GEORG-AUGUST-UNIVERSITÄT GÖTTINGEN

Graduiertenschule für Geisteswissenschaften Göttingen
Göttingen Graduate School of Humanities

SLG SIGN LAB Göttingen

Workshop on Anaphora Resolution in Spoken and Sign Languages (ARISAS)

Program

Venue: Göttingen Graduate School of Humanities | Friedländer Weg 2, 37085 Göttingen

Sunday, 19.02.2017
From 18:00 Uhr: warming-up @ Café & Bar Celona (Weender Landstraße 3)

Monday, 20.02.2017:

9:00 – 9:30: Registration

9:30 – 10:00: Opening/Greetings

10:00 – 11:15: Invited talk: *The time course of anaphora resolution*
Petra Schumacher (University of Cologne) 5

11:15 – 11:30: coffee break

11:30 – 12:20: *Binding and Agreement in Icelandic ECM Constructions: From Nominative Reflexives to Pronouns*
Gurujegan Murugesan, Louise Raynaud, Sandhya Sundaresan & Hedde Zeijlstra
(University of Leipzig & University of Göttingen) 6

12:20 – 14:00: lunch break

14:00 – 14:50: *German preschoolers' comprehension of personal and demonstrative pronouns*
Melanie Fuchs & Petra Schumacher (University of Cologne) 8

14:50 – 15:30: *Acquisition of anaphora in the Brazilin Sign Language*
Lídia da Silva (Universidade Federal do Paraná) 10

15:30 – 15:50: coffee break

15:50 – 16:40: *Pronominalizing Subjects: Referentially Empty Pronouns in ASL* 12
Anne Therese Fredericksen & Rachel Mayberry (University of California, San Diego)

16:40 – 17:30: *Experimental Evidence on the Processing of Spatial Anaphora in DGS*
Anne Wienholz, Derya Nuhbalaoglu, Nivedita Mani, Markus Steinbach,
Annika Herrmann & Edgar Onea (University of Göttingen) 14

19:00: Dinner @ Café Botanik (Untere Karspüle 1b)

Tuesday, 21.02.2017:

ABSTRACTS

INVITED TALKS

The time course of anaphora resolution

Petra B. Schumacher
(University of Cologne)

The talk provides an overview of recent research on the time course of anaphora processing pointing towards two core mechanisms involved in i) expectation-based resolution of anaphora and ii) forward-directed discourse updating. The language system makes available different cues to encode the role of a referent in discourse, including form features, prosodic and syntactic cues. Event-related brain potentials (ERPs) are utilized to investigate the time course of reference processing and to examine how comprehenders make use of multiple cues during the construction of a mental representation.

A good indexical is hard to find

Emar Maier
(University of Groningen)

In his seminal "Demonstratives" (1977/1989), Kaplan offers a semantic theory for a class of context dependent expressions he calls indexicals. He characterizes this class primarily by example ('I', 'my', 'you', 'his', 'this', 'here', 'now', 'tomorrow', 'actual'). In his proposed semantics, indexicals are not only context dependent, but also directly referential, meaning that, unlike anaphoric pronouns and presuppositions, their interpretation is fixed directly by the (extralinguistic) utterance context, regardless of the linguistic environment. At first sight it looks like the expressions listed by Kaplan indeed satisfy these properties, but ever since the circulation of Kaplan's manuscripts, linguists and philosophers have been coming up with anaphoric, bound, shifted, or otherwise non-indexical uses of these alleged indexicals. In my talk I review the literature to establish that most of the items on Kaplan's list do not actually behave in accordance with Kaplan's theory. Only the 'day indexicals' ('tomorrow' and 'yesterday') seem to resist anaphoric readings. Opinions differ about their potential for shifting in reported speech contexts (cf. Plank/Eckardt vs. Kaplan/Schlenker). To settle this empirical matter we performed an experiment involving stimuli like "On Tuesday I met Lisa and she said that her history test would be tomorrow". Results indicate that native speakers readily allow shifted interpretations of day indexicals. I conclude that Kaplanian indexicals are a theoretical fiction -- there are no expressions in English that behave according to Kaplan's theory. Finally, I compare two theoretical responses: (i) there are genuine indexicals, getting their reference from the utterance context, but there are also monstrous operators that shift these utterance contexts (Schlenker/Anand), or (ii) indexicals are a subspecies of anaphora, getting their referent by binding to a salient antecedent (Maier/Hunter).

BINDING AND AGREEMENT IN ICELANDIC ECM CONSTRUCTIONS:
FROM NOMINATIVE REFLEXIVES TO PRONOUNS

1.DATA : There are three puzzling facts in Icelandic ECM constructions involving a 'quirky' dative subject: (i) the absence of a nominative reflexive in (1); (ii) the ability of having a nominative pronoun replace it and be locally bound, in apparent violation of principle B (contrast (1) with the accusative pronoun and reflexive in (2)); (iii) the fact that the coreference possibilities of the pronoun seem to be independently restricted by φ-agreement. Indeed, when the nominative pronoun occurs as the object of an ECM construction, the pronoun cannot co-refer with the matrix subject if there is obligatory object agreement with the verb. I.e. we seem to have object agreement in the absence of binding in (3a), and binding in the absence of object agreement in (3b).

(1) Maríu$_i$ fannst ***sig** / **hún$_i$** vera gáfuð.
Mary.DAT seemed.3SG **REFL.NOM / she.NOM** be gifted.F.SG.NOM
'Mary thought she was smart' (Taraldsen 1995: 315-316)

(2) Henni$_i$ virðist **hana$_{*i/k}$ /sig$_i$** vanta peninga.
Her.DAT seems **her.ACC/REFL.ACC** lack money
'She seems to herself to lack money' (Everaert 1991: 288)

(3) a. Konunum$_i$ fun**du**st þær$_{*i/k}$ vera gáfaðar.
women.the.DAT seemed.3PL they.NOM be gifted.F.PL.NOM
'The women thought they were smart'

b. Konunum$_i$ fan**n**st þær$_{i/k}$ vera gáfaðar.
women.the.DAT seemed.3SG they.NOM be gifted.F.PL.NOM
'The women thought they were smart' (Taraldsen 1995: 317)

These interesting facts in Icelandic have not gone unnoticed in the literature. But these puzzles have been dealt with as more or less independent facts. For example, Hicks (2009) provides an account for binding and agreement facts in (3) and considers the absence of nominative reflexive for an independent reason, namely a morphological gap (Zaenen, Maling and Thráinsson 1985). Everaert (1991) accounts for the absence of nominative reflexives by assuming that nominative case cannot form a part of a binding chain but he gives no account for the agreement and binding facts in (3).

2.PROPOSAL : In this paper, we aim at providing a unified account for the data discussed above, by addressing the following questions. First, how can the presence of seemingly bound pronominals be accounted for with respect to Binding theory, i.e. are these co-referential elements true pronominal or anaphors in disguise? Second, how can we explain the apparent incompatibility between agreement and co-referentiality in (3a-b)?

a. Syncretism between pronoun and reflexives?: One way to approach these puzzles would be to assume that there is no nominative morphological form for the anaphor and that there is a syncretism between the nominative pronoun and the nominative reflexive (e.g. Maling 1984). If this is really the case, then we would expect *hún$_i$* in (1) and *þær* in (3b) to be underlyingly reflexive with surface pronominal morphology. However, Everaert (1991) quite convincingly demonstrates that the pronouns in Icelandic exhibit none of the syntactic and semantic properties usually associated with anaphors. Furthermore, if pronoun and reflexive were syncretic, we would also expect the pronoun to be coreferential with the dative subject in (3a), which is clearly not the case. So we conclude after Everaert (1991) that pronouns are just pronouns and they are not syncretic with the nominative form of the reflexive.

b. A structural difference: distinct binding and agreement domains : Our proposal to account for these facts without having recourse to syncretism is a structural explanation that relies on the identity between the locality domains of binding and φ-agreement. Though the constructions in (3a) and (3b) seem to be alike in having the dative subject and infinitival complement, our main thesis is that they are structurally different as shown in (4).

(4) a. [Konunum$_i$ fundust þær$_{*i/k}$ [vera gáfaðar]]
[women$_i$ find.3PL they.NOM$_k$ [be gifted]]
b. [Konunum$_i$ fannst [þær$_i$ vera gáfaðar]]
[women$_i$ find.3SG [they.NOM$_i$ be gifted]]

We assume here that the locality domain is the same for φ-agreement and for binding (Reuland 2011, Hicks 2009, Rooryck and van den Wyngaerd 2012). In (4b), the infinitival complement constitutes a different locality domain from the matrix clause, whereas that in (4a) is part of the same local domain as the matrix clause. If we assume that this is indeed the case, the binding facts, far from being puzzling, are actually precisely what is predicted. In (4b) the pronoun is too far away to be bound (so it doesn't constitute a principle B violation) and consequently also too far to agree. Binding via Agree thus fails to happen, and we propose that Icelandic exhibits a fallible agree strategy, i.e. 3SG default agreement (Preminger 2014). In (4a) the pronoun is in a higher position after raising so it is local enough to agree - but coreferentiality would be a principle B violation. The pronoun can only be in that domain with disjoint reference/without being bound.

We can extend this same argumentation to derive the patterns in (1)-(2). Whereas (2) is straightforwardly accounted for in this framework (the accusative pronoun/anaphor is in the same domain than its antecedent and obeys standard Binding Theory), (1) raises a remaining question: the absence of nominative reflexive cannot be accounted for by principle A of binding theory because the Icelandic reflexives can occur as long distance reflexives in subjunctive and infinitival complement (Thrainsson 2007). The absence of nominative reflexives can be attributed to a paradigmatic gap in the morphology (Maling 1984, Hicks 2009). Another, more systemic explanation would be that the absence of the nominative reflexives is due to Rizzi (1990)'s Anaphor Agreement Effect, which states that anaphors cannot occur in a position construed with φ-agreement. In (1), the subject position of the infinitival complement could indeed be an agreement triggering position of the matrix verb (unlike in (2)).

This approach has the advantage of accounting both for the agreement facts and the potential principle B violation, postulating nothing more than our traditional binding theory and standard locality assumptions. Our hypothesis makes the correct prediction for mono-clausal examples like (5) below. While an account based on syncretism would wrongly predict that both (5a) and (5b) are grammatical, ours correctly predicts that (5a) is ungrammatical, because not only does it constitute a Principle B violation but if the nominative pronoun is clause-bound then it should be able to agree. The syncretism account, in contrast, considers *they$_i$* as an anaphor and therefore would require a separate explanation for why it cannot agree (cf Tucker 2011).

(5) a. *Konunum$_i$ leiddist þær$_i$ b. ?Konunum$_i$ leiddust þær$_k$
women$_i$ was.bored.3SG they.NOM women$_i$ was.bored.3PL they.NOM

Our structural difference hypothesis also makes the correct prediction for non-finite examples like (6), where the pronoun is not clause-bound, i.e. the pronoun can corefer with its antecedent since it is outside of the matrix clause.

(6) Eg tel Jóni$_i$ [finnast hann$_i$ (sjálfur) skrytinn]
I believe John.DAT to.find him.NOM (self) strange.NOM.M.SG
'I believe John to find himself strange' (Pesetsky, 2011: 6)

Summing up, the hypothesis that we propose provides a unified explanation for the interaction of binding and agreement facts in Icelandic, as well as for absence of nominative reflexives and the anaphoric reading of nominative pronouns.

SELECTED REFERENCE: Everaert, Martin. 1991. 'Nominative anaphors in Icelandic: Morphology or syntax?' In Werner Abraham, Wim Kosmeijer, and Eric Reuland, eds. *Issues in Germanic syntax*. 277-307. Amsterdam: Benjamins.

German preschoolers' comprehension of personal and demonstrative pronouns

How do German preschool children understand personal and demonstrative pronouns? The personal pronoun *er* is typically said to refer to a prominent referent whereas the demonstrative *der* is claimed to refer to a less prominent referent in discourse (e.g., Gundel et al. 1993; Zifonun et al. 1997; Bosch & Umbach 2007). Accordingly, a lot of research has focused on the identification of the cues that contribute to a referent's prominence status. For example, Schumacher et al. (2016) showed in sentence continuation and referential selection tasks with adults that *er* is typically understood as referring to the highest thematic role (proto-agent) whereas *der* is understood as referring to the patient in the antecedent clause – irrespective of word order. Others have argued for grammatical function, topicality or order of mention as decisive factors (see Bosch & Umbach 2007; Schumacher et al. 2016 for an overview). However, there are only few studies that addressed the question of how children understand anaphoric pronouns (e.g., Bittner 2007).

We conducted a referent selection experiment to examine the development of the resolution of personal and demonstrative pronouns in monolingual native speakers of German. We tested two age groups (4-year-olds vs. 6-year-olds) and used a forced choice referent selection task: The participants heard 40 pre-recorded short sentence pairs; the first sentence introduced two masculine animate characters and the second one contained a potentially ambiguous pronoun (either the personal pronoun *er* or the demonstrative *der*). We varied the word order in the first clause in order to investigate the effects of grammatical role/thematic role and word order during pronoun resolution, as illustrated in the examples below.

(1) **a. Canonical clause (SVO)**
Ein Bauer schimpft einen Jungen. ***Er/Der*** *steht unter einem Apfelbaum*.
A farmer$_{NOM}$ is scolding a boy$_{ACC}$. **He$_{PPRO}$/He$_{DEM}$** is standing under an apple tree.
b. Non-canonical clause (OVS)
Einen Jungen schimpft ein Bauer. ***Er/Der*** *steht unter einem Apfelbaum*.
A boy$_{ACC}$ is scolding a farmer$_{NOM}$. **He$_{PPRO}$/He$_{DEM}$** is standing under an apple tree.

After each sentence pair, the children were presented with pictures of the two characters. They were asked to point at the character of which they thought the second sentence was about (e.g. "Can you show us who is standing under an apple tree?").

Statistical analyses showed that the answers of the 4-year-olds (N=14, age range: 4;0-4;11) did not reveal reliable resolution preferences for either pronoun type, i.e. they responded at chance for all four conditions. Around their 6th birthday (N=14, age range: 5;7-6;4), children have developed interpretative strategies – but only for the demonstrative *der*. Unlike adults,

the children selected the second-mentioned candidate as antecedent for *der* (and thus the subject/agent in non-canonical clauses). In addition, the personal pronoun still evoked chance performance. We will argue that due to limited processing capacities children aged 6 can only use linear order as a cue during pronoun resolution and thus always choose the second-mentioned entity as referent for *der*. This is in line with research on argument processing by Leuckefeld (2005) who showed that even older children do not yet use linguistic cues in an adult-like manner.

We will further show that the fact that children first acquire preferences for *der* has to do with the main function of demonstratives, which is to establish joint attention (cf. Diessel 2006). Demonstratives are among the first words that children use because they are an important means for children to direct their caretakers' attention towards objects and thus to create a situation of joint attention (cf. Clark 1978; Diessel 2006; Tomasello 2008). In anaphoric use, demonstratives have a very similar function, namely to direct the hearer's or reader's attention towards a particular (not yet prominent) referent in discourse (cf. Diessel 2006). We will argue that because children make use of demonstratives very early in language acquisition, they also acquire interpretative strategies for demonstratives before those for personal pronouns as the results in our experiment suggest (see also Bittner 2007 for similar results on children's production of pronouns).

References

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Acquisition of anaphora in the Brazilian Sign Language

ABSTRACT
The objective of this work is to present a short diagnosis of the acquisition of anaphora by hearing learners of the Brazilian Language of Signs - Libras.
In order to fulfill this objective, we look at the study by Paradis (2008) that indicates that the diagnosis of bilingual individuals varies according to the age and form of acquisition and we apply these considerations to the acquisition process of Libras by listeners. For this author the early acquisition occurs until puberty and the late, after that and the age factor interferes in the processing of the language. That is, if it is acquired early (it is incidentally) the second language constitutes a subsystem in the language area but if it is acquired late (it is explicitly learned), only part of the language goes to the subsystem.
In addition to the theoretical considerations about age and form of acquisition, we also use Liddel (2000) notes to study the resumption of the referents of a discourse, that is, the activation of anaphora, specifically through the use of subrogated space and token for the Which subrogated space results from the conceptual integration of body parts of the flag with entities belonging to the event space. Through this mental space, the person can refer to the characters of the story and represent their actions and attitudes using different body postures, facial expressions, trunk and head movements and token space that is the place where gestures are allowed Are aimed at the conceptualization of entities that belong to the space of the event and that are not physically present in the real space.
To ascertain these theoretical findings we look at the production data of a type of discourse: narrative. To obtain this data, we elicit the retelling of a story and apply a questionnaire about age and form of acquisition to apprentices from an extension course of Libras for listeners - Advanced Level - offered by the State University of Paraná. During the completion of the narrative, we captured the image and afterwards, we transcribed the videos in Elan. Thus, we composed a corpus with 10 narratives of listeners (pseudonym AP)
The narrative is called "The Three Axes" and was flagged by Rimar Romano and is available on Youtube. Rimar tells us that there was a beautiful woman, admired by everyone in the kingdom that lived with an evil witch who was very envious of her beauty. One day this evil witch made a magic potion and threw it against the woman so that the girl turned into a mermaid and was thrown into the river. The wicked witch warned that as long as the mermaid did not find any honest person, she would remain so, but if she found her, she could have her human form again. Discouraged, the mermaid stayed at the lake for many years. Then, one day, a peasant appeared, cutting down the trees he found, even those near the river. Until his ax fell into the river, but he could not swim, and therefore could not catch him. The peasant asked the mermaid to bring him, and she did so only that she brought him a golden ax, and then asked if that was his ax and he said no. The mermaid showed him a piece of silver, and the peasant replied that it was not his ax. Then the mermaid brought him the bronze that was what he had felled in the river and the peasant accepted it. At this moment, the mermaid became, again, in human form.

As you can see the narrative contains 4 characters: the beautiful woman, the evil witch, the mermaid and the woodcutter.
For the study on screen, we propose the discussion of the anaphora about the first character: the beautiful woman.
Regarding the form and age of acquisition, our results indicate that 9 apprentices had late acquisition (from 18 to 40 years of age) and only 1 had precose acquisition (before 15 years of age) and that the 9 passed through formal process of Learning of the language, while the apprentice with early acquisition never made Pounds course
As for the anaphora, we have that of the 40% of the apprentices that used the space subrogated did it without maintenance of the details signaled in the original narrative and only 50% of them used token space, sometimes with the referent placement in a point of space and now With note but not making use of both features according to Rimar signaling.
With this, we conclude that the apprentice who had an early acquisition and acquired the Pounds incidentally produced anaphora in the same way as the deaf. (Paradis, 2008) and that there is a huge difference in the production of character retakes (space under and token) of the beautiful woman character between the APs and the deaf.

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Pronominalizing Subjects: Referentially Empty Pronouns in ASL

Recent years have seen a rising interest in examining how signers choose anaphoric referring expressions beyond the sentence level [1, 2]. Pronouns in signed languages have received particular attention because of their spatial nature. Discussions of sign language pronouns tend to focus on the role of spatial anchoring in determining the referent of the pronoun [3, 4, 5, 6]. It is assumed that pronominal pointing signs get their meaning from the spatial locus they index. The locus, in turn, is believed to be previously associated with a referent [3, 4]. In the present study, we examine the use of pronominal pointing signs in the absence of spatial anchoring. Because a pronoun is referentially empty if it indexes a locus where no referent has been set up in the preceding discourse, we might expect such pronouns not to occur as a consequence. Nonetheless, our work shows that these pronouns do exist in signed discourse. We report the preliminary results of a study using a novel paradigm to ask how these pronominal points can be explained.

The present study tests whether the hypothesis advanced by Stevenson and colleagues as well as Kehler and colleagues [7, 8] holds for pronouns in ASL. These studies have shown that speakers tend to pronominalize the subject from the preceding clause, even when the pronoun could potentially refer to both the subject and the object, regardless of the potential problems this may cause for the listener [7, 8, 9, 10, 11, 12, 13]. They suggest that the speaker's choice of referring expression is a largely a mechanical function that does not take into account how accessible the referent is to the addressee. Instead, pronominalization simply happens whenever the subject of the preceding clause is referenced.

Due to how anaphoric links in the visual modality have been described in the literature, sign language pronouns have been assumed to be less ambiguous than spoken language pronouns. However, in the absence of spatial anchoring, ASL pronominal pointing signs are even more ambiguous than English pronouns, given their lack of gender marking. Currently, no framework exists to account for such pronouns. We propose that if pronominalization processes in sign language are anything like the processes in spoken languages, signers, too, might have a tendency to pronominalize the subject from the previous clause, and this would permit the use of otherwise referentially empty pronominal points.

We test this hypothesis for signed discourse using a sentence completion experiment in ASL. Four deaf native ASL signers each saw 112 prompts. In the free condition, we presented transitive sentences such as 'JOHN ADMIRE LISA WHY? ...', "*John admires Lisa, because ...'*. Subjects were asked to repeat the prompt, and then continue it with another clause[1]. In the point condition, the prompt included a pronominal point, for example 'MARY HATE SARA WHY? IX…'*,'Mary hates Sara, because she…'*. This type of prompt forces participants to assign a referent to the provided pronoun. Which referent they choose is revealed by the sentence content they construct [7]. The stimuli were devoid of factors that could set up spatial associations (e.g. fingerspelling the names to the left/right of the signer's body). We counter-balanced the verbs in the prompts (with respect to verb type [14]) and next-mention bias [8], and we also counter-balanced the pronominal points (half the prompts had a point to the left, the

[1] The prompt repetition was included as part of our adaptation of the sentence completion paradigm for use in sign language. Having the subjects repeat the prompt ensures that they use space as we intended.

other half had a point to the right side). The data were transcribed by a deaf, native ASL signer who also coded the next-mention, that is, which referent was mentioned first in the subjects' continuation. We excluded trials from the analysis in which participants' next mention was not one of the referents from the prompt.

To discover whether signers show a preference for pronominalizing the subject, we asked whether they had more next-mentions to the subject than the object in the point condition. The results show that the four signers referred to the subject between 30-62% of the time. We next asked how these proportions compare with next-mentions in the free condition. The results revealed that all signers had a higher proportion of subject next-mentions in the point condition (30-62%) than in the free condition (29-67%), although there were sizeable individual differences (see Figure 1).

Our main findings confirm that pronominal pointing signs can occur in the absence of spatial anchoring, and thus indicates that at least some ASL pronouns are referentially ambiguous. Overall, our results are in line with the results from Kehler and Rohde [8], suggesting that the preference for pronominalizing subjects is present in ASL as well as in English. However, our preliminary analysis also suggests that the trend might be weaker in ASL signers than in English speakers. Whereas Kehler and Rohde [8] report that their participants mentioned the subject first on average 80% of the time with similar stimuli, the signers in the current study only mentioned the subject first between 30-62% of the time. Although this difference might be due in part to the present experiment being signed rather than written, the results nonetheless indicate that additional principles interact with the tendency to pronominalize the subject in ASL and we are investigating these factors in further research.

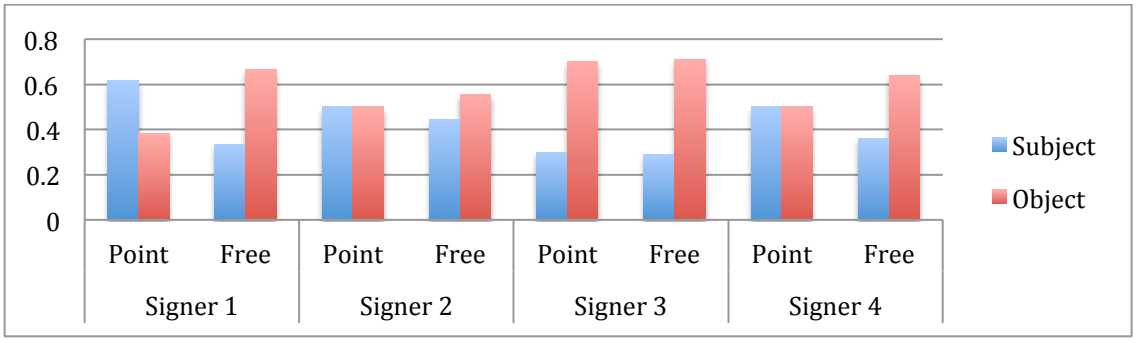

Figure 1. Proportion of next mentions referring to subject and object in free and point prompts

References

1 Bel et al, 2013; **2** Authors, 2016; **3** Friedman, 1975; **4** McBurney, 2002; **5** Sandler & Lillo-Martin, 2006; **6** Kuhn, 2015; **7** Stevenson et al., 1994 ; **8** Kehler & Rohde, 2013; **9** Kehler et al., 2008; **10** Rohde & Kehler, 2014; **11** Rohde, 2008; **12** Miltsataki, 2007; **13** Kehler & Ueno, 2010; **14** Padden, 1988

Experimental Evidence on the Processing of Spatial Anaphora in German Sign Language

Background:
In sign languages, discourse referents (DRs) are introduced and referred back to by means of referential locations (R-loci), i.e. regions in the horizontal plane of the signing space, which are identified either by overt grammatical (manual or non-manual) localization strategies such as pointing, body movement, and eyegaze or by covert default strategies (Barberà, 2012; Geraci, 2014; Steinbach & Onea, 2015). Hänel-Faulhaber et al. (2014) and Hosemann et al. (2013) are the first studies on the processing of R-loci with agreement verbs (introducing R-Loci overtly). One of the strongest preferences driving pronoun resolution in spoken languages is the first mention bias (Crawley & Stevenson, 1990; Gernsbacher & Hargreaves, 1988; i.a.). Namely, the first mentioned referent is most accessible, and typically expected to co-refer with (personal) pronouns. However, only a few studies concentrated on a small range of pronominal elements in some sign languages. For instance, Emmorey & Lillo-Martin (1995) observe no first mention bias for ASL null pronouns, while Koulidobrova & Lillo-Martin (2016) mention that the majority of overt third person pronouns refer to the subject/first mentioned referent.
Up to now, neither default constraints on the assignment and resolution of DRs to R-loci nor the preferences driving pronoun interpretation have been investigated experimentally. The present event-related potential (ERP) study on German Sign Language (DGS) is divided in two parts. The first part investigates the hypothesis that signers assign distinct and contrastive R-loci to different DRs even in the absence of any overt localization strategy. The second part examines the reality of a first mention bias in the discourse of DGS.

The present study:
We conducted a classical ERP study to elicit an N400 component by violating the semantic expectation created in the two-sentence context. Hence, we used a mismatch-design and constructed sentence sets (see example 1) containing two DRs without any overt localization in the first sentence and a pronoun (INDEX) at the beginning of the second sentence followed by a predicate clearly identifying one of the two DRs. The pronoun either picked up the first mentioned or second mentioned referent from the preceding sentence. 160 stimuli (40 for each condition) were video-recorded with two right-handed professional deaf signers of DGS, digitized, and then presented to the participants at the rate of natural signing. The stimuli were controlled for non-manuals, verb types and the semantic relation the sentence-final predicate establishes. Given that even the transition phase between two signs can already provide sufficient information about the next sign to evoke neurophysiological correlates (Hosemann et al., 2013), three different points in time (including the time window before sign onset) of the predicate (henceforth 'description part') and three different points in time of the INDEX sign were manually coded by two researchers for the later analysis. The following results are based on the trigger 'target handshape' for Part I and on the trigger 'direction' for Part II.
In total 21 right-handed deaf native signers of DGS (12 female, 9 male, age range: 20-51 years) participated in this study. The participants were acquired from different regions of Germany, had a least high school education level, and learned DGS before the age of three. We recorded ERPs while participants watched the pre-recorded videos and judged the presented sentence sets according to their well-formedness.

(1) a. WOMAN MAN MEET. **INDEX$_R$** AGAIN PREGNANT.
b. MAN WOMAN MEET. **INDEX$_L$** AGAIN PREGNANT.
c. WOMAN MAN MEET. **INDEX$_R$** AGAIN PREGNANT.
d. MAN WOMAN MEET. **INDEX$_L$** AGAIN PREGNANT.
'A man/woman meets a woman/man. She/he is pregnant again.'

Part I: Following the DRT-analysis developed in Steinbach & Onea (2015), we assume that in case of two DRs, the signing space is divided into two contrastive areas with the first DR being assigned by default to the ipsilateral area and the second DR being assigned to the contralateral area of the signing space. According to our expectations, example (1ab) should be felicitous sentence sets because the anaphoric relation established by the pronominal pointing does not violate the semantic expectation (henceforth match condition). By contrast, the examples in (1cd) should not be felicitous since the anaphoric relation creates a mismatch (henceforth 'mismatch condition').
Part II: There are three possible scenarios for the results: (i) the ERPs do not differ across conditions, (ii) increased brain activity in the ipsilateral condition, which would speak in favor for a second mention effect and (iii) increased activity in the contralateral condition, supporting the notion of a first mention effect. In (1ac) the pronoun INDEX$_R$ establishes an anaphoric link to the first referent (ipsilateral condition) and accordingly in (1bd) the INDEX$_L$ refers to the second referent (contralateral condition).

Results:
Part I: For the analysis we compared the match and mismatch condition. The data show a difference on the description in the second sentence between 500 and 600 milliseconds over central and centro-parietal regions on the left hemisphere. This is in line with our hypothesis that signers of DGS use default strategies for assigning DRs to R-loci if the DRs are not linked to R-loci overtly. Additionally, the data show that in case of two DRs, they are assigned to the contrastive areas in the signing space.
Part II: The data show a significant difference between the ipsilateral and contralateral condition in the time window 400-500ms following onset of the trigger 'direction' over parietal-occipital regions in the right hemisphere, with the contralateral condition being more negative than the ipsilateral condition. Hence, the results seem to confirm scenario (iii). This suggests increased processing costs for the contralateral INDEX sign: It appears that participants expect the second sentence to continue with the first referent. Based on the findings of Part I, the effect can be interpreted as an effect of first mention.
The current study suggests that there is an underlying pattern for the assignment of DRs to R-loci and shows a difference between pronominal pointings to ipsi/contralateral areas in signing space for DGS.

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Processing, modality, transfer…Argument omission in anaphora resolution tasks by unimodal and bimodal bilingual signers of ASL

Background: Literature on acquisition of spoken languages has robustly shown that individuals learning two languages only one of which allows arguments to be omitted do not transfer this property into their non-null argument language; instead, the null argument language becomes affected as they oversupply overt arguments (pronouns and NPs) where the target grammar prefers omission (Sorace 2011 and references therein). A number of explanations have been put forth, among which is processing: because language inhibition is cognitively challenging, bilinguals may present patterns in both of their languages that are atypical. These patterns reflect performance difficulties associated with executive function tasks, not the knowledge of grammar. In terms of anaphora resolution tasks, which heavily rely on cognitive control, this means additional – unexpected from the point of view of target grammar – forms, irrespective of whether either or both of the languages of the bilingual require the argument to be overt. For instance, Spanish and Italian allow/prefer certain arguments to be silent; English generally requires its arguments to be overt. Specifically, the proposal advocated by the processing literature suggests that not only might Spanish-English bilinguals not omit in their English and oversupply overt arguments in their Spanish, Spanish-Italian bilinguals would also oversupply overt forms in both languages (Baldo et al. 2009, i.a.). This type of account offers a number of predictions for users of a sign language. If the crux of the matter is language inhibition (Kroll et al. 2008, i.a.) due to a single set of articulators, then bilinguals with access to two sets of articulators are expected to behave differently than bilinguals relying on one set (Emmorey et al. 2008, i.a.): bimodal (speech-sign) bilinguals should not pattern with unimodal speech bilinguals in terms of argument omission in each of their languages. At the same time, unimodal sign bilinguals ought to behave on par with unimodal speech bilinguals (as in (1)). Alternatively, if there is something special about sign modality, then both bimodal and unimodal sign bilinguals will perform similarly (as in (2)).

(1) Processing account: a. *Bimoda*l bilinguals ≠ *unimodal* bilinguals
b. Unimodal *speech* bilinguals = unimodal *sign* bilinguals

(2) Modality (aka 'SL is special') account:
a. *Bimodal* bilinguals = *unimodal* bilinguals
b. Unimodal *speech* bilinguals ≠ unimodal *sign* bilinguals

Study 1: Unimodal

Participants: 12 males (age_{mean} 15;03) from the UAE in their 2nd year of residence at a school for the Deaf in the USA and with no previous exposure to ASL. 10 are deaf, 2 hard of hearing; 10 have home-signing deaf family members and learned EmiratiSL in late childhood; 2 began learning ASL and EmiratiSL concurrently.

Languages: To our knowledge no literature exists on EmiratiSL. It appears to be related to other ArabicSLs and wrt argument omission functions similarly to JordanianSL and Japanese (Hendricks 2008): like ASL, EmiratiSL allows is a null argument language.

Method: 10-15min narratives (~100 utterances) recounting recent travel elicited as a part of familiar school-trip debriefing, with minimal support from a familiar native (Deaf-of-Deaf) signer of ASL. Utterances with overt verbs were coded (ELAN) for null subjects.

Results: The mean rate of subject omission was 35% (range: 30-43%), sharply contrasting with the L1 (~70%) in Wulf et al. (2002) and beginner/lower-intermediate (~51-77%) bimodal L2 ASL data in Frederiksen & Mayberry (2015). Both NPs and *IX* were found.

Study 2: Bimodal

Participants: 5 hearing children of Deaf adults (Kodas) and 2 Deaf with cochlear implants (DDCIs) (age_{mean} 6;06) with normal or above scores on the Leiter, PLS, and other measures

of (non-)verbal ability. All children are growing up in ASL signing Deaf families with and English in the world around them (USA).

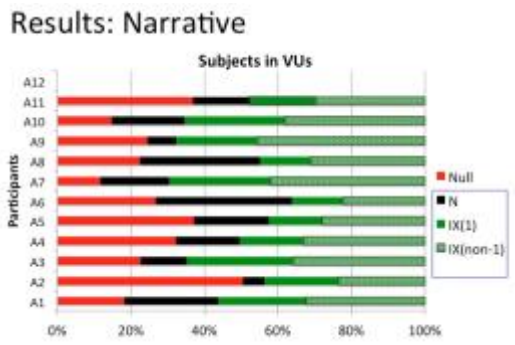
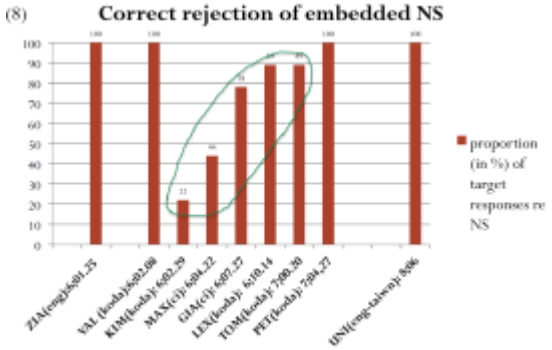
Languages: ASL is a null-argument language, English is not.

Method: Grammaticality Judgement Test (similar in spirit to Sorace et al. 2009): two toys perform some action; the experimenter speaks for one of the toys; a cat describes the situation; children judge the cat's sentences. 45% of the test trials contained an overt complementizer, 50% embedded subjects, and a variety of predicates.

Results: Both Kodas and DDCIs performed differently from monolingual and unimodal speech bilingual controls by incorrectly accepting more embedded NSs (z=4.03, p<.0003).

Conclusions:

Consistently with the previous works on unimodal bilingualism, unimodal ASL bilinguals oversupply arguments in ASL (1b); unlike unimodal bilinguals acquiring English and another language with argument omission, bimodal bilinguals allow null arguments in their English in syntactic contexts where monolingual English grammar disallows them (1a). Therefore, the data offer support for the language inhibition/ executive control explanation of the argument suppliance effects in bilingual production (1) over the modality-based account (2). The data shed further light on the importance of SL-based evidence for any theorizing regarding language processes, specifically in terms of cross-language interaction (as in Lillo-Martin et al. 2009, Koulidobrova 2012, i.a.).

Study 1	Study 2
	

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Reinterpreting N1-Reference as Direct Anaphora

In the canonical literature on compounds the first constituent ("N1" henceforth) is assumed to be an anaphoric island due to lexical integrity (e.g. Lapointe 1979, DiSciullo/Williams 1987). The N1 is treated like an invisible part of semantics which can only be accessed via bridging and therefore is inaccessible for pronominal anaphora. To illustrate this assumption Postal (1969) gives the examples in (1) which are assumed to be equally inaccessible.

(1) a. The best pork comes from young ones.
b. The best wombatmeat comes from young ones.

Nevertheless there are so called 'exceptions' like in (2).

(2) a. The rocket launch had to be delayed because of some unexpected problems with its fuel tanks. (Coulmas 1988)
b. ?Was Hundehalter mit ihnen tun sollen, wenn sie tollwütig werden. (Wunderlich 1986)

As a reason for those 'exceptions' the degree of compositionality (Coulmas 1988) or pragmatic licensing (Wunderlich 1986) is mentioned. We want to shed more light on this issue. In presenting two experiments we want to show firstly that there is a pure structural condition influencing the N1-accessibility, and, secondly, that this kind of anaphora has to be interpreted as direct anaphora.
As the crucial structural condition we put forward the difference between root and synthetic compounds. As (2) shows, there are indications for a better accessibility in the latter case. In line with the framework of Distributed Morphology (Halle/Marantz 1993, Harley 2009) we claim that the N1 has a different categorial status depending on the structure of the compound.
To get empirical evidence for this approach, we conducted two experiments. Both experiments consisted of 24 items in three conditions: a - synthetic compounds, b - root compounds, c - monolexemes (as sanity check). Experiment 1 was a sentence completion task using stimuli like in (3) with 41 participants (14 male, mean age = 23,05, SD=2,95).

(3) a. Karl ist ein richtiger Heimwerker geworden. Die Dachbegrünung ist wirklich gut gelungen. Es kann ...
Karl got to be a real home improver. The roof$_i$greening worked out pretty well. It$_i$ can ...
b. Karl ist ein richtiger Heimwerker geworden. Der Dachgarten ist wirklich gut gelungen. Es kann ...
Karl got to be a real home improver. The roof$_i$garden worked out pretty well. It$_i$ can ...
c. Karl ist ein richtiger Heimwerker geworden. Das Dach ist wirklich gut gestaltet. Es kann ...
Karl got to be a real home improver. The roof$_i$ got to be really pretty. It$_i$ can ...

It was conducted using OnExp 1.3.1 and analysed via annotation of referential choice. The descriptive outcome can be seen in figure 1. LMEMs with item and subject as random factors and STRUCTURE as fixed factor (without slopes) were significant ($p<0.001$) for both contrasts ($|z_1|=7.706$, $|z_2|=8.015$). The outcome of experiment 1 shows that this kind of anaphora is indeed productive and gives further credibililty to the hypothesis that the N1s in synthetic compounds are more accessible than the ones of root compounds.
Experiment 2 was an eye-tracking-study. Stimuli like in (4) have been read by 27 participants (7 male, mean age=25,6, SD=3,61) while their eye-movements were tracked with an EyeLink1000.

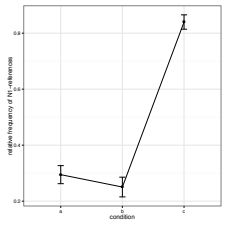

Figure 1: Experiment 1, grand mean of the relative frequency of N1-reference (a = synthetic comp., b = root comp., c = monolexeme)

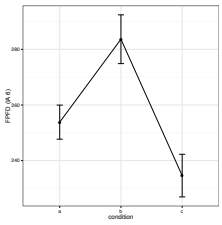

Figure 2: Experiment 2, grand mean of the FPFD of the anaphora area (a = synthetic comp., b = root comp., c = monolexeme)

(4) Karl ist ein richtiger Heimwerker geworden.
Seit die Kinder ausgezogen sind,
ist er nur noch am Bauen und Buddeln.
cond. a: Die Dachbegrünung ist wirklich gut gelungen. Es kann
cond. b: Der Dachgarten ist wirklich gut gelungen. Es kann
cond. c: Das Dach ist wirklich gut gestaltet. Es kann
jetzt bei gutem Wetter wunderbar als Rückzugsort genutzt werden.
Als nächstes will sich Karl den Keller vornehmen.
Karl got to be a real home improver.
Since the children moved out
he is always building and digging.
cond. a: The roof$_i$greening worked out pretty well. It$_i$ can
cond. b: The roof$_i$garden worked out pretty well. It$_i$ can
cond. c: The roof$_i$ got to be really pretty. It$_i$ can
now perfectly be used as a retreat when the weather is nice.
Up next Karl wants to take the cellar in hand.

We found significant results on regressions and on the total reading time of the anaphora. This supports the findings of experiment 1 and strongly indicates an influence of compound structure on on-line processing, with a significant advantage for synthetic compounds. Most interesting are the results of the First Pass Fixation Duration (FPFD) of the anaphor. The descriptive outcome can be seen in figure 2; the by-subjects-ANOVA indicates that this pattern is significant ($p<0.01$), as did the by-items-ANOVA ($p<0.001$; $minF'$ was significant, too ($p<0.05$)). At this point, no pragmatic licensing like bridging or coercion could have taken place, which means that indeed a direct anaphor was established.

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Cleft focus and accessibility: Online vs. offline differences

Several studies have demonstrated that putting a noun in focus via clefting makes the noun more accessible for pronoun reference. More recently, it has been demonstrated that this effect is critically dependent on discourse units (DUs). When the clefted noun and the pronoun appear in different DUs as shown in (1a), the clefted noun receives a boost in accessibility, whereas when the clefted noun appears in the same DU (1b), the boost in accessibility is reversed. This reversal of accessibility within DUs has been dubbed the anti-focus effect [1; 2; 3]. The main evidence for the anti-focus effect comes from offline questionnaire tasks. Building on and extending previous research, the current study investigates whether and how this effect emerges during online processing.

Memory studies (e.g. [4]) have shown that focused NPs are more easily retrieved from memory than non-focused NPs, but this does not take into account the change in accessibility from inside to outside the DU. It is possible that being in focus makes an NP more easily retrieved and therefore initially more salient for pronoun resolution, but that this salience is overridden once the rest of the DU has been processed and the anti-focus effect emerges. In order to investigate the emerging accessibility of potential antecedents within the discourse unit, an online eye-tracking experiment was carried out. We manipulated the focus type of the first noun phrase (N1), with a baseline condition (no focus), a cleft and a particle. We additionally forced pronoun reference to N1 or N2 by manipulating the gender of the nouns. Examples of the six conditions are given in (2) below. 35 native speakers of German (9 male) read 24 experimental and 82 filler sentences while their eye-movements were monitored. After completing the online experiment, participants were asked to rate each experimental sentence on a scale of 1 (*sehr gut*, very good) to 7 (*sehr schlecht*, very bad). If focus makes an NP more salient initially, the N1 reference should show an advantage in the focus conditions (2c) /(2e) compared to the baseline (2a) when the pronoun is first encountered. If the anti-focus effect subsequently overrides the initial NP salience once the whole DU has been processed, there should be a processing disadvantage reflected in increased re-reading of the pronoun in the N1 cleft and focus particle conditions (2c)/(2e) compared to the baseline (2a), and an advantage for N2 ((2d) /(2f) versus (2b)).

Participants' post-experiment ratings showed the expected anti-focus effect. Cleft items were rated as significantly worse than the baseline when the pronoun referred to N1 (t = 2.54), while significantly better than baseline in N2 conditions (t = -2.18). The eye-tracking data, however, revealed a different picture. There was no effect in early measures at the pronoun region, but in the following region (spillover1), early measures were significantly shorter in the cleft condition than in the baseline when the pronoun referred to N1 (first fixation times, t = -2.50; first-pass times, t = -2.02). First fixations were also marginally longer in the cleft compared to the baseline in N2 conditions (t = 1.88). However, re-reading times in the same region were marginally longer in the cleft condition compared to the baseline when the pronoun referred to N2 (t = 1.77); total times were significantly longer (t = 2.13). The same pattern was also found in first-pass and regression-path times in the following region (fp, t = 2.16; fp, t = 2.96), as well an advantage for the N1 cleft condition compared to baseline (t = -2.98).

Initial measures showed an early advantage for N1 reference when the pronoun refers to the clefted antecedent, in line with memory accounts of easier retrieval for focused NPs. This suggests that being in focus via a cleft makes an NP initially more accessible, despite being inside the same DU. Later measures, however, did not show a reversal of this pattern.

The contrast with the previous offline results, and even participants' own post-experiment ratings, suggests that the anti-focus effect, which is necessary to override the initial advantage for the clefted antecedent, may emerge at a late stage, well after the whole DU has been processed.

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Example 1

(a) It was John who greeted Peter. He was in the car at the time.

(b) It was John who greeted Peter when he was in the car.

Example 2

Lead in: Für die folgende Woche war eine Klassenfahrt geplant.
A class trip was planned for the following week.

(a) No cleft (baseline), N1 reference

Herr Müller erklärte der Lehrerin am Freitag, dass er nicht mitfahren könne.

Mr Müller explained to the teacher (*fem.*) on Friday that he could not come along.

(b) No cleft (baseline), N2 reference

Frau Müller erklärte dem Lehrer am Freitag, dass er nicht mitfahren könne.

Mrs Müller explained to the teacher (*masc*.) on Friday that he could not come along.

(c) *NP1 in cleft, N1 reference*

Es war Herr Müller, der der Lehrerin am Freitag erklärte, dass er nicht mitfahren könne.

It was Mr Müller who explained to the teacher (*fem.*) on Friday that he could not come along.

(d) NP1 in cleft, N2 reference

Es war Frau Müller, die dem Lehrer am Freitag erklärte, dass er nicht mitfahren könne.

It was Mrs Müller who explained to the teacher (*masc.*) on Friday that he could not come along.

(e) *NP1 focus particle, N1 reference*

Ausgerechnet Herr Müller erklärte der Lehrerin am Freitag, dass er nicht mitfahren könne.

Of all people Mr Müller explained to the teacher (*fem.*) on Friday that he could not come along.

(f) NP1 focus particle, N2 reference

Ausgerechnet Frau Müller erklärte dem Lehrer am Freitag, dass er nicht mitfahren könne.

Of all people Mrs Müller explained to the teacher (*masc.*) on Friday that he could not come along.

Interpreting Spatial Pronouns in German and Turkish Sign Languages: An Empirical Study

Background: Pronouns being one of the most frequent yet referentially underspecified anaphoric expressions remain to be a challenge both for spoken (SpL) and sign language (SL) research. This challenge gets even bigger in the ambiguous contexts, where overt pronoun resolution cues such as gender in SpLs and localization in SLs are not present. The factors effecting pronoun interpretation in SpLs have been intensively investigated (Ariel 1990, Crowley & Stevenson 1990, Gundel et al. 1993, Smith 1994, Kehler et al. 2008, i.a.). However, except the well-known mechanism of localization, we do not have much information on how pronouns in ambiguous contexts are interpreted in SLs. Steinbach & Onea (2015) proposed a default pattern for pronoun interpretation for German Sign Language (DGS), which is experimentally confirmed by Wienholz et al. (2016). The aim of the present study is two-fold: (i) to determine whether the default localization pattern attested for DGS can also be seen in a historically unrelated SL, Turkish Sign Language (TID) and (ii) to determine further factors (e.g., verb type) responsible for interpretation and/or production of the spatial pronouns in DGS and TID from empirical perspective.

Present study: The signers completed two consecutive tasks: sentence completion and forced choice. The sentence completion task comprised the repetition and continuation of a presented sentence having the following structure: *Time ADV_Ref1_Ref2_Verb* (see example 1 and 2). In each sentence, two referents (one male and one female; counterbalanced in terms of their order) were introduced with their sign names and combined with a verb. Participants were familiarized with these names before each sentence. All verbs were transitive and either non-localizing or used with reduced localization (localization occurred only in the neutral area of the signing space). The signed sentences of two right-handed deaf native signers of each language were pre-recorded and presented to the participants on a laptop computer. The participants were asked to repeat (re-sign) the presented sentences and continue them telling a short story about either first or second character introduced in this sentence. They were free in their choice of referential items and contexts. Their productions were video-recorded by the researcher. The aim of this task was to obtain semi-controlled production data on pronouns/anaphoric expressions and the usage of signing space in localizing the referents. After a short break, participants completed the forced choice task. The same sentences as in the completion task were shown again. However, this time each sentence was followed by a second sentence (continuation, see example 3 and 4). This second continuation began with a spatial pronoun oriented either to the right (ipsilateral) or to the left (contralateral) side of the signing space, following a neutral predicate, i.e. the predicate could potentially refer to one or the other referent. The signers were asked to name the referent of the pronoun, choosing from the two referents introduced in the previous sentence. Their answers were discussed and marked on a forced-choice checklist by the researcher and a deaf assistant. For this study, data from fluent signers of DGS (n: 10, 4 male , 6 female) and TID (n.10, 4 male, 6 female) were collected by the researcher with the help of one deaf assistant for each SL. Each group of

participants contained 5 right-handed and 5 left-handed signers.

(1) TODAY FEMALE$_{\text{SINGNAME}}$ MALE$_{\text{SIGNNAME}}$ CHEEK-KISS...
'*Female-referent* kissed *male-referent* on the cheek today.

(2) NOW MALE$_{\text{SIGNNAME}}$ FEMALE$_{\text{SINGNAME}}$ SEARCH...
'*Male-referent* is looking for *female-referent* at the moment.'

(3) LATER FEMALE$_{\text{SINGNAME}}$ MALE$_{\text{SIGNNAME}}$ MEET. **INDEX$_{\text{R/L}}$** TALK WANT.
'*Female-referent* meets *male-referent* later. She/he wants to talk.'

(4) THIS AFTERNOON MALE$_{\text{SIGNNAME}}$ FEMALE$_{\text{SINGNAME}}$. **INDEX$_{\text{R/L}}$** NOW DANCE.
'*Male-referent* married *Female-referent* this afternoon. She/he is dancing now.'

The completion task data were annotated by a fluent DGS signer for DGS and by the researcher herself with the help of a fluent TID signer for TID. The forced choice data was coded and evaluated (numerically) by the researcher for both SLs. The annotation and coding conventions were developed particularly for the purpose of this study.

Results/Findings: Preliminary findings of the forced choice task reveal that the default pattern for introduction and tracking of discourse referents suggested by Steinbach & Onea (2015) for DGS, is overridden by the preferences of the verb type, which mainly boost second mention interpretations for both DGS and TID in this data. The completion task show that in case of two discourse referents, there is a contrastive localization of these referents which can be generalized in terms of Proximate-Distant divisions in the signing space. Namely more accessible referents (e.g., subjects) are introduced and referred back *closer* and less accessible ones (objects) *further* from the body of the signer. This pattern is more general than the one suggested by Steinbach & Onea (2015), according to which first referent is introduced/and referred back to in the ipsilateral and second in the contralateral part of the signing space. In other words, production data shows that both SLs show identical pattern of (overt) localizations for right and left handed signers, which is crucial for interpretation of ambiguous pronouns.

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