$ [$_{X'}$ X [$_{NPi}$ BALL [$_{ModP}$ [$_{AP}$ BIG] [$_{Mod'}$ (size) [$_{ModP}$ [$_{AP}$ RED] [$_{Mod'}$ (color) [$_{NP}$ t_i]]]]

Both Bernath's and MacLaughlin's analyses incorrectly expect that prenominal adjectives can be stranded by the topicalization of the NP, since they are specifiers of Modifier Phrases above the NP. Also, Bernath's analysis does not expect the interpretational differences between prenominal and postnominal adjectives (cf. (3)). Moreover, none of the existing analyses comprehensively consider non-manual markings.

<u>New observations:</u> First, based on the data from ASL native signers, I found certain non-manual markings are always used with postnominal but not prenominal adjectives: brow raising, head tilted back, and upper lip raising. Importantly, Liddell (1980) indicates that the same set of non-manual markings are used simultaneously with ASL relative clauses. Therefore, the accurate gloss for phrases with postnominal adjectives should include the non-manual markings, as in (11).

11. a. relative clause
[BALL BIG RED]DP

b. relative clause
[POSS1p FRIEND OLD]DP

Second, with the non-manual markings, prenominal and postnominal adjectives can co-exist (see (12)), contrary to the observation by Bernath (2009) (cf. (6a)).

12. relative clause
[BIG BALL RED] DISAPPEAR

Finally, some signers tended to add SELF between a noun and a postnominal adjective, together with the non-manual markings mentioned above, as in (13). And it is assumed that SELF can be used as a relative pronoun in relative clauses (cf. Fischer 1978; Liddell 1980).

13. _________ relative clause
IX1p BUY BALL SELF BIG RED
'I bought a ball which is big and red.'

New proposal: Based on all the observations, I propose that: 1) ASL prenominal adjectives are adjuncts to the noun, as proposed by Boster (1996), and that they should obey the ordering constraints by Cinque (1994); 2) postnominal adjectives are all predicates in relative clauses (copula structures); 3) the 'adjectives' that can be used with aspectual inflections are actually verbs, as proposed by Bernath (2009).

The 'relative clause' analysis of postnominal adjectives expects their parallel with relative clauses: similar non-manual markings, and the presence of SELF. Also, according to this new proposals, both prenominal and postnominal adjectives are actually adjuncts to the noun. The difference is that a prenominal adjective is an AP (see (14a)), while a postnominal adjective is a CP (see (14b)). In either case, ASL adjectives cannot be stranded by the topicalization of the noun.

14. a. IX1p BUY [NP [N' [AP RED] [N' BOOK]]]
'I bought a red book.'

b. relative clause
IX1p BUY [NP [N' [N' BOOK] [CP RED]]]
'I bought a book which is red.'

Finally, the proposal that the aspect-inflected 'adjectives' are actually verbs rather than adjectives has some advantages. Any analyses not treating aspect-inflected adjectives as verbs have to explain: 1) why ASL aspectual markers are not restricted to verbs; 2) why not all adjectives can be used with these inflections; 3) why the aspect-inflected adjectives can only occur as predicates in copula structures (cf. (5)). The current proposal can solve all these questions.

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Comprehension in hearing non-signers from angle-diverse learning input

Freya Watkins & Robin L. Thompson

Thursday, 12:00-12:30

Background: Speech recognition in adverse conditions has been shown to be more challenging for L2 listeners (for review, see Lecumberri et al., 2010). Investigating language comprehension in such 'noisy' conditions offers both insight into the nature and strength of linguistic representations, as well as scope to overcome these challenges. For example, Sommers & Barcroft (2007) found that training using varied input positively impacts L2 learning. One type of *visual* 'noise' in sign language processing occurs when signs are viewed from side-angles, e.g. watching dialogues or group discussions - a type of input that L1 signers have more exposure to than adult L2-M2 learners. Indeed, Watkins et al. (2018) suggest that hearing L2-M2 British Sign Language (BSL) learners struggle disproportionately with side-view comprehension compared to Deaf L1 signers. The present study investigates whether employing a range of visual angles when teaching signs to new BSL learners can combat adverse effects of visual angle, and potentially aid sign learning and retention. We consider two possible outcomes: 1) signs taught from multiple angles create phonological representations that are more resilient to angle diversity and thus signs will be comprehended faster and more accurately when a new angle is encountered; 2) alternatively, signs taught from a single angle create more robust representations (higher frequency of consistent input) and thus signs will be comprehended faster and more accurately even when a new angle is encountered. Additionally, we predict that participants with better mental rotation skills will perform better overall on the learning task.

Methodology: Sign-naïve English monolinguals (n=60) were taught n=96 BSL signs, split across three learning conditions: ⅓ front-view 0° only; ⅓ side-view 90° only; ⅓ both 0° and 90° views (Fig. 1; with view counterbalanced across participants). Signs were all nouns, counterbalanced for sign type (⅓ one handed, ⅓ two-handed symmetrical; ⅓ two-handed asymmetrical). Each sign was displayed preceded by the written English word. After learning 24 signs, participants saw these 24 signs again and were asked to name them (with feedback given for incorrect responses). This process was then repeated for a second block. At the end of the learning phase, participants completed a short distractor game ('2048') and were then tested on their sign knowledge. Testing consisted of naming aloud as quickly and accurately as possible the English equivalent for all 96 BSL signs, presented from a new, untaught visual angle (45°). At session 2 (one week later), participants returned for a re-test of their comprehension at the same 45° angle and completed a mental rotation task (Mueller, 2011).

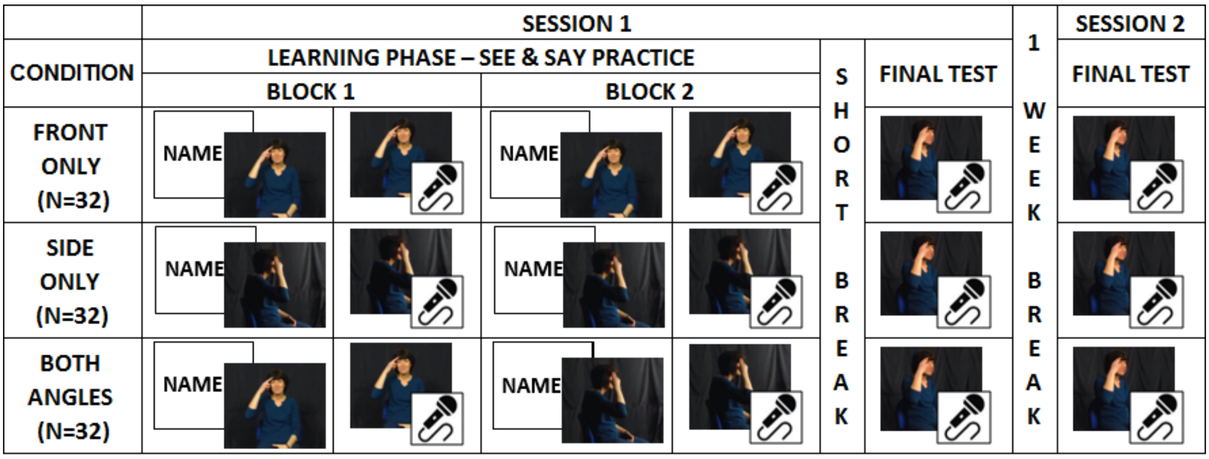

Fig 1: Experimental design showing example BSL sign NAME in the 3 learning conditions

Results: A linear mixed effect model for reaction time (RT)[1] was fit on preliminary data from *n*=17 participants, with AngleCondition (Front, Side, Both) and Session (1 or 2) as predictors, and random intercepts and slopes for Participants and Signs. The analysis revealed an AngleCondition x Session interaction (p=.006) such that signs were named significantly slower at session 2 if learnt from a front angle only (M=2294ms; RT measured from video onset) compared to either learning from both angles (M=2137ms) or from a 'side-only' angle (M=2245ms). There were no other significant differences. For Mental Rotation Accuracy, there was a positive correlation with Session 1 Accuracy (r^2=.27; better rotation skills correlated with higher accuracy in sign learning) that increased slightly in Session 2 (r^2=.36).

Discussion: Preliminary results provide further evidence that visual angle plays an important role in sign perception. Furthermore, these results indicate that teaching via the canonical front angle alone is not the most effective method for initial lexical acquisition. This has immediate implications for L2 sign teaching: individual signs should be taught from multiple or non-standard angles, and early exposure to sign dialogues and group conversations should be ensured, to encourage input from a range of visual angles. Dialogue exposure seems especially important, given that we see tentative evidence that front-only teaching is actually worse than side-only teaching. The correlation between accuracy and mental rotation skills (which increased across sessions) indicates the importance of mental rotation ability for long-term sign learning and that mental rotation is a non-linguistic domain that may be worth training in the context of L2 sign acquisition. Finally, the results have implications for how signs are stored and retrieved in the mental lexicon: building a more angle-diverse representation of a sign seems to be more effective in the face of noise compared to a representation created through more repetitions of a single angle. This extends a number of findings in the spoken language literature suggesting that diverse input can build linguistic representations that are resilient to adverse comprehension conditions.

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[1] A separate analysis of Accuracy revealed only a main effect of Session (M=91% accuracy Session 1, compared to M=72% in Session 2).

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Examining lexicalized forms in International Sign: Multilingual cognates, maximized iconicity, or ASL loan signs

Lori Whynot

Friday, 17:30-18:30 (SIGNopsis) – **CANCELLED**

In the broad area of contact linguistics, communication between Deaf signers who do not share a language is an understudied phenomenon. Distinguishable from ad hoc, paired cross-signing (Byun et al., 2018, Bradford et al., 2013; Zeshan, 2015), International Sign presentations are a type of sign language contact in the form of semi-conventionalized expository texts (Whynot, 2015). International Sign (IS) presentations may be multimodal, multilingual 'translanguaging' (Wei, 2011) whereby Deaf signers or interpreters render information to an audience with varied sign language backgrounds, recruiting material from their linguistic resources or their "semiotic repertoires" (Kusters et al., 2017).

Little is known about the degree of mutual intelligibility across signed languages, or about linguistic distances between sign languages. Lexicostatistical studies that compare sign forms for concepts (e.g., Swadesh lists) measure linguistic relationships and the likelihood that two languages (or dialects) are potentially more or less related (e.g., Woodward 1993; Guerra Currie et al. 2002; Johnston 2003; Al-Fityani & Padden 2008). There is an assumption that similarity between the languages of individual signers will enable "communicative compatibility". Notably, Deaf signers whose languages share the same or similar lexical signs as those recruited for IS presentations performed better on IS lexical comprehension testing (Whynot 2015).

In IS presentations by Deaf signers, 63.6% of sign types (N= 7,033) were lexicalized forms, (Whynot, 2015; 2016). Lexical signs in IS presentations offer conventional, agreed form-meaning pairs that may be more widely recognized. Previously described as simplified, small in number it is suspected that they are the most transparent, iconic signs (Rosenstock, 2008). Lexical forms are often borrowed from the interlocutors' own signed language (Woll, 1990), or they may be sign forms that are similar across several signed languages (Woll 1984, Rosenstock, 2004). Previous research asserted that 53% of the 162 highly used signs by IS interpreters were shared cognates across several Western signed languages, and only 12% were loans from a single signed language (Rosenstock, 2004). Matched sign forms were determined by judgments of native foreign signed language users based in the United States, rather than by phonologically coded datasets. The 162 signs also included non-lexical (gesture) signs and grammatical function signs. Research on IS lecture datasets from 1985, 1989, and 1991 identified 70% of sign tokens as BSL signs, and 12%- 16% as ASL signs (Wol1, 1996); Another study of lexicalized signs in varied Deaf signers' IS presentations showed that 58% were citation ASL forms and 20.7% were citation Auslan signs (Whynot, 2015), a BSL-related signed language (Johnston, 2003). The methods in all three studies are not easily comparable. This study aims to identify to what extent highly used lexicalized forms in IS presentations are multilingual cognates across several sign languages or if there is a predominance of

ASL loan signs in IS presentations, and if the forms are predominantly motivated by iconicity.

The current data includes IS presentations rendered by 13 Deaf signers, and 4 presentations interpreted into IS by Deaf or hearing interpreters. The top 200 most frequent lexicalized forms and their meanings in IS (from Whynot, 2015) were compared to 301 Swadesh list concepts that were used for the ECHO project (Woll et al., 2010), resulting in 67 overlapping sign concepts. The other 234 concepts were not consistently observed in a patterned, lexicalized way in the available IS presentation data. Of the 67 overlapping ECHO/ high frequent IS lexical signs, 32 are citation ASL signs, 25 of which are also citation NGT signs. Additional comparisons will be made between the remaining 133 high frequency IS signs and NGT and other available datasets in Global Signbank, (e.g. LSFB, CSL and VGT).

To evaluate whether high frequent, lexicalized signs in IS are either highly iconic or multilingual cognates, users of those several signed languages will next be given an iconicity judgement task and a recognition task for the most frequent IS lexical forms. Lexical relatedness of IS lexical signs to varied potential lexifier languages are then compared to iconicity ratings for these highly frequent signs. It is hypothesized that lexical material recruited into IS presentations by Deaf signers and interpreter target texts are multilingual cognates and/or are motivated by iconicity, rather than indicate purely ASL loan predominance.

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Similar or different? Tracking phonological priming effects in American Sign Language

Anne Wienholz

Friday, 2.61

In sign languages, signs are composed of different phonological parameters such as handshape, location and movement (Stokoe, 1960). A key question in understanding how signs are processed during comprehension involves identifying the activation of these phonological parameters. Activation of phonology informs theories of how signs are organized and accessed in the mental lexicon. Studies using a range of experimental paradigms have examined the effects of these phonological parameters on comprehension in sign languages by varying the degree of overlap between two signs. To date, these findings suggest an impact of individual parameters as well as combination of those on the speed of processing of signs reflected in facilitation or inhibition effects (Emmorey & Corina, 1990; Grosjean, 1980; among others).

Studies using a priming paradigm provide evidence for a phonological priming effect in sign language processing. Although findings vary with regard to the influence of different parameters and the direction of effects (i.e., facilitation or inhibition), a consensus from previous work is that signs sharing either location or both location and movement seem to evoke greater effects relative to other parameter combinations (Dye & Shih, 2006; Hosemann, 2015; Lieberman, Borovsky, Hatrak, & Mayberry, 2015; Thompson, Vinson, Fox, & Vigliocco, 2013; among others). A previous eye tracking study on German Sign Language examining phonological priming effects revealed facilitation for prime-target sign pairs that share the same handshape and movement, but differ in their location parameter.This raises the question whether their observed effects are based on the two parameters that are shared or the one parameter that differs in the phonologically related prime-target sign pairs used as stimulus material (Wienholz, Nuhbalaoglu, Steinbach, Herrmann, & Mani, 2018). One factor that makes it difficult to synthesize the extant literature is the variation in how phonological relationships between signs are defined. Specifically, while some studies present pairs of signs that *share* a single parameter, others present pairs of signs that *differ* along only one parameter. The current study aims to answer this question by systematically varying the phonological relation of prime-target sign pairs embedded in American Sign Language (ASL) sentences.

Using an adapted Visual World Paradigm, we present deaf native signers of ASL with ASL sentences that contain a target word at the end of the sentence, and pictures of the target object and an unrelated distractor, while recording their eye movements. The sentences are all mono-clausal, and embedded within the sentence is a sign “prime” that is phonologically related to the sentence-final target sign. In the *two parameter condition,* the pairs share two out of three phonological parameters, e.g. the target HAT shares handshape and movement with the prime PIRATE; in the *single parameter condition,* the pairs share only one parameter e.g., HAT shares the same movement with the prime CHAIR; finally, in the *unrelated condition,* there is no phonological relation between the signs e.g., the signs HAT and BANDAID do not share a phonological parameter. Each target occurs in all three conditions but is combined with a different prime (see Table 1 below). The prime-target pairs were all semantically unrelated to one another.

During analysis, target looking will be examined across the time course of the unfolding sentence as signers comprehend the sentences. We will look for divergences between priming and unrelated conditions using a cluster-based permutation analysis (Maris & Oostenveld, 2007). Furthermore, the time course will be divided in two discrete time windows, i.e., the *prime window* when the prime sign is presented and the *target window* for the time the target sign is presented in the video. Time windows will be analyzed running mixed-effects models with random effects for items and participants and fixed effects for condition (two parameter, single parameter, unrelated), phonological parameter (hs&mov, hs&loc, loc&mov, hs, loc, mov) and time window. We predict that there will be more target looks in the priming conditions relative to the unrelated condition across the time course as well as increased target looks in the target time window relative to the prime time window both providing evidence for a priming effect. Moreover, differences between priming conditions will shed light on the influence of the phonological pairs that share either one or two phonological parameters.

At the time of abstract submission, data collection is still ongoing. This is the first study that systematically combines and investigates the effect of phonological overlap in one, two or no parameter(s) on sign processing in real-time. This study adopts and extends the approach by Wienholz et al. (2018) and will contribute to our understanding of phonological parameters and their effect on sign processing. Moreover, this research aims to clarify whether phonological priming effects are evoked by sharing or differing in a phonological parameter.

Table 1: overview of experimental conditions

	Two parameters	Single parameter	Unrelated
	Handshape & movement	**Movement**	
1	a) ON HALLOWEEN MY FRIEND DRESS-UP AS **PIRATE** WITH **HAT.** 'On Halloween, my friend dresses up as a **pirate** with a **hat**.'	b) IN APARTMENT ME PLACE IX **CHAIR** IX **HAT.** 'In my apartment, I put over there a **chair** and over there a **hat**.'	c) BOX INSIDE ME HAVE **BANDAID** AND **HAT.** 'In the box, I have a **baindaid** and a **hat**.'
	Handshape & location	**Handshape**	
2	a) FOR CHIRSTMAS ME WANT 1. **BICYCLE** 2. **SHOES.** 'For Christmas, I want first a **bicycle** and second **shoes**.'	b) WHEN PLAYING ME HIDE **CARROT** WHERE **SHOES.** 'When I play, I hide the **carrot** in the **shoes**.'	c) FOR VACATION ME BUY NEW **CAMERA** OR **SHOES.** 'For vacation, I buy a new **camera** or **shoes**.'
	Location & movement	**Location**	
3	a) CLOSET INSIDE ME FIND **TROPHY** AND **FOOTBALL.** 'In the closet, I find a **trophy** and a **football**.'	b) WEEKEND TRIP ME TAKE-WITH-ME **TENT** AND **FOOTBALL.** 'On my weekend trip, I take a **tent** and a **football** with me.'	c) GAME IX MY FRIEND WIN **CANDY** OR **FOOTBALL.** 'In the game, my friend wins **candy** or a **football**.'

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Effects of semantics and efficiency on adjective position in American Sign Language: A reference production study

Anne Wienholz, Simon Kirby & Paula Rubio-Fernández

Thursday, 1.60

Cross-linguistically, languages show variation in adjective position within a noun phrase. For spoken languages, a recent eye tracking study by Rubio-Fernández, Mollica, & Jara-Ettinger (2018) investigated the effect of adjective position on reference assignment and observed that when English and Spanish speakers looked for a blue triangle in the same visual display, English speakers searched for the referent by color and used shape to disambiguate the instruction (e.g., 'the blue triangle') whereas Spanish speakers searched by shape and disambiguated by color (e.g., 'el triángulo azul'). In an eye tracking study on American Sign Language (ASL), Wienholz & Lieberman (2019) show that the word order of color adjectives and nouns only plays a minor role for adult signers when identifying a referent in a comprehension task. The difference between sign and spoken languages in referential communication tasks may have to do with the difference between processing a visual or an acoustic linguistic signal while searching for a referent in a visual context. There has been little research on the motivation for use of a particular adjective noun word order when describing referents in ASL. Overall, it has been observed that adjectives occur in both prenomial as well as postnominal position, and that this use is affected by age of the signer (Gee & Kegl, 1983; Klima & Bellugi, 1979; Padden, 1988). However, it remains unclear which adjective position is used predominantly or whether position varies depending on the semantics of the adjective.

In this referential communication task, we asked whether adjective position varies for absolute (i.e., color) and relative (i.e., scalar) adjectives and whether signers may use prenominal or postnominal adjectives depending on their relative efficiency. Evidence suggests that prenominal color adjectives are more efficient as a visual cue than postnominal ones (Rubio-Fernández, 2016; Rubio-Fernández et al., 2018; see also Eberhard et al., 1995; Spivey et al., 2001). However, not all adjectives may be more efficient in prenominal position. Scalar adjectives, for example, are interpreted in relation to a comparison class (Kennedy, 2001). Therefore, scalar adjectives may be more efficient in postnominal position since they would be readily interpretable once the noun has been processed. If the semantics of the adjective affects its position relative to the noun phrase, and for maximal efficiency, we expect ASL signers to use color adjectives in prenominal position and reserve postnominal uses for scalars (e.g., YELLOW UMBRELLA, TREE TALL).

We presented 34 deaf adult ASL signers with a battery of 48 displays (24 color and 24 scalar contrasts) with arrays of 4 objects where one was marked with an asterisk (see Fig.1). Participants were instructed to refer to the target object in a way that would allow a recipient/addressee to uniquely identify it. In order to avoid possible priming across adjective types, materials were presented in two blocks, one including color trials and the other scalar trials, counterbalanced between participants in two separate lists.

During the analysis, we excluded all responses that did not include both the target adjective and noun (21%). We used Logistic Mixed Effects Regression (LMER; with subjects and items as random effects and maximal random effects structure) to model Adjective Position (prenominal = 1, postnominal = 0) with Condition (color / scalar) and Order (color-scalar / scalar-color) as fixed effects. As predicted, there was a main effect of Condition (β = -3.9231, $p < .001$) with greater prenominal modification in the color condition. There was also a main effect of Order (β = -1.5858, $p < .05$) showing that signers presented with the color-scalar block order produced more prenominal adjectives than those presented with the scalar-color block order, suggesting carry-over effects from the color block to the scalar block. Given the effect of Order on Adjective Position, an LMER model with the data from block 1 only revealed the same pattern across participants: there was a main effect of Condition (β = -4.5905, $p < .001$) with greater prenominal modification with color adjectives.

The data show that the semantics of the adjectives used affects their position within the noun phrase such that absolute color adjectives are used predominantly in prenominal position while the position of relative scalar adjectives varies. This difference might be due to the visual modality of ASL, as signers need to set the referent first in order to modify it (e.g., a signer cannot easily describe the height of a tree without first establishing the lexical referent TREE). These results support the hypothesis that ASL signers use variable adjective position to maximize the efficiency of their interlocutor's search for a referent – similar to what has been observed with English and Spanish speakers. Ongoing item analyses of the scalar adjective trials to see which specific adjectives occurred pre- or postnominally will allow us to determine additional factors that might affect adjective position. We predict that scalar adjectives that incorporate specific aspects of the size and shape of the referent will be more likely to occur postnominally than those that use a lexical sign to indicate scalar features.

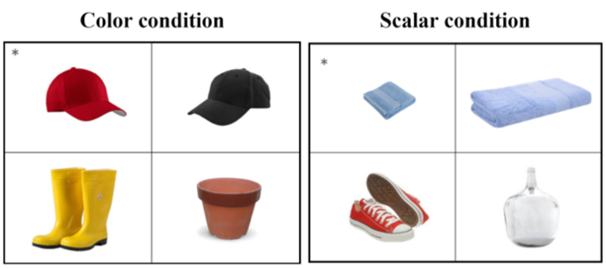

Fig. 1: Sample display from each condition

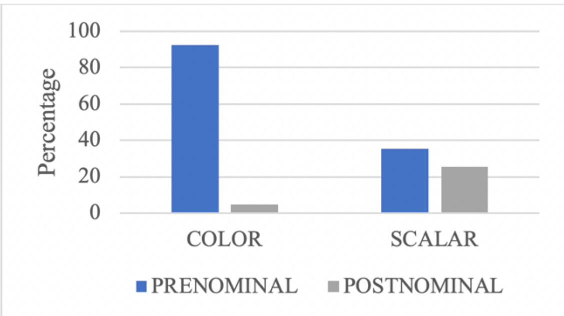

Fig 2: Percentage of prenominal and postnominal uses by adjective type

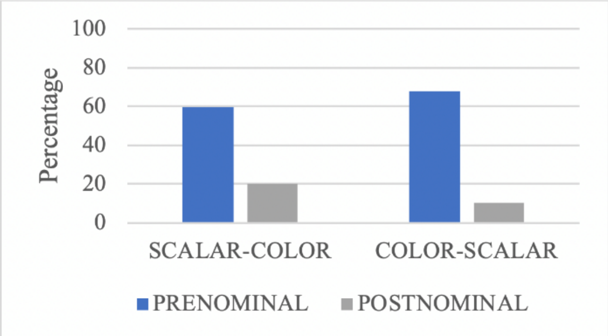

Fig. 3: Percentage of Prenominal and Postnominal uses by block order

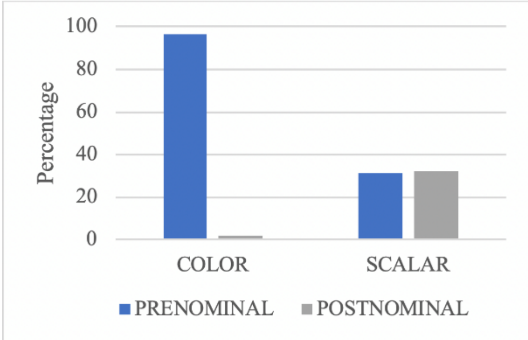

Fig. 4: Percentage of Prenominal and Postnominal adjectives in Block 1 (between participants).

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The influence of overt localization on the processing of referential expressions in German Sign Language

Anne Wienholz, Derya Nuhbalaoglu & Nivedita Mani

Saturday, 3.61

In sign languages, discourse referents are assigned to referential locations (R-loci) in the horizontal space, which serve to establish a relation between a discourse referent and a referential expression in subsequent discourse (Liddell, 1990; Lillo-Martin & Klima, 1990). One way to associate a discourse referent with a specific R-locus is to use INDEX signs that often take multiple functions simultaneously such as a localizing and assigning (in)definiteness (Neidle & Nash, 2012). In spoken languages, the processing of referential expressions is not only affected by their form, but also by the accessibility or prominence of their antecedents. In general, the most accessible discourse referent is picked up by the least marked referential expression while less accessible referents are referred to by more marked referential expressions (Almor & Eimas, 2008; Ariel, 1988; Gundel, Hedberg, & Zacharski, 1993). Moreover, a vast literature on spoken languages provides evidence for an effect of grammatical role during the comprehension of a referential expression such that referents occurring in subject position are more salient and thus more likely to be interpreted as the antecedent of a referential expression (Gernsbacher, 1989; Gernsbacher, Hargreaves, & Beeman, 1989; among others). Given that the is no available research on the issue, the question arises whether in sign languages the overt assignment of a discourse referent in space, depending on its grammatical role, increases its prominence leading to facilitative processing of a subsequent co-referential expression.

The present study examines whether overt manual localization with the INDEX sign in German Sign Language (DGS) increases the prominence and hence the accessibility of a discourse referent and how this interacts with the grammatical role of this referent. Stimulus videos include short discourses (presented in Table 1 below) that introduce two discourse referents with varying overt localization in a first sentence, i.e., localizing both referents (1a, 2a), only the subject (1b, 2b), only the object (1c, 2c) or none (1d, 2d). A subsequent second sentence starts with a bare noun co-referential with one of the referents, i.e., either the previous subject (examples in 1.) or object (examples in 2.) (note that DGS is an SOV language). Using eye tracking and a modified version of the Visual World Paradigm, 23 deaf native signers (20-58 years, mean age: 33 years) were presented with two pictures representing the discourse referents contained in the simultaneously presented stimulus video while their eye movements were recorded. If overt localization of a referent facilitates its processing, this should be reflected in proportionally more looks to the respective referent picture in one of the single localization conditions than in another condition, i.e., for example more looks to the picture of the woman in 2c than in 2a, 2b or 2c. Moreover, observing a difference in the gaze pattern comparing the two continuation types for each condition, i.e., comparing 1a with 2a, etc., would suggest an effect of the grammatical role of the referent.

For the analysis, we fitted linear-mixed effects models for mean proportion of target looking (PTL) examined across a time window of 1000ms following the first fixation to one of the presented pictures. The best-fitting model ($\chi^2(4) = 12.59$; $p = .013$) with fixed effects for condition and continuation type and random effects for participants and items revealed increased looks to the target referent for conditions containing overt localization of both referents ($t = 2.8$; $p = .005$) or only localizing the subject ($t = 2.17$; $p = .031$) for the subject localization discourses.

Overall, the results suggest that localization influences the processing of referential expressions. However, this effect only applies to the forms co-referential with the grammatical subject of the first sentence. Thus, the data suggest a conjoined effect of the factors overt localization and grammatical function, i.e., subject preference, on the processing of referential expressions. Changes in the accessibility of antecedents reflected in modulations of their activation patterns can account for the observed effects. Referents that are localized and occur in subject position show increased activation leading to easier lexical retrieval when the referent is mentioned again in subsequent discourse since less additional activation is needed to exceed the retrieval threshold. Localization with the INDEX sign seems to increase the prominence of a referent similar to a prosodic focus marker in spoken languages and can therefore be analyzed as a manual focus marker. However, the sign language literature describes focus markers often as a combination of manual and nonmanual components suggesting that the effect of overt localization might increase if accompanied by a nonmanual marker such as eye brow raise (Herrmann, 2014; Wilbur, 1999). However, our data cannot provide evidence for clarifying the role of nonmanuals since these were not included in the stimulus material and their effects are subject to further research. This study is the first to determine the influence of manual localization on processing mechanisms and to show its interaction with the subject preference for DGS.

Table 1: Overview of experimental conditions

Subject continuation	**Object continuation**
Localization of both subject and object	
1a) TEACHER IX$_R$ GIRL IX$_L$ TALK. TEACHER DIFFERENT CITY BORN.	2a) COOK IX$_R$ WOMAN IX$_L$ MEET. WOMAN A-LOT EAT CAN.
Subject localization	
1b) TEACHER IX$_R$ GIRL ___ TALK. TEACHER DIFFERENT CITY BORN.	2b) COOK IX$_R$ WOMAN ___ MEET. WOMAN A-LOT EAT CAN.
Object localization	
1c) TEACHER ___ GIRL IX$_L$ TALK. TEACHER DIFFERENT CITY BORN.	2c) COOK ___ WOMAN IX$_L$ MEET. WOMAN A-LOT EAT CAN.
No localization	
1d) TEACHER ___ GIRL ___ TALK. TEACHER DIFFERENT CITY BORN.	2d) COOK ___ WOMAN ___ MEET. WOMAN A-LOT EAT CAN.
'A teacher talks with a girl. The teacher was born in a different city.'	'A cook meets a woman. The woman can eat a lot.'

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Code mixing in fingerspelling: A unique type of same-language switching in individuals bilingual in 2 sign languages

Bencie Woll & Robert Adam

Friday, 2.62

ISL (Irish Sign Language) and Auslan (Australian Sign Language) are two historically unrelated sign languages which are both used in the context of hearing English-speaking communities. As well as differences between the sign languages, the manual alphabets used in association with these two sign languages differ: the Irish manual alphabet is a 1-handed alphabet, while the Auslan manual alphabet is 2-handed.

Adam (2016) provides an analysis of types of code mixing/switching between the two sign languages, including data on doubling (where a sign is produced twice – first in one sign language and then in the other. His research analyses conversational and interview data with 11 members of a multi-lingual community: individuals who use an Australian dialect of ISL (AISL) and Auslan (the sign language used by the majority of the Deaf community in Australia) and who also use written English. This small and ageing community attended Catholic schools for the deaf in Australia where AISL was the medium of communication, learning Auslan in their teens.

Here data are presented of switches involving fingerspelling. The examples below illustrate various types of such code-switching (AISL signs in bold upper case; AISL fingerspelling in bold lower case; Auslan signs in italic upper case; Auslan fingerspelling in italic lower case).

1. INTRA-WORD SWITCHING (ENGLISH-SUFFIX):
   HOT-**e-s-t**
   hottest

2. SWITCHING FROM AUSLAN TO AISL FINGERSPELLING
   REMEMBER PRO1 WRITE **E-n-g-l-i-s-h** *WHEN* PRO_{3pl} *CORRECT* PRO_1 *LITTLE NOT-UNDERSTAND* **UNDERSTAND w-h-y**
   I remember they would correct my English when I wrote things [in school] and I never completely understood why

3. DOUBLING (AUSLAN FINGERSPELLING TO AISL FINGERSPELLING)
   w-e WEATHER *FUNNY NOW f-u-n-n-y*
   The weather is a bit funny these days

The presentation discusses the various types of mixing and switching involving fingerspelling, their frequency and the contexts in which they occur. Although the term ‘code switching’ is broadly used in both spoken and signed language research to refer to changes between two languages, switching involving AISL and Auslan fingerspelling does not involve a direct language switch – since in both languages fingerspelling is used to represent English. Thus questions arise as to the nature of this type of switching and what drives it. In order to explore these questions, analyses include directionality of switching (whether more switching takes place from Auslan to AISL or AISL to Auslan in relation to both language switching and fingerspelling switching), points at which switches occur between signs and fingerspelling of the two different sign languages, and comparisons of doubling. The presentation concludes with a discussion of the findings in this study and their implications for understanding the relationship between sign languages and fingerspelling, and the differences and similarities between code switching and language switching.

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Mouthing in the acquisition of a second sign language by Deaf learners

Bencie Woll, Konstantin Grin, Tatiana Davidenko & Anna Komarova

Thursday, 1.61

Mouthing is one of the most common types of mouth action found in sign languages (Bank ert al., 2011; 2016). For example, Crasborn et al. (2008) reported that mouthings represented between 39 and 57% of all mouth actions in narratives produced by signers in 3 different European sign languages (Britain, Sweden, the Netherlands), Johnston et al. (2017) report a nearly identical figure for Auslan, and Bauer (2018) found that 46% of 20 commonly occurring signs in a corpus of Russian Sign Language (RSL) were accompanied by mouthing.

The relationship between mouthings and the sign languages with which they are associated has been the subject of considerable debate. Some researchers have analysed mouthings as borrowings from spoken languages which have been integrated into the structure of sign languages (Boyes Braem 2001; Bank et al., 2011; 2016; Crasborn et al., 2008). In this view, mouthings are considered to form part of sign language. Others see mouthings as representing online code mixing (i.e., arising from bilingualism in a signed and spoken language), rather than being an integrated part of a sign language (Boyes Braem, 2001; Ebbinghaus & Hessmann, 2001; Vinson et al., 2010; Giustolisi et al., 2017; Mohr, 2012). The continuum of opinions ranges from seeing mouthings as always representing instances of online code-blending, where signers freely and simultaneously combine elements from a spoken and signed language, to mouthings as part of a sign's phonological description. In the study reported here the validity of these different approaches is explored, using data from a study of the acquisition of a second sign language.

In the study *Bilingualism in Deaf and Hearing People: Learning and neuroplastic processes*[1], 17 Deaf native or near-native signers of RSL underwent a 12 week course in BSL as a second sign language, taught by a Deaf near-native signer of BSL who was an experienced BSL teacher. The learners had varying degrees of knowledge of written and spoken Russian, but very limited familiarity with spoken and written English. Data for the present paper are drawn from recordings of one-to-one conversations between the learners and the teacher following 6 weeks and 12 weeks of BSL classes. Students exhibited varying degrees of code-mixing between RSL and BSL. Additionally, all students produced frequent mouthings: these included both Russian and English mouthings co-occurring with RSL and BSL signs respectively; rarely, Russian mouthings co-occurred with BSL signs.

Analysis of these data suggest that during initial stages of learning of a second sign language, mouthing is processed as part of a sign's phonology, but that learners are also able to build independent lexical representations through mouthing, independent of their knowledge of the spoken language associated with those mouthings.

[1] This research was supported by a grant from the Russian Academy of Sciences

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A semantic analysis of calendric terms in Chinese Sign Language

Junhui Yang

Saturday, 3.62

There is a growing awareness that the vastness of the Chinese nation and the increasing socialization of its large number of sign language users has resulted in a significant amount of variance in the signs and systems of Chinese Sign Language (CSL). This variance is confounded by the history of the language, and by the education of deaf children through the years (Fischer and Gong 2010). The proliferated interaction of sign language users has led to a sense of shared language community. For this reason, the semantic perspective taken in this study serves to treat the variance related to calendric terms as semantic, rather than regional lexical variance. The recurring tendency to treat similar phenomena as a matter of regional variation has not produced a coherent understanding of the use of calendric terms. Hence, this new and intriguing perspective considers the possibility that calendric terms may be expressed through two synonymous co-existing systems: an iconic and an arbitrary organization for the semantic expression of calendar terms.

In order to examine the semantic organization of calendric terms, the principal purposes of this study are to attempt to categorize the terms in relation to the level of iconicity that they contain, and to specify the semantic operations at play in each group (Zeshan and Sagara 2016). Additionally, the study aims to examine the influences of Chinese culture, and language contact between Chinese and CSL in the expression of calendric terms. Through the use of an online corpus of CSL, and the addition of a questionnaire and consultation with CSL users, calendric terms in CSL are analyzed in term of the following semantic features: synonymy and antonymy (in order to establish the extent to which they are something more than regional variants); meronymy (the extent to which whole/parts of terms are employed to describe the four seasons of a year); and metaphor (the mapping between the signed forms and meanings). The study explores the types and degrees of iconicity in relation to the above semantic features, and identifies elements of Chinese culture, and features of language contact, contained in calendric terms.

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The use of TOO in gapping in Catalan Sign Language

Giorgia Zorzi

Friday, 2.63

Introduction. *Too* and *also* are considered focus additive particles (Krifka 1998) and they are used to extend a predication to at least another alternative with respect to the element in focus. As claimed by Kripke (2009), they are considered anaphoric elements. Moreover, they can be used in elliptical sentences where their anaphoric nature is confirmed. In particular, they are commonly used in VP ellipsis (VPE) and stripping, but not in gapping, where their use as anaphoric elements is ungrammatical. Interestingly, though, in Catalan Sign Language (LSC), the focus additive particle glossed as TOO can be used in gapping. The aim of this paper is to analyze the properties of TOO in gapping in LSC by making a comparison with those of *too* and *also* in English, and accounting for its anaphoric nature like the English particle *too*. Moreover, the behavior of TOO gives further support for a classification of ellipsis in LSC in which gapping behaves similarly to stripping and VPE, differently than in English.

***Too* and *also* in English.** Additive focus particles such as *too* and *also* in English are commonly considered to trigger presuppositions, to be anaphoric elements and to associate with Focus. If we consider (1a, 1b), the two sentences presuppose that someone else other than Florian works on semantics. Moreover, both elements *too* and *also* are anaphoric: the presupposition needs to be satisfied within the context. In (1) we can also see that *too*, which indicates Subject-Focus, is preferred in sentence-final position. In (2), instead, we can see that *also*, more naturally found in sentence-medial position, indicates Focus on V(P) (Göbel 2016).

(1) *Context Sentence*: Michael works on semantics and psycholinguistics.
  a. Florian ALSO works on semantics.
  b. FLORIAN works on semantics **TOO**. <- *slightly preferred*

(2) *Context Sentence*: Michael works on semantics and psycholinguistics.
  a. He **ALSO** works on PROSODY. <- *slightly preferred*
  b. He works on PROSODY TOO. (Göbel 2016)

***Too* and *also* in ellipsis in English.** These two focus particles are also found in ellipsis. *Too* can appear in sentence-final position indicating Subject-Focus in stripping and VPE, as in (3a) and (3b), respectively. Trying to use *also* in its preferred sentence-medial position in stripping, instead, results in NP coordination, like in (3a’). In the same position in VPE, the sentence is ungrammatical due to the fact that *also* is trying to modify the subject of the second conjunct, like in (3b’), for which *too* would be needed, instead.

(3) a. John ate an apple and Mary, too. Stripping: too

a'. John ate an apple and also Mary.

= John ate both an apple and Mary. NP coordination

≠ John ate an apple and Mary ate an apple. Stripping: *also

b. John ate an apple and Mary did, too. VPE: too

b'. *John ate an apple and [also Mary] did. VPE: *also

Turning now into gapping, this structure has been claimed to behave syntactically differently than VPE (Johnson 2006). The behavior of *too*/*also* in gapping further confirms the difference between the two structures. In (4a, a') we can see that neither *too* nor *also* can be used in sentence-final position in gapping. *Also* used before the second remnant, instead, modifies it and gives an additive meaning indicating Focus on V(P) (4b).

(4) a. *John ate an apple and Mary a pear, too. Gapping: *too
a'. *John ate an apple and Mary a pear, also. Gapping: *final also
b. John ate an apple and Mary [also a pear]. Not gapping:
= Mary ate an apple and a pear. non-final *also*=additive meaning

TOO in ellipsis in Catalan Sign Language (LSC). In LSC, there is only one sign used as additive focus particle and it is glossed as TAMBÉ. It seems, though, that in ellipsis it only shows the properties of the English *too*. In examples with ellipsis, LSC, an SOV language that displays V-T movement, shows that TAMBÉ in stripping can only be used in sentence-final position to indicate Subject-Focus (5a), like *too*. In ellipsis, then, TAMBÉ will be glossed as TOO. If used in a sentence-medial position in ellipsis, instead, it constitutes a case of NP extraposition, in which TAMBÉ is used to reinforce coordination (5b). The same sign can, in fact, be used in NP and sentential conjunction. When it reinforces coordination, TAMBÉ is best glossed as ALSO.

(5) a. MARC CAKE BAKE-CL MARINA TOO. Stripping
'Marc baked a cake and Marina, too.'
b. MARC CAKE BAKE-CL [ALSO MARINA]. NP coordination
'Marc baked a cake and Marina.'

As for gapping, LSC only gaps forward (SOV-SO) and, differently than English, it shows similar syntactic properties to VPE and stripping. In particular, the *No embedding constraint* does not apply and gapping can be found in subordination. When it comes to the behavior of TOO, we find another difference between LSC and English gapping. In (6), TOO can appear sentence-finally indicating Subject-Focus. TOO in LSC, when used in sentence-final position, seems to always assume the function of the English *too*, even when it is not close to the subject.

(6) JORDINA CAKE BUY, JORDI FRUIT TOO. Gapping

'Jordina bought a cake and Jordi some fruit.'

The only way to express in LSC an additive meaning similar to the one found for *also* in gapping in English (4b) is to use a different sign glossed as PLUS-Q, as we can see in (7a). Without PLUS-Q, the sentence is not acceptable and it needs to be produced in combination with adversative coordination to mark the contrast with the previous sentence in which TAMBÉ behaves like *too*, as we can see in (7b, b').

(7) a. JORDI PIZZA CAKE BUY JORDINA TOO, PLUS-Q APPLE.
'Jordi bought a pizza and a cake and Jordina, too, as well as some apples.'
b. ??MARC CAKE THROW-TRASH MARINA TOO, PIZZA.
b'. MARC CAKE THROW-TRASH MARINA TOO, BUT PIZZA.
'Marc threw away a cake and Marina did so, too, but a pizza.'

Discussion. TAMBÉ in LSC in ellipsis can be compared to the English *too* when it appears in sentence-final position. It indicates Subject-Focus and it has an anaphoric function, its antecedent is the VP, as it is possible to see in cases of stripping (5a). For this reasons it is glossed as TOO. When it appears in a sentence-medial position in stripping (5b), it reinforces conjunction in extraposed NP coordination, and it never shows the same function of the English *also*, i.e. it can never indicate Focus on V(P). In gapping (6), it is preferably found sentence-finally, where it assumes the same anaphoric function of *too* in stripping (5a), i.e. its antecedent is the VP, and it indicates Subject-Focus.

Conclusions. In this paper, an explanation has been provided for the unexpected presence of the sign TOO in gapping in Catalan Sign Language. Differently than in English, TOO has an anaphoric function, and it is preferably found in sentence-final position even if it indicates Subject-Focus. The behavior of TOO in gapping in LSC confirms the similar nature of this type of ellipsis structure to others, such as stripping and VPE.

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Testing similarity to confirm the use of minimal pairs and phonologically related signs as phonological distractors in a comprehension task

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Saturday, 3.63

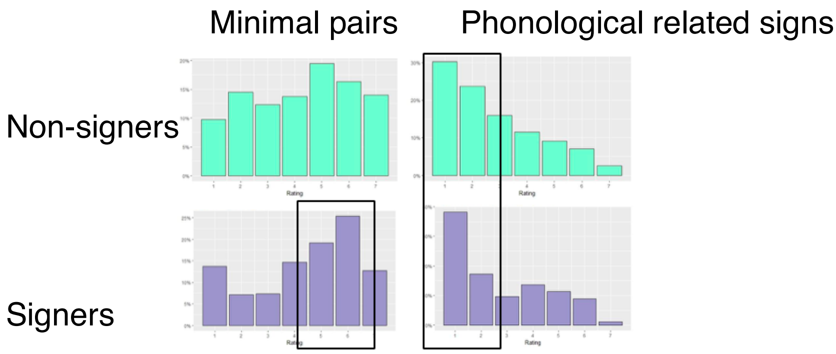
Introduction. Phonological processing of diverse populations of sign language users may differ from native signers who have no language impairment (Mayberry et al. 2005, Mason et al. 2010, Hall et al. 2012). Signers with specific language impairments (SLI) show different results when assessing their proficiency in different areas of language (grammar, phonology, narrative, etc.), and late sign language learners differ from native signers in the phonological processing. Assessment tools are being developed to contribute to the diagnosis of linguistic deficits in special populations (signers with SLI, aphasia, etc.). In this study we focus on a comprehension task that tests phonological impairment in Deaf Catalan Sign Language (LSC) signers in which minimal pairs and phonologically related signs are used as stimuli. The objective is to apply an articulatory **similarity test** with the goal of ensuring that the criteria applied to select the minimal pairs guarantee a certain degree of contrast between the target and distractors.

The comprehension task. In the LSC comprehension task with phonological distractors, for a total of 25 targets, 5 phonological distractors per target were selected: 3 minimal pairs for handshape, localization or movement, and 2 phonologically related signs, i.e. with two or three parameters differing from the target. Since the state of the art of phonology research in most sign languages is still underdeveloped, and criteria for determining the nature of minimal pairs are not full-described yet (Morgan 2018), very detailed criteria to select the distractors for the comprehension task were established. The phonological model of reference used was the one by Brentari (1998), in which SL phonemes can be further split into smaller units which behave like phonological features in spoken language. Many features, though, come into play when considering contrast between signs, and, according to Monçao et al. (2006) for spoken languages, it is necessary to consider that two phonetic units can be distinct in a greater or lesser degree.

Goal. In order to ensure that the criteria applied to select the minimal pairs guarantee a certain degree of contrast between the target and distractors selected for the comprehension task in LSC, we conducted an articulatory similarity test from a perceptual point of view with hearing participants, signers and non-signers, showing an actual difference in perception of similarity in the form of the sign. Minimal pairs were rated more similar to the target than the phonologically related signs. On the basis of the results got from hearing people, the goal of this paper, then, is to evaluate if the same similarity ratings are found in Deaf people, showing the reliability of minimal pairs as stimuli.

Similarity test. An online questionnaire was created to display 127 pairs of signs in a video format composed by a target and a distractor. The test consisted in rating 73 minimal pairs and 54 phonologically related signs and was conducted with hearing participants. Among them, 10 were proficient signers of a sign language different than LSC and 10 were non-signers. Participants were asked to judge the similarity between each pair of signs on a scale from 1 to 7. In this paper, the experiment aims to be conducted with 10 LSC Deaf signers. In the instructions of this one, it is specifically requested that the participants rate the similarity between the signs based on their form and not on their meaning. Moreover, three main questions guided the construction and the evaluation of the test: i) is similarity in minimal pairs and phonologically related signs rated differently?; ii) in minimal pairs, is the similarity affected by the parameter that is changing (movement, handshape, location)?; iii) in phonologically related signs, is the similarity affected by the number of parameters that are changing (2 parameters, 3 parameters)?

Similarity test: first results. Ratings were analysed with cumulative link mixed models. Both signers and non-signers rated differently minimal pairs and phonologically related distractors. Participants rated as more similar minimal pairs (signers Mean = 4.45, SD = 1.93; non-signers Mean = 4.23, SD = 1.91) than phonologically related signs (signers Mean = 2.74, SD = 1.79; non-signers Mean = 2.77, SD = 1.71).



Regarding minimal pairs, no statistically significant difference was found depending on the type of parameter in both signers and non-signers. As for phonologically related signs, the number of parameters changing (two or three) did not significantly affect the similarity rating. In the on-going study with Deaf LSC signers, we expect to find the same difference between minimal pairs and phonologically related signs.

Summary and conclusions. In sum, this work, through one of the first similarity tests that has been conducted on SL, gives support to the presence of difference in the perception of minimal pairs and phonologically related distractors looking at the performance of hearing people, signers and non-signers. The differences in the perception of similarity depending on a specific parameter points out that a similarity scale might be used instead of the categorical classification between minimal pairs and phonologically related signs. We expect that results from Deaf LSC signers enrich the interpretation of the findings, further supporting the use of minimal pairs as stimuli in comprehension task to test phonological impairment in Deaf signers.

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