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RESEARCH

Detecting clauses and their dependencies in signed utterances: A syntactico-semantic approach

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Investigating the syntactic structure of utterances with multiple predicates in sign languages requires a clear understanding of how many finite and infinitival clauses they contain and which syntactic dependencies exist between them. Since the sign language literature currently lacks a standardized methodology for identifying clause boundaries, this paper discusses syntactico-semantic diagnostics of clausehood and clause size and analyzes their applicability to American Sign Language (ASL) and German Sign Language (DGS). First, I discuss tests that distinguish coordinated clauses from dependent clause structures; specifically negation, A'-movement, and subject pronoun copy. Limitations of *wh*- and topic fronting as clausehood diagnostics are identified and a modified subject pronoun copy test is proposed. Determining whether a given utterance contains coordinated or dependent clauses is only half the battle, however; we also want to know the approximate "size" of the constituent an embedded predicate projects. The present study takes a first pass at filling this gap by introducing rightward *wh*-movement and confirming center-embedding as diagnostics that can discriminate between finite and infinitival clauses in signed languages. Based on acceptability judgments from 13 native signers of DGS and ASL, I show that *wh*-subjects can move across infinitival control complements and the secondary predicates of resultative constructions, but they cannot cross a finite complement clause. The diagnostic thus provides empirical evidence for the existence of various types of embedded clauses in signed languages that differ in their functional structure.

Keywords: clausehood diagnostics; coordination; subordination; sign language; ASL; DGS

1 Introduction

In signed as well as in spoken languages, an utterance may contain more than one predicate. In such cases, the question arises how much functional structure each predicate projects and what the relationship between the resulting constituents is. Do they form coordinated clauses or is there a stronger syntactic bond such that one predicate is embedded in the clause projected by the other? Clausal subordination as an instance of recursive structure has been shown to exist across many sign languages, which exhibit the gamut of clausal embedding types from complement clauses to adverbial and relative clauses (Liddell 1980; Padden 1983; Tang & Lau 2012; Pfau et al. 2016). Here, I focus on subordinate clauses that saturate an argument of the embedding verb, which typically come in two flavors: finite and infinitival.[1] This distinction is relevant for the investigation of a

[1] More fine-grained distinctions of infinitives have been proposed based on their different syntactic behaviors across Indo-European languages like German, Polish, or Spanish (for an overview, see Sabel 2001; Wurmbrand 2001, and Reis & Sternefeld 2004 for German, Polish, and Spanish, and Rizzi 1982; Cinque 2004 for Italian and Spanish). In brief, while restructuring/coherent infinitives allow long passives and scrambling into the matrix clause, non-restructuring/incoherent infinitives tend to extrapose obligatorily and do not allow long-distance scrambling or passives. Addressing these more fine-grained distinctions in a

wide variety of syntactic phenomena ranging from control and raising verbs to the syntax of serial verb constructions or resultatives. The main goal of this paper is to review, modify and add to the linguistic toolbox currently at our disposal for distinguishing between coordinate and subordinate clauses on the one hand, and finite vs. infinitival complement clauses on the other.

In signed languages, carving up the sign stream into discrete clauses is complicated by several factors: On the one hand, morphosyntactic devices such as complementizers and conjunctions that mark clause boundaries are optional (Tang & Lau 2012). On the other hand, prototypically nominal signs can take on predicative functions in many sign languages: A pointing sign, for example, may establish a referent in the signing space in determiner-like fashion, or it can predicate a particular location of said referent. Add to that the availability of *pro*-drop for arguments that have previously been established in the discourse, and a signed utterance such as (1) from German Sign Language (DGS) can potentially contain as many as three clauses (a) or as few as one (b) (potential clause boundaries are marked by the symbol |).[2]

(1) *DGS*

FRAU (IX-rt) | TELLER (IX-fr) | LECK-teller
woman she plate it lick-plate

a. 'A woman is there. A plate is there. (She) licks the plate.'
b. 'The woman licked the plate.'

Prosody can assist in determining clause boundaries, but since syntax and prosody are not isomorphous systems (for spoken languages, see e.g. Truckenbrodt 2012; for signed languages Sandler & Lillo-Martin 2006; Sandler 2010) and the clause is a syntactic category, the role of prosody in clause detection should only be supplemental. Prosodic markers in visual-manual languages include such manual cues as sign lengthening, holds, and pauses during sign transitions, as well as non-manual markers such as eye blinks, changes in facial expression, and head and torso movements (Crasborn 2007; Brentari et al. 2015). While these cues co-occur reliably with prosodic boundaries, sign languages vary in the combinations of prosodic markers present at the end of intonational phrases. Importantly, however, no single prosodic cue or cluster thereof has been identified in any given sign language to mark all and only sentential or clause boundaries.[3]

In light of these facts, this paper takes a syntactico-semantic approach to detecting signed clauses. The two clausal distinctions investigated here are (i) coordination vs. subordination and (ii) finite vs. infinitival subordinate clauses. In the first part of the paper, I review existing syntactic and semantic diagnostics for coordination vs. subordination

sign language requires a better understanding of, for example, scrambling and extraposition processes and is therefore beyond the scope of this paper.

[2] Following sign linguistic conventions, signs are represented via small capital letter glosses that represent rough translation equivalents in English (for ASL and sign languages not examined in detail in this paper) or German (for DGS). Information about the non-manual components of an utterance are provided above the manual signs, their scope is indicated by a solid line above the manual utterance. An overview of the notational conventions used here can be found at the end of this paper.

[3] Eye blinks, which frequently coincide with clause boundaries in DGS and American Sign Language (Wilbur 1994; Herrmann 2010), are neither obligatory at the end of a sentence nor restricted to clausal constituents. A signer may combine several sentences under one intonational contour marked by a final blink in fast signing (Wilbur 1999), or they may blink intra-clausally after topics, between a subject and its predicate, or within a DP containing a relative clause (Herrmann 2010). Pauses and holds often accompany the end of a sentence, but they occur infrequently compared to non-manual markers (Hansen & Heßmann 2007 for DGS; Fenlon et al. 2007 for British and Swedish Sign Language). A related cue involves an increase in sign duration at the end of intonational phrases and utterances. Phrase-final lengthening occurs at the end of conjoint and independent clauses, however, the difference between conjunct-final and conjunct-internal signs only surfaces at slower-than-normal signing rates (Grosjean & Lane 1977; Coulter 1993; Wilbur 1999).

in signed languages and suggest modifications where appropriate. In the second part, I propose rightward *wh*-movement as a new clause "size" diagnostic that distinguishes between two types of clausal complements.

The existence of coordinate and subordinate clauses is well-established across many sign languages (Liddell 1980; Padden 1983; Davidson 2013 for ASL; Tang & Lau 2012 for Hong Kong SL; Pfau et al. 2016 for Turkish SL, Italian SL, Catalan SL, and Sign Language of the Netherlands), and various diagnostics to distinguish them have been proposed (for an overview, see Tang & Lau 2012). The present paper takes another look at the range of application of some of these diagnostics and amends them where advisable. In contrast, the sign linguistics literature currently lacks comprehensive analyses or even an inventory of infinitival clauses, let alone diagnostics that distinguish them from finite CPs (but see Geraci & Aristodemo 2016 on center-embedding as a diagnostic for non-sentential complementation in Italian SL (LIS)). The present paper starts to fill this gap by proposing rightward *wh*-movement as a diagnostic that can distinguish infinitival control complements from finite sentential complements in two sign languages. I present data from an empirical study on DGS and American Sign Language (ASL) showing that final *wh*-subjects can follow object control and result clauses but not finite embedded clauses. Resultatives form an interesting testing ground for the diagnostic since they contain two predicates but are typically analyzed as monoclausal (containing fewer than two finite clauses). Additionally, I show that the availability of center-embedding also distinguishes between finite and infinitival complements in DGS.

The research presented in this paper focuses on clause boundaries in two sign languages, ASL and DGS. The underlying assumption is that, while the diagnostics discussed here rely on language-specific syntactic phenomena, these phenomena are shared by a number of signed languages and can be applied with modifications to several (though by no means all) of them. Some of these modifications are discussed in the text. ASL and DGS in particular were chosen as representatives of the two basic word orders most frequently attested in signed languages, SVO and SOV. ASL is underlyingly SVO, whereas DGS sentences follow SOV order (Fischer 1975; Liddell 1980; Padden 1983; Glück & Pfau 1997; Happ & Vorköper 2006).

The paper is structured as follows. Section 2 reviews existing syntactic and semantic diagnostics that discriminate between coordination and subordination in signed languages, while Sections 3 and 4 discuss the diagnostic potential of passives, A'-movement, center-embedding, and rightward *wh*-movement for detecting the presence of functional projections in an embedded clause. Section 5 concludes the paper.

2 Distinguishing coordination from subordination

In order to discuss diagnostics that detect the number and size of clauses contained in a signed utterance, we first need a working definition of the object of study. Syntactically, a clause minimally contains a (typically verbal) predicate and all of its arguments and modifiers. This definition closely reflects the semantics of clauses, which denote a proposition that can be assigned a truth value; clauses express "a complete thought" (Kroeger 2005: 52). Hodge (2013) argues that not every signed utterance can gainfully be analyzed in terms of its clausal structure, given the frequency of non-linguistic enactments (constructed action) in signed narratives. However, while most signed languages documented so far make use of constructed action and dialogue, they also exhibit more conventionalized clausal structure. Evidence for functional projections in signed clauses has been gathered in the analysis of such diverse phenomena as *wh*-movement (requires a CP, e.g. Petronio & Lillo-Martin 1997; Neidle et al. 2000), topicalization (TopP, e.g. Liddell 1980; Neidle et al. 2000; CP in Wilbur & Patschke 1999), and point-of-view operators

introducing role shift (Speech Act Phrase, e.g. Lillo-Martin 1995; Quer 2005). Importantly for the present discussion, there is evidence of both clause linkage and subordination in sign languages (Liddell 1980; Padden 1983; Glück & Pfau 1997; Tang & Lau 2012; Pfau et al. 2016); hence a distinction between independent and subordinate clauses is warranted.

The goal of this section is to review one semantic and two syntactic diagnostics that distinguish coordination from both embedded structures and single clauses and that have been applied successfully to signed languages (Liddell 1980; Padden 1983; Tang & Lau 2012). The semantic scope of negation is discussed first, followed by A'-movement and subject pronoun copy, which rely solely on syntactic principles. The three diagnostics uniquely identify coordinate structures as follows. Only over conjoined clauses does a non-manual negation marker such as a headshake have to be interpreted as negating the clause (subordinate clauses accompanied by a headshake need not be negated). Further, conjoined clauses containing an NPI also need to contain its licensor. A'-movement out of a coordinate clause is not acceptable, and subject pronoun copies cannot be co-referential with the subject of the first conjunct. In addition to describing how these diagnostics work, I identify limitations of the A'-movement test, and provide new data for a modified version of the subject pronoun copy test.

2.1 Negation

The semantic scope of a negative operator identifies coordinated clauses by virtue of the fact that the negator necessarily scopes over each conjunct individually. Assuming that the semantics of negation behaves similarly cross-linguistically, I will illustrate the relevant facts for English. Sentence (2a) is only true in situations where Mary ate rice, because the negator in the first conjunct does not have scope over the second conjunct. Sentences containing a negator and a subordinate clause (2b) or a small clause such as the resultative in (2c), on the other hand, are true as long as either predicate is negated. One way to tell whether a signed utterance with two predicates consists of coordinate clauses is thus to insert a negator and check whether only one conjunct is negated. If both predicates are negated, the utterance contains some level of embedding.

(2) a. John didn't eat pasta and Mary ate rice.
¬ (eat'(j, p)) ∧ eat'(m, r)

b. John doesn't think that Mary ate anything.
i. ¬ (think'(j, eat'(m, a)))
ii. think'(j, ¬ (eat'(m, a)))

c. John didn't lick the plate clean.
¬ (lick'(j, p) ∧ clean'(p))

The scope of manual negation signs has not been explored as a clausehood diagnostic in many signed languages, where the focus has been more on non-manual markers of negation. Nonetheless, Tang & Lau (2012) report for Hong Kong Sign Language (HKSL) that the negative sign NOT-HAVE may take scope over both conjuncts of a coordinate structure (3) and therefore cannot distinguish coordination from subordination. As a reviewer points out, this may be due to the status of NOT-HAVE as a sentential negator akin to English *It is not the case that*, which can scope over conjoined clauses in English.

(3) *HKSL* (Tang & Lau 2012: 348)
TEACHER PLAY SPEEDBOAT EAT COW^CL:cut_with_fork_and_knife NOT-HAVE
'The teacher did not ride the speedboat and did not eat beef steak.'

My data suggest that manual negation does not distinguish coordination from subordination in DGS either.[4] DGS has an optional negation particle NICHT which occurs clause-finally and is accompanied by a headshake and other non-manual negation markers (Pfau 2001). In a coordinated structure such as (4a), NICHT takes scope only over the conjunct immediately preceding it. While there is no manual coordinator, contrastive body leans to the left and right accompanying each conjunct overtly mark conjunction in (4a). The same scopal behavior holds of the subordinate structure in (4b), where NICHT only takes scope over the clause immediately preceding it and cannot scope over the matrix clause.

(4) *DGS*

bl-lf bl-rt
hs
a. JUNGE IX-lf SPIEL, MÄDCHEN IX-rt WEIN NICHT
boy he play girl she cry not
1. 'The boy was playing and the girl was not crying.'
2. #'The boy was not playing and the girl was not crying.'

hs
b. IX-1 STOLZ JUNGE SPIEL NICHT
I proud boy play not
1. 'I am proud that the boy is not playing.'
2. #'I am not proud that the boy is playing.'

Negation was first used to test for coordinate structures in ASL by Padden (1983) and has since been replicated for other signed languages (e.g. Göksel & Kelepir 2016 for Turkish Sign Language (TİD)). Rather than look at manual negation signs, which are optional in several sign languages (Zeshan 2006), Padden focused on the interaction between semantic scope and the spread of non-manual negation markers clustered around the negative headshake in ASL. Her data in (5) show that if there are two clauses *x* and *y*, and *x* is negated with a headshake, the negation non-manual will spread over clause *y* only if *y* is embedded under *x* (5a). In this case, *y* is not negated. If *x* and *y* are coordinated, on the other hand, a negative headshake over *y* entails the negation of this clause (5b).

(5) *ASL* (adapted from Padden 1983: 74)

neg
a. [IX-1 WANT [IX-i GO-AWAY]$_y$]$_x$
1. 'I didn't want him to leave.'
2. #'I didn't want him not to leave.'

hs hn
b. [IX-i SEE]$_x$, [IX-j UNDERSTAND]$_y$
'He didn't see but she understood.'

In addition to the scope of manual and non-manual negators, NPI licensing should be mentioned here as an additional diagnostic relying on negation. As observed in Schlenker (2017b), ASL ANY behaves like an NPI in that it only occurs in downward-entailing contexts such as (6a) but is unacceptable without a licensor, as illustrated in (6b).[5]

[4] The sentences in (4) and their possible interpretations were elicited from one near-native signer (exposed to DGS by age three) and confirmed by two further native signers. All three signers agree on the possible interpretations of (4).

[5] Each example in Schlenker (2017b) is prefaced with its acceptability rating. Schlenker uses a 7-point acceptability scale where 7 = fully acceptable.

(6) *ASL* (Schlenker 2017b: 4)
IX-a JOHN OFTEN MEET-MEET [INJURED PEOPLE]-b,
'John often meets injured people,
a. 6 BUT IX-a NEVER SHOW-b ANY HEART-SOFT
'but he never shows them any kindness.'
b. 2.7 IX-a OFTEN SHOW-b ANY HEART-SOFT
'and he often shows them kindness.'

For NEVER to act as licensor, it needs to establish a grammatical dependency to ANY. Schlenker notes that this dependency can hold within a clause or between a matrix and an embedded clause (7a), but it cannot cross independent clause boundaries such as are introduced by quotation (7b), or, presumably, coordination. Fleckenstein & Yuwon (to appear) use this diagnostic to establish the syntactic scope of negation in ASL, but it may serve more generally as a diagnostic for coordination.

(7) *ASL* (Schlenker 2017b: 5)
a. 5.3 IX-a JOHN OFTEN MEET-MEET [INJURED PRISONER PRISONER]-b, BUT IX-a NEVER SAY IX-a SHOW-b ANY HEART-SOFT
'John often meets injured prisoners, but he never says he shows them any kindness.'
b. 2.7 IX-a JOHN OFTEN MEET-MEET [INJURED PEOPLE]-b, BUT IX-a NEVER SAY
$\underline{\qquad\qquad\qquad\qquad\qquad\qquad RS_a}$
IX-1 SHOW-b ANY HEART-SOFT
'John often meets injured people, but he never says to them: 'I show (you) (my) kindness.''

In summary, the scope of manual negators could not be shown to distinguish between coordination and subordination in at least HKSL and DGS. Non-manual negators and NPI licensing, on the other hand, can help detect whether two predicates project coordinated or juxtaposed clauses in ASL, or whether syntactic dependencies exist between their projections.

2.2 Limitations of A'- movement as a diagnostic: Wh-movement and topicalization

Restrictions on syntactic movement of arguments to non-argument positions in the functional periphery of a clause are frequently cited as indicators of clause boundaries in spoken and signed languages. Ross's (1967) Coordinate Structure Constraint first captured the observation that *wh*-words (8a) and topics (8b) can move out of some complement clauses in English, but they cannot be fronted from a conjunct (8c and d).

(8) a. What$_i$ did you say John bought t_i?
b. His mom$_i$ he decided to take t_i out for dinner, but his sister had to stay behind.
c. *What$_i$ did John eat an apple and Jim drink t_i?
d. *His mom$_i$ John hit his sister and she told t_i.

Padden (1983) and Lillo-Martin (1992) show that Ross' island constraints hold in ASL as well. MOTHER in (9a) cannot be topicalized out of the conjunct translated as 'he told his mother', nor can it topicalize out of a *wh*-island (9b).

(9) *ASL* (Padden 1983: 77 (a); Lillo-Martin 1992: 261 (b))
a. $\underline{\qquad\text{top}}$
*MOTHER, 1-HIT-i SISTER, IX-j TATTLE-k
intended: 'His mother, I hit my sister and he told.'

top
b. *MOTHER$_i$-a, IX-1 DON'T-KNOW WHAT$_j$ t_i LIKE t_j
intended: 'Mother$_i$, I don't know what t_i likes.'

However, several factors conspire to reduce the range of applications of this clausehood diagnostic. Koulidobrova (2017) observes that in the absence of locus assignment to MOTHER, sentences like (9b) are acceptable. She argues that rather than movement, such sentences involve bare NP ellipsis under identity with the antecedent topic (here, MOTHER). If her account is on the right track, we would not expect to be able to detect clauses via their island properties in ASL, since the relevant phenomena involve ellipsis rather than movement. If we adopt a movement analysis, the following problems remain. Lillo-Martin (1986; 1991; 1992) notes that ASL provides an escape hatch to avoid the island violations triggered by A'-movement. Topics may be base-generated in the functional periphery of the matrix clause as long as an overt or a null resumptive pronoun remains *in situ*. Null pronouns of type *pro* are licensed by agreement marking on the verb of each conjunct. While the syntactic status of agreement in signed languages is currently under debate (see Lillo-Martin & Meier 2011 for arguments in favor of a syntactic analysis; Liddell 1995; 2000 and Schembri et al. 2018 for arguments against treating directionality in verbs as agreement), researchers agree that verbs can index their arguments via modifying their initial, final, or overall location to coincide with the location assigned to said arguments (their referential loci). Sentence (10a), for example, differs minimally from (9a) in that the verb TATTLE shows agreement with its object MOTHER. MOTHER is established at location a in the signing space via the pointing sign IX-a, and the articulation of TATTLE-a moves towards that location. The presence of a null resumptive pronoun *pro* renders (10a) acceptable, since MOTHER IX-a can be base-generated in the specifier of TopP and does not have to move there. Lillo-Martin (1992) shows that the same facts hold for *wh*-words; WHO in (10b) is associated with location b through the resumptive pronoun IX-b in the first conjunct, and since the verb of the second conjunct, c-HATE-b, agrees with WHO, no overt resumptive pronoun needs to be present in the second conjunct in order to license a base-generated WHO.[6]

(10) *ASL* (adapted from Lillo-Martin 1992: 261)
top
a. MOTHER$_i$ IX-a, 1-HIT-i SISTER, IX-i TATTLE-a *pro*$_i$
(As for) Mom$_i$, I hit my sister$_j$ and she$_j$ told her$_i$.'
b. wh
WHO MARY-a LIKE IX-b (BUT) JOHN-c c-HATE-b (IX-b)
'Who$_i$ does Mary like him$_i$ but John hate (him$_i$)?'

Given their status as definites (Liddell 1980), topical referents are typically assigned a referential locus (Engberg-Pedersen 1993; Sze 2008), which increases the likelihood of a predicate agreeing with that locus. In fact, my consultants considered it unnatural for a predicate not to show agreement with a topicalized constituent. Hence, unless the utterances under investigation contain verbs that are categorized as "plain" in the sign literature (Padden 1983) because they cannot modify their location to index a referent,[7] it is impossible to create a context where an element has to move in order to surface in the

[6] Given that the null pronoun in the second conjunct of (10b) is referentially identical to the overt resumptive pronoun of the first conjunct, there is a chance that the acceptability of the sentence results from gapping rather than the presence of a null resumptive pronoun.

[7] An example of a plain verb is EAT in (17b): Since the form of the verb cannot index its object, no resumptive pronoun is licensed and therefore, MOTHER could not be base-generated in the specifier of a topic phrase.

periphery of the matrix clause. Since it is this ability to move that would identify the presence of a coordinate clause in ASL, A'-movement can only serve as a clausehood diagnostic when at least one of the conjoined clauses is headed by a plain verb.

Göksel & Kelepir (2016) propose a modification of the diagnostic that does not require overt syntactic movement but relies on covert movement at LF instead. For languages without *wh*-movement such as Turkish SL (TİD), sentences with *wh*-words in embedded clauses are interpreted as questions, suggesting that the interrogative scopes over the matrix clause. A question interpretation is presumably not available for coordinated structures in which only one conjunct contains an interrogative. This modified variant of the diagnostic is applicable for ASL but not for DGS, which seems to prefer *wh*-movement over *wh-in situ* (Grin 2014).

2.3 Subject pronoun copy: New data and a modification

Subject pronoun copy is likely the most frequently cited clausehood diagnostic in the sign language literature. Liddell (1980) first observed that a pronominal point in utterance-final position in ASL can refer back to the sentential subject, whether that subject is expressed overtly or not. Such pronoun copies are frequently accompanied by a head nod and are not separated with a pause from the rest of the utterance. Padden (1983) noted syntactic constraints on the co-reference potential of final pronoun copies that can be exploited for identifying coordinate clauses. As illustrated in (11a), a pronominal copy may be co-referential with the subject of a simple clause such as IX-rt WOMAN 'the woman'. Padden claims that such a co-reference relation can be established when a dependent clause intervenes between subject and copy, as is the case in (11b). Crucially, however, a pronoun copy cannot refer back to the subject of the first conjunct in a coordinated structure: The final index sign in the ungrammatical (11c) shares the referential locus 'i' with IX-i 'he', the subject of the first conjoined clause. According to Petronio (1993), the final pronoun copy right-adjoins to the matrix C and m-commands a co-referential subject. In her analysis, the subject has moved to a focus position in the specifier of CP and therefore, the relevant syntactic notion is m- rather than c-command (where a head m-commands all the phrasal constituents of its maximal projection rather than of its sister). In a coordinated structure, the final copy can only search for a co-referential subject inside its own CP, the second conjunct. Since the relevant co-referential subject is located in the CP of the first conjunct, the copy does not m-command it, resulting in ungrammaticality.

(11) *ASL* (Padden 1983: 73–74)

a. **IX-rt WOMAN** IX-rt READ SOMETHING **IX-rt**
'The woman is reading something.'

b. **IX-1** DECIDE [IX-i SHOULD i-DRIVE-j SEE CHILDREN] **IX-1**
'I decided he ought to drive over to see his children, I did.'

c. *__IX-i__ i-SIT, IX-j j-STAND, __IX-i__
'He sat there and she stood there, he did.'

Subject pronoun copies have also been observed in a number of other signed languages. For all of them, the literature agrees on the acceptability of simple clauses with pronoun copies like (11a) and on the fact that such copies in coordinate structures like (11c) are not accepted. However, signed languages seem to vary systematically when it comes to the acceptability of pronoun copies in sentences containing embedded clauses. Languages like ASL allow pronominal subject copies following all types of complement clauses, while Sign Language of the Netherlands (NGT) does not allow final pronouns to refer back across any kind of subordinate clause (van Gijn 2004). Note that in NGT, pronominal

copies have been argued to pick up topics rather than subjects (Crasborn et al. 2009; Sze 2012 also offers a topic-based analysis for pronoun copies in HKSL). For a third class of signed languages, the size of the embedded clause seems to matter. Göksel & Kelepir (2016) have recently shown that final pronoun copies are only acceptable following complements of WANT-type verbs but not of KNOW-type verbs in TİD. Only WANT-type verbs allow center-embedding of their complements, a property that Geraci & Aristodemo (2016) have linked to taking an infinitival complement in SOV languages like TİD and LIS. It thus stands to reason that languages like TİD disallow final pronoun copies following full sentential complements, but that such pronouns can refer back to the matrix subject if an infinitival complement clause intervenes. The examples in (12) summarize the typological possibilities for pronoun copies following dependent clauses. In conjunction with (11b), (12a) shows that ASL allows subject pronoun copies with full and infinitival complement clauses; (12b) and (12c) illustrate that NGT does not allow subject pronoun copy with any type of subordinate structure; and (12d) and (12e) show that in TİD final pronoun copies are accepted with complements of WANT but not of KNOW.

(12) *ASL* (Padden 1983: 73)
a. **1**-FORCE-i MAN i-GIVE-j BOY j-POSS BOOK **IX-1**
'I forced the man to give the boy his book, I did.'

NGT (van Gijn 2004: 92, 94)
b. *__MARIJKE IX-rt__ KNOW INGE IX-lf lf-COME-1 __IX-rt__
intended: 'Marijke knows that Inge comes to me.'

c. *__IX-lf__ WANT HOUSE GO-TO __IX-lf__
intended: 'He wants to go home.'

TİD (Göksel & Kelepir 2016: 73)
d. *?__ALI-k IX-k__ IX-1 UNIVERSITY WORK KNOW __IX-k__
intended: 'Ali knows that I am working at the university.'

e. __ALI-k__ IX-1 UNIVERSITY WORK WANT __IX-k__
'Ali wants me to work at the university.'

Based on a different set of facts, subject pronoun copy may serve as a clause-size diagnostic in Brazilian SL (Libras). According to Quadros (1999), doubled elements including pronoun copies sit in a functional projection that intervenes between the IP/TP and the CP. Both main and embedded clauses have such a focus head, resulting in the possibility of two doubled elements per sentence: one inside the embedded clause and one in the matrix clause (13). Thus one can gauge the amount of functional structure of the embedded clause by checking if it can host a doubled element – if it cannot, it does not project a full CP layer.

(13) *Libras* (Quadros 1999: 227)
hn hn
IX-1 WOULD-LIKE PAY HOUSE PAY WOULD-LIKE
'I would like to pay for the house.'

Recognizing that restrictions on subject pronoun copy are language-specific has important repercussions for the range of applications of the diagnostic. While the phenomenon can only distinguish between coordinate clauses and a higher degree of syntactic integration in languages like ASL, it can detect the number of clauses in a signed utterance in NGT, where only simple clauses without embedded infinitival or full clauses allow the addition of subject pronoun copies. In languages like TİD, utterance-final pronouns can identify

whether a particular constituent forms a full clause or shows a higher degree of syntactic integration with the matrix clause, as control and raising constructions do.

Since claims about the diagnostic potential of subject pronoun copies in ASL rest primarily on the native intuitions of a small number of linguists (but see Lillo-Martin 1998 for a small empirical dataset), in this paper I provide additional acceptability judgments from seven native signers of ASL on a modification of the test. Instead of presenting subject pronoun copies in declarative sentences, I propose embedding them in polar questions. In her typological overview of interrogative constructions in signed languages, Zeshan (2004) points out that final pronoun copies typically accompany yes/no questions. This observation is bolstered by Petronio (1993), who notes that, in ASL, doubling constructions including pronoun copy are common in polar questions. Framing the diagnostic as a polar question has the advantage of not requiring a particularly emphatic context for the utterance.[8] During informal elicitation, some of my ASL consultants initially rejected subject pronoun copies in simple declarative clauses even when provided with a context that invited emphasis on the subject. Embedding final pronominal points in a polar question improved their overall acceptability in simple clauses for at least two signers. A further advantage of this modified diagnostic is that it provides an additional prosodic cue for clause boundaries. The entire polar question, including the final point, is marked by the non-manual feature brow raise, suggesting that the utterance in question forms at least an intonational phrase.

As part of a larger study on the syntax of resultative constructions, seven ASL signers provided acceptability judgments on a 5-point Likert scale (5 = completely natural ASL) for the sentences in (14). The mean acceptability ratings for each simple, subordinate, and coordinate structure with a subject pronoun copy are provided next to each sentence. A Student's t-test confirms that simple clauses with a final subject pronoun copy receive similarly high acceptability ratings as sentences containing an embedded clause ($t(13) = 1.06$, $p > 0.05$). Ratings for the pronoun copy following a conjoint clause in (14), on the other hand, were significantly lower than those for any of the simple or embedded clauses (e:a $t(6) = 5.16$, $p < 0.05$; e:b $t(6) = 3.58$, $p < 0.05$; e:c $t(6) = 1.98$, $p < 0.05$; e:d $t(6) = 3.95$, $p < 0.05$). These data confirm the diagnostic potential of the subject pronoun copy test in polar interrogatives.

(14) *Simple clauses*

a. **Context**:[9] Mary just met Mike, who looks to be about 50 years old. As they're talking, Mike mentions that he is going to Law School. Given Mike's age, Mary is surprised and asks:

y/n
4.86 IX-2 STUDENT IX-2
'You're a student?'

b. **Context**: Mary just found out that John beat up Mike. She is surprised because John does not usually get mad and Mike is a strong guy. Mary double-checks with John:

y/n
4.57 IX-2 BEAT-UP MIKE IX-2
'You beat up Mike?'

[8] Padden (1983: 71) observes that subject pronouns are copied in declaratives for emphatic or confirmation purposes.

[9] All contexts were presented in ASL.

Subordination

c. **Context**: Mike has heard a rumor that Mary forced John to eat a worm. John is a bully, so the next time Mike runs into Mary, he asks her:

y/n

3.86 IX2 FORCE JOHN EAT WORM IX-2

'Did you force John to eat a worm?'

d. **Context**: Mike is not very popular. His friend John wants to help him by spreading a rumor that Mike kissed Mary, a very popular girl. After school, Mary's boyfriend walks up to John angrily and asks:

y/n

4.79 IX-2 TELL-pl PEOPLE MIKE KISS MARY IX-2

'Did you tell everyone that Mike kissed Mary?'

Coordination

e. **Context**: Mary is mad at John because he gave her money for her birthday instead of something special. Mike, for example, gave her flowers. Mary confronts John:

y/n

bl-rt bl-lf bl-rt

2.0 IX-2 GIVE-1 MONEY, lf-GIVE-1 FLOWER IX-2

'Did you give me money and he gave me flowers?'[10]

Two final notes on applying the diagnostic may be useful. First, it is important to keep in mind that the various subject-like referents in the utterance under investigation cannot be identical if the diagnostic is to offer any syntactic insights. The acceptability of the hypothetical DGS example (15) does not allow the conclusion that the utterance contains a subordinate rather than two coordinate clauses. Both predicates have a first person subject, so the final pronoun copy can m-command a co-referential subject in the second clause. It does not need to look any further for a subject in the first clause to m-command, hence there is no way to ascertain whether this type of government is possible.

(15) *DGS*

a. **IX-1** COLA TRINK DANN RÜLPS **IX-1**
I coke drink then burp I
'I drank a coke and then burped, I did.'

A second related caveat concerns marginally acceptable cases of pronoun copies that nonetheless indicate a coordinate structure. In (16), the intended subject of WACH-lf 'awake' is the man, as indicated by both the extra-linguistic context (the action sequence was presented on video) and the indexing -lf on the verb. Nonetheless, the only available interpretation for this utterance is that the woman woke up.

(16) *DGS*

IX-rt FRAU MANN IX-lf SCHÜTTEL-lf WACH-lf **IX-rt**
the woman man him shake-him awake-him she
#'The woman shook the man awake, she did.'
?'The woman shook the man. She woke up.'

[10] As a reviewer points out, this sentence could have received low acceptability ratings for independent reasons: ASL may not allow single polar questions formed from conjoined clauses, or it may be infelicitous to use a polar question in a non-information-seeking context. Nonetheless, we know that the declarative version of the sentence is judged unacceptable in Padden (1983: 72), suggesting that at least some of the low ratings for this sentence can be attributed to the presence of the pronoun copy.

This strongly suggests that the clauses containing SHAKE and AWAKE are at best coordinated, since the final pronoun cannot look outside of the clause containing AWAKE for a co-referential subject. In order to salvage the utterance, the phonologically null subject of AWAKE is interpreted as co-referential with IX-rt, namely the woman. In summary, it is important to ascertain that the final pronoun is not co-referential with the subject of the clause immediately preceding this pronoun.

To summarize, we can spot coordination in signed utterances using negation as well as the subject pronoun copy test, while A'-movement has more limited applicability. It was shown that the scope of manual negators in two typologically different sign languages, DGS and HKSL, cannot distinguish coordination from clausal embedding. Data from ASL suggests, however, that in addition to non-manual negation, manual negators may be used as a coordination test in conjunction with NPI licensing. Further, the utility of the subject pronoun diagnostic was examined for different sign languages. The test distinguishes between coordination and subordination in ASL, while it provides information about the presence of any embedded clause in NGT and can gauge the size of an embedded clause in TİD and Libras. Further, a modified subject pronoun copy test was introduced. I proposed embedding the relevant structure in a polar question, which removes the need for emphatic contexts and adds a prosodic non-manual cue for clause boundaries. Lastly, limitations on topicalization and *wh*-movement as clausehood diagnostics were identified; coordinate clauses can only be detected as islands for movement when they are headed by a verb that does not mark agreement.

3 Determining clause size: A closer look at clausal complementation

Showing that a clause is embedded in another clause rather than coordinated with it is only the first step in determining the level of syntactic integration of a (signed) utterance. In describing the syntax of clausal complementation, we would also like to be able to distinguish between finite and infinitival complements. Geraci et al. (2008) show that LIS has both full sentential complements and control and raising constructions that differ from each other in syntactic behavior. Likewise, Göksel & Kelepir (2016) report a difference in the syntactic behavior of complements of WANT-type verbs versus KNOW-type verbs in TİD that may correspond to the finite-infinitival clause distinction.

This paper takes a first pass at testing the syntactic status of an embedded clause in ASL and DGS by introducing two diagnostics that discriminate between finite and infinitival clauses. First, the diagnostic potential of center-embedding complement clauses, which has also been described for LIS and TİD, is shown to extend to DGS. Second, I show that rightward *wh*-movement is only possible over infinitival clauses and can therefore distinguish finite from infinitival complements. As rightward movement results in center-embedding at the CP level, this second diagnostic allows applying the center-embedding diagnostic to SVO languages.

Since most sign languages, including DGS and ASL, do not have morphological tense,[11] the distinction assumed here relies on the presence/absence of an independent subject in the embedded clause (see Geraci et al. 2008 and Geraci & Aristodemo 2016 for similar proposals for LIS). The connection between overt subjects and finite T and dependent subjects and infinitival T has been formalized in the literature as matching valued and unvalued features for case and agreement on DPs and T (e.g. Chomsky 2001). Cross-linguistically, subjects of finite clauses tend to be overt and subjects of non-finite clauses

[11] But note that Zucchi (2009) argues for the existence of grammatical tense in LIS. In his account, the non-manual marker backwards shoulder lean marks past tense on verbs, while the forward shoulder lean indicates future tense.

tend to be covert.[12] In this paper, we will look at two types of clauses that contain an anaphoric PRO subject controlled by an argument of the matrix clause: Object control complements and result XPs in resultative constructions.

In this section, I first consider A- and A'-movement as potential clause size diagnostics and explain why they have limited applicability or fail. I then show that center-embedding distinguishes between finite and infinitival clauses in DGS. The discussion of rightward *wh*-movement as a finiteness diagnostic presents the main contribution of this paper and will be discussed in Section 4.

3.1 A-Movement: Passives

Movement to argument positions such as passivization and raising is frequently used in spoken languages to test the monoclausal status of a construction. The rationale is that raising to object and subsequent promotion to subjecthood are possible from a small clause into its matrix clause but not from a finite subordinate clause, whose arguments cannot move into the matrix subject position due to locality constraints on passivization. However, passivization tests are of limited use in sign language linguistics due to the lack of a clearly identified passive construction.

Agent-backgrounding strategies have been described for various sign languages (Padden 1983; Barberà & Hofherr Cabredo 2017), but their status as syntactic passives has not been established. In both ASL and DGS, a perspective shift from agent to patient can be achieved by the signer role-shifting into the patient's perspective through changes in posture and facial expression. Role shift is a grammatical phenomenon in sign languages that allows signers to present information from the perspective of one character (Lillo-Martin 2012). Figure 1 illustrates such a perspective shift: After introducing the patient via the lexical sign WOMAN, the signer breaks eye contact with the addressee and adopts the facial expression, torso and head movement of a woman vainly looking at herself in the mirror.

Role shift with eyegaze shift away from the addressee has been argued to resemble passivization in that it semantically demotes the agent (Kegl 1990; Janzen et al. 2001; Hansen 2007). However, Barberà & Hofherr Cabredo (2017) point out that perspective shift may involve either the patient argument of a transitive verb or the subject of a passive. Since

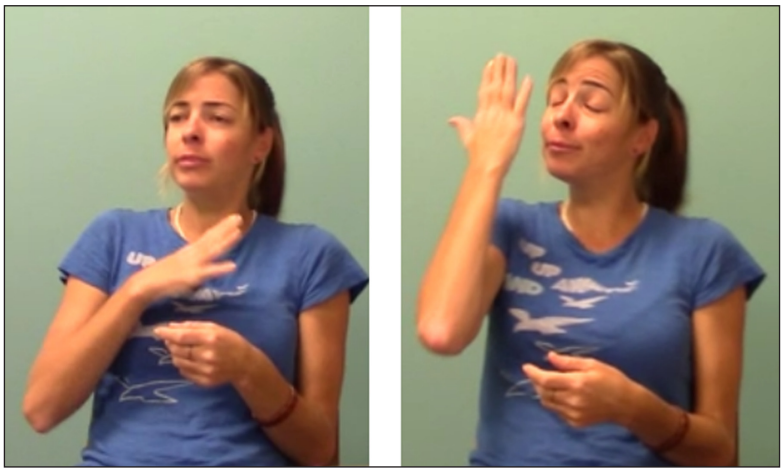

Figure 1: Illustration of role shift in ASL. On the left, the signer produces the lexical sign WOMAN while maintaining eye contact with her addressee. On the right, she role-shifts into the woman's character by assuming her eye gaze, torso and head position, as well as her facial expression.

[12] For a different proposal that links the presence of an overt subject to the level of dependency of an embedded clause (temporal and/or modal) rather than finiteness, see McFadden & Sundaresan (2011).

the direct object of transitives can also become the center of perspective, such role shift cannot serve as a passive marker, which leads the authors to conclude that perspective shift is not a syntactic object promotion strategy. Since syntactic object promotion is crucial to the use of passivization as a clause size diagnostic, the agent backgrounding strategies described for signed languages so far cannot serve a diagnostic purpose.

3.2 A'-Movement, take two

It has been claimed that in ASL and DGS, not only coordinate clauses but all clauses function as islands for A'-movement (Lillo-Martin 1986; 1991; 1992; Glück & Pfau 1997).[13] Lillo-Martin (1992) shows that a DP like THAT COOKIE in (17a) cannot be topicalized out of a subordinate clause; Glück & Pfau (1997) argue that similar extraction facts hold for DGS (17b). Since movement cannot cross a clause in this analysis, A'-extraction in theory provides a good clause-size diagnostic for embedded clauses. Take the resultative construction in (17c): Since the object B-A-R-T can be topicalized, the secondary predicate WAKE-UP does not project a full subordinate clause.

(17) *ASL* (Lillo-Martin 1992: 263)

top

a. *THAT-a COOKIE$_i$-a, SISTER-b b-PERSUADE-c MOTHER-c EAT t_i
intended: 'That cookie, my sister persuaded my mother to eat (it).'

DGS (Glück & Pfau 1997: 200)

top

b. *BUCH-DA$_1$, KIND DENKEN, MANN *pro*$_1$ KAUFEN
book-there child think man buy
intended: '(As for) the book$_i$, the child thinks the man is buying it$_i$.'

DGS

top

c. B-A-R-T$_i$ IX-lf, H-O-M-E-R-rt rt-SCHÜTTEL-lf t_i AUFWACH
Bart he Homer he-shake-he wake.up
'Bart, Homer shook awake.'

However, the same caveats that were described in Section 2.3 apply. In both ASL and DGS, movement out of an embedded clause may be circumvented by a null resumptive pronoun licensed by agreement on the embedded verb (18). A'-movement can thus only serve as a diagnostic of clause size when the embedded predicate is a plain verb.

(18) *ASL* (Lillo-Martin 1991: 56)

top

a. $_a$THAT $_a$MAN, STEVE SAY $_c$JULIE FINISH $_c$GIVE$_a$ $_a$*pro* BOOK
'That man$_i$, Steve said Julie already gave a book to (him$_i$).'

DGS (Glück & Pfau 1997: 200)

top

b. FRAU-DA$_2$, KIND DENKEN, MANN-DA$_1$ *pro*$_2$ BUCH $_1$ZEIGEN$_2$
woman-there child think man-there pro book show
'To this woman, the child thinks, the man is showing the book.'

[13] The discussion in this section only considers topicalization but there are other types of A'-movement whose diagnostic potential should be explored. For instance, ASL allows non-topic object fronting in the presence of an aspectually marked or spatial verb, which has been analyzed as raising to the specifier of a functional projection in an articulated CP domain (Braze 2004; Chen Pichler 2010). The availability of object fronting with an embedded aspectual verb could thus provide clues about the amount of functional structure present in an embedded clause.

Even with plain predicates, a second caveat needs to be addressed. Contrary to Lillo-Martin's (1992) findings, subordinate clauses do not form islands for *wh*-movement for all ASL signers (Petronio 1993; Petronio & Lillo-Martin 1997; Schlenker 2017a). My consultants consistently accept fronting of *wh*-words out of finite complements clauses (19a). Note that LOVE is a plain verb that does not license a *pro* resumptive pronoun, confirming that WHAT has truly moved.[14] Similar differences in acceptability arose for topic movement in DGS. My data do not replicate Glück & Pfau's (1997) findings that clauses block DP fronting, as several signers allow topic movement out of full sentential complements (19b).[15] Extraction can thus only be used to identify full subordinate clauses when they contain morphologically plain predicates and after establishing that, in the signers' idiolects, clauses form islands for topic and *wh*-extraction.

(19) *ASL*

a. WHO IX-rt B-I-L-L THINK IX-lf J-O-H-N LOVE t_{WHO}
'Who does Bill think John loves?'

DGS

b. top
KUCHEN$_i$ IX-fr, ICH DENK ICH FERTIG ESS t_i
cake there I think I finish eat
'The cake, I think I've eaten (it).'

3.3 Center-embedding

Center-embedding has been shown to distinguish between finite and infinitival complements in LIS (Geraci et al. 2008; Geraci & Aristodemo 2016) and TİD (Göksel & Kelepir 2016) and I will show here that it has the same diagnostic potential in DGS.

[14] Consider (i) for the complete paradigm of acceptability judgments. Three native signers of ASL judged leftward movement of *wh*-phrases acceptable out of simple clauses (ia), infinitival complements (ib), and finite complements (19a); but they consistently rejected leftward *wh*-movement out of a conjunct in a coordinate structure (ic). Note that neither LOVE nor EAT show agreement.

(i) a. WHO J-O-H-N LOVE t_{WHO}
'Who does John love?'

b. WHAT IX-2 2-FORCE-lf J-O-H-N-lf EAT t_{WHAT} IX-lf
'What did you force John to eat?'

c. *WHO J-O-H-N LOVE t_{WHO}, IX-rt B-I-L-L HATE M-A-R-Y
'Who does John love and Bill hates Mary?'

[15] Keeping in mind Koulidobrova's (2017) analysis of topic movement as bare NP ellipsis for ASL, we might speculate that a similar process accounts for the observed grammaticality of "moved" topics in DGS. Further research is necessary to determine the exact nature of null arguments of plain verbs in DGS. The full paradigm of participant judgments are provided in (ii), collected from five native signers of DGS. For all signers, topicalization from a simple clause (iia) and from infinitival (iib) or finite complement clauses (19b) is acceptable, but they cannot topicalize an argument from a conjoint clause (two participants can do so if they add BETRIFFT 'relating to' after MAMA).

(ii) a. top
KUCHEN$_i$ IX-lf, IX-1 t_i ESS (FERTIG)
cake the I eat finish
'*The cake* I have eaten.'

b. top
KUCHEN$_i$ IX-lf, IX-1 ZWING-2 t_i ESS IX-2
cake the I force-you eat you
'*The cake* I (will) force you to eat.'

c.?? top
MAMA$_i$ IX-lf, IX-1 SCHWESTER HAU, IX-rt DANN CL1:person_walking t_i BESCHEID-lf
mom she I sister hit she then walk_up_to_someone tell-her
intended: 'As for my mom, I hit my sister and she walked up to my mom and told her.'

In SOV languages like Hindi and German, nominal complements precede the verb (20a) while finite clausal complements have to occur in extraposed position to the right of the verb (20d). This deviation from OV word order is often attributed to a trade-off with the increased processing cost associated with computing a syntactically complex center-embedded structure (Hawkins 2004). While full complement clauses are typically banned from the pre-verbal position (20c), center-embedded infinitival clauses such as (20b) are acceptable. According to Büring & Hartmann (1997), finite CPs in German may not be governed by the matrix verb and therefore obligatorily extrapose.

(20) *German* (Bader et al. 2013: 63-65)

a. ... dass Fritz [$_{DP}$ ein Buch] gelesen hat.
that Fritz a.ACC book read has
'…that Fritz read a book.'

b. ... dass Max [$_{TP}$ das Buch zu lesen] versucht hat.
that Max the.ACC book to read tried has
'… that Max tried to read the book.'

c. ?*...dass Peter, [$_{CP}$ dass es wieder regnen wird], behauptet hat.
that Peter that it again rain will claimed has

d. ... dass Peter behauptet hat, dass es wieder regnen wird.
'... that Peter claimed that it will rain again.'

The same distribution of finite and infinitival complement clauses is attested in DGS, LIS, and TİD. By choosing to illustrate the phenomenon with German above we thus do not wish to imply that DGS is borrowing a syntactic property of its ambient spoken language, but that center-embedding of NPs and infinitival clauses is common in both spoken and signed languages with SOV word order. In DGS, DP objects remain *in situ* (21a) while complements of control verbs or resultatives with an anaphoric PRO subject may either extrapose or remain *in situ* (21b–e). Finite complement clauses, on the other hand, are obligatorily extracted (21f–g).[16]

(21) *DGS* (Pfau & Steinbach 2005: 516 (f-g))

a. HANS [$_{DP}$ WURM] ESS.
Hans worm eat
'Hans ate a worm.'

b. IX-1 HANS$_i$ [$_{Control}$ PRO$_i$ WURM ESS] ZWING
I Hans worm eat force
'I forced Hans to eat a worm.'

c. IX-1 HANS$_i$ ZWING [$_{Control}$ PRO$_i$ WURM ESS]
I Hans force worm eat

d. IX-2 LÖFFEL$_i$ IX-lf$_i$ [PRO$_i$ FLACH-lf] HÄMMER-lf KANN
you spoon the flat hammer can
'You can hammer the spoon flat.'

e. LÖFFEL$_i$ IX-lf$_i$ HÄMMER-lf [PRO$_i$ FLACH-lf] WER
spoon the hammer flat who
'Who hammered the spoon flat?'

[16] One thing to keep in mind when applying this diagnostic is that center-embedding of full clauses may sometimes be licensed when the relationship between matrix subject and predicate can be strengthened (Geraci & Aristodemo 2016). In LIS, sentential-like complement clauses are accepted in pre-verbal position when accompanied by role shift, or whenever the matrix subject is indexed on the matrix verb.

f. *IX-3 [$_{CP}$ IX-2 2-HELP-3 MUST] SAY

g. IX-3 t_i SAY [$_{CP/i}$ IX-2 2-HELP-3 MUST]
'He says that you must help him.'

In summary, we have seen that passivization cannot diagnose clause size in signed languages, none of which have yet been shown to have a syntactic passive. Topicalization and *wh*-fronting are sensitive to the presence of a full subordinate clause for some ASL and DGS signers, but they only have diagnostic potential when the embedded predicate is plain and cannot agree with its argument. Center-embedding distinguishes reliably between finite and infinitival clauses, but its applicability is limited to SOV languages.

4 Restrictions on rightward *wh*-movement

While center-embedding at the VP level has limited cross-linguistic applicability as a clause-size diagnostic, rightward *wh*-movement can distinguish between different types of clausal complements in both SVO and SOV languages. In this section, I present the results of an empirical study showing that *wh*-elements can only cross infinitival but not finite complement clauses when moving to the right periphery in DGS and ASL. The section is structured as follows. First, I introduce two crucial structural phenomena that this study builds on: the clause-boundedness of rightward movement (Section 4.1) and the non-finite status of resultative constructions (Section 4.2). Section 4.3 lays out the methodology, while Section 4.4 presents and discusses the findings.

4.1 Rightward movement does not cross clauses

In contrast to center-embedding, the use of utterance-final question words as a finiteness diagnostic does not depend on the basic headedness of a language. Along with many other sign languages, DGS and ASL allow final *wh*-elements (Aarons et al. 1992; Grin 2014; Jahnke & Volk 2015) and thus arguably rightward *wh*-movement (but see Quadros 1999; Aboh et al. 2005; Abner 2010, who analyze final *wh*-elements in ASL and Indian SL as leftward plus remnant movement). Rightward movement is cross-linguistically rare and subject to strict locality conditions (Ross 1967). Thus it is not surprising that Geraci & Aristodemo (2016) find locality constraints on rightward movement in LIS, where a moved *wh*-word may cross a DP (22a), but it cannot cross a finite extraposed CP (22b + c).[17]

(22) *LIS* (Geraci & Aristodemo 2016: 100 (a), 115 (b); Geraci & Cecchetto 2013: fn.5 (c))

a. t_{WHO} HOUSE BUY WHO
'Who bought a house?'

b. *t_{WHO} THINK [PIERO BIKE FELL] WHO
intended: 'Who thinks that Piero fell off the bike?'

c. ?*t_{WHO} SAY [PAOLO ARRIVE AFTER] WHO
intended: 'Who said that Paolo arrived later on?'

The authors propose that the unacceptability of final *wh*-elements with finite complements results from center-embedding at the CP level. If the same mechanisms are at work as during VP-internal center-embedding, the prediction is that infinitival complements followed by a *wh*-subject should be acceptable.

[17] A reviewer points out an alternative interpretation for the unacceptability of (22b): The clausal domain for extraction may be higher than that targeted for *wh*-movement, hence the *wh*-element should precede the extraposed clause. While this hypothesis cannot be refuted based on the LIS data, I will show for DGS that a *wh*-element may follow an extraposed constituent (as long as it is an infinitival clause). It thus seems as if at least for DGS, a final *wh*-elements targets a higher functional projection than extraposition.

In this section I will show that this is indeed the case in DGS and ASL. I present data from an empirical study showing that rightward *wh*-movement across extraposed complement clauses can distinguish finite from infinitival complements. The infinitival structures discussed here involve (i) object control predicates and (ii) resultative constructions. In both cases, the subject of an embedded predicate receives its interpretation from an argument of the matrix clause. The syntax of resultative constructions in ASL and DGS has been analyzed by Kentner (2014) and Loos (2017) and will be laid out briefly in the next section, before turning to the methodology for the present study.

4.2 Resultatives in DGS and ASL

Constructions consisting of more than one predicate are widespread in signed languages, where they express a variety of complex events including complex movements with separate manner and path predicates (23a) and cause-result events (23b–c) (Supalla 1990; Slobin & Hoiting 1994; Benedicto et al. 2008; Lau 2012; Kentner 2014; Loos 2017). While the part of speech of some of the predicates involved in such constructions is clearly verbal (e.g. RUN in (23a)), some stative or change-of-state predicates are harder to classify as verbal (e.g. NO-TRACE-LEFT in (23b)). Given the paucity of established criteria for determining parts of speech in signed languages, especially for adjectives (Zeshan & Schwager 2008; Loos 2014), I will remain agnostic as to whether the secondary predicate of a resultative construction such as (23b–c) is adjectival or verbal.

(23) *ASL*

hs

a. MARY RUN CL-1:move_in_circles
manner path
'Mary didn't run around in circles'

b. MARY LICK PLATE NO-TRACE-LEFT
cause result
'Mary licked the plate clean/empty.'

DGS

c. HANS TELLER LECK+ SAUBER
Hans plate lick clean
'Hans licked the plate clean.'

Resultatives are composed accomplishments that consist of a causer (MARY in (23b)) who performs an activity (LICK) that results in an affected participant (PLATE) undergoing a definitive change of state. The result of this change is expressed with the help of a secondary predicate (NO-TRACE-LEFT) within the same clause. DGS resultatives differ from their ASL counterparts in word order (23c); the affected participant precedes the causing verb and the order of causing and result predicate varies (Loos 2017). Result predicates are typically analyzed as complements of the causing verb (Simpson 1983; Carrier & Randall 1992; Rothstein 2004) that form a small clause with the affected participant (Stowell 1983; Hoekstra 1988; Guéron & Hoekstra 1995).

Analyses differ as to whether the subject of the small clause is controlled by the object of the causing verb (Stowell 1995), or whether it is independent because all causing verbs enter the resultative derivation as intransitives (Hoekstra 1988; Kratzer 2005). In DGS, the result clause may be center-embedded, which is suggestive of its infinitival status (see Section 3.3) and of the fact that its subject is controlled by the object of the matrix clause.

(24) *DGS*
IX-2 LÖFFEL IX-lf FLACH-lf HÄMMER-lf KANN
you spoon it/the flat hammer can
'You can hammer the spoon flat.'

The infinitival status of ASL result clauses can be established via the following set of facts. ASL resultatives pass the subject pronoun copy test (25) as well as the *wh*-cleft test (for an overview of this diagnostic, see Kentner 2014), showing that their result clauses are syntactically integrated into the main clause rather than forming a separate or coordinate clause. Furthermore, we can show that the affected participant in a resultative (TABLE in (25)) has to receive its theta role from the matrix verb and is therefore located in its direct object position, controlling a PRO subject in the result clause. This is supported by the observation that a resultative like (25) has to describe a scenario in which the verbal action is performed on the object TABLE. It cannot, for example, be used to talk about a person sanding the floor, which in turn activates a machine that automatically sands the table positioned under it.[18]

(25) *ASL*
y/n
IX-2 SAND+ TABLE SMOOTH IX-2
'Did you sand the table smooth?'

The hypothesized structure of resultatives in ASL and DGS is given in (26).

(26) *ASL*
a. JOHN LICK+ PLATE$_i$ [PRO$_i$ NO-TRACE-LEFT]

DGS
b. HANS TELLER$_i$ LECK+ [PRO$_i$ SAUBER]
Hans plate lick clean
'John licked the plate clean.'

Resultatives thus form an important testing ground for a diagnostic that purports to distinguish between finite and infinitival embedded clauses. The specific prediction here is that a *wh*-subject can move to the right of the result clause in DGS and ASL resultative constructions.

4.3 Methods

To test whether DGS and ASL disallow *wh*-movement across a finite subordinate clause but license movement across infinitival complements, six DGS and seven ASL consultants provided acceptability judgments of final *wh*-elements on a set of simple clauses, resultative and object control constructions, and full subordinate clauses. Participants, stimuli, and procedure are described in the following sections.

4.3.1 Participants

Six DGS and seven ASL native and near-native signers participated in the acceptability judgment task. The definition of "native" in the context of sign language research

[18] The actual context is more complex and goes as follows: Mary has a fancy new tool that can perform a variety of actions including sanding and hammering. The handling of the tool is very intuitive, you just gesture sanding and the tool registers your hand motion and starts sanding whatever object you have placed under it. Mary wants to sand her floorboards and needs to get a table out of the way, so she places it under the machine and then starts sanding. Accidentally, the machine picks up Mary's motion and sands the table until it is smooth.

warrants some discussion, since only 5–10% of sign language users acquire their primary language in a way that is comparable to first language acquisition in hearing children. Given the various etiologies of deafness, most prelingually deaf children have hearing parents, and most of these hearing parents do not sign. As a consequence, these children may first be exposed to a sign language in pre-school or even later. The final state grammar of signers exposed to ASL past the age of three differs significantly from that of native signers in such areas as sentence processing (Mayberry 1993); therefore one criterion for inclusion in this study was exposure to ASL or DGS by age three. In fact, almost all participants acquired their respective sign language from birth. An exception was made for one ASL participant who was exposed to the language from age four. He exhibited a heightened metalinguistic awareness in discussing differences between ASL and English and his acceptability judgment responses do not differ noticeably from those of the other participants. This is in line with Newport (1990), who shows that early learners of ASL (aged four to six) consistently outperform later learners of ASL.

4.3.2 Stimuli

The data for this study were collected as part of a larger acceptability judgment task on resultative constructions in DGS and ASL. Participants were presented with two simple clauses, two embedded object control clauses, 14 resultative constructions, and two finite complement clauses each (27).[19] All target sentences and their contexts were recorded by a native signer of ASL and DGS, respectively. The signers memorized and practiced sentences that seemed ungrammatical to them until their productions looked and felt natural in terms of their prosody. In each resultative, the affected participant was a semantic argument of the causing verb. Each target sentence had a *wh*-word in final position, was accompanied by interrogative prosody (lowered eyebrows throughout the production of the question), and was presented in a context that satisfied their potential presuppositional requirements. Final *wh*-words have been argued to carry an existential presupposition about their referent in ASL, similar to *wh*-clefts in English (Neidle 2002; Abner 2010). Each target sentence was thus presented in a context that adds an existential presupposition about the referent of the *wh*-word.[20] The context for (27a–i), for example, was *Mary saw on the news that John was killed. She does not know who did it, so she asks*. The contextualization establishes that there is a killer, and Mary's question in (27a–i) simply seeks to establish their identity.

(27) a) Simple clauses
ASL

hf
wh
i. t_{WHO} KILL JOHN WHO
'Who killed John?'

wh
ii. t_{WHO} EAT-UP POSS-1 CAKE WHO
'Who ate my cake?'

[19] Participants judged a total of 90 (ASL) to 100 (DGS) sentences in blocks of 20–30 sentences at a time. The stimuli for the present study were presented in randomized order as a part of the overall stimuli set and were, for the most part, non-adjacent.

[20] Presupposition-implying contexts were created for the *wh*-diagnostic in ASL and DGS, although there is no literature on final *wh*-words in DGS triggering an existential presupposition. To allow for the possibility that DGS behaves like ASL in this regard, parallel contexts were created, since non-presuppositional *wh*-words should be acceptable in them as well.

DGS

wh
iii. t_{WER} HANS SCHIESS WER
Hans shoot who
'Who shot Hans?'

wh
iv. SUSI t_{WAS} ESS WAS
Susi eat what
'What did Susi eat?'

b) Control complement clauses
ASL

hf
wh
i. t_{WHO} FORCE-rt JOHN IX-rt EAT WORM WHO
'Who forced John to eat a worm?'

wh
ii. t_{WHO} PERSUADE JOHN KISS-1 WHO
'Who persuaded John to kiss me?'

DGS

wh
iii. t_{WER} HANS ZWING WURM ESS WER
Hans force worm eat who
'Who forced Hans to eat a worm?'

wh
iv. t_{WER} HANS ÜBERRED WURM ESS WER
Hans persuade worm eat who
'Who persuaded Hans to eat a worm?'

c) Resultative constructions
ASL

cu
wh
i. t_{WHO} LICK PLATE NO-TRACE-LEFT WHO
'Who licked the plate clean/empty?'

DGS

wh
ii. t_{WER} TELLER LECK+ SAUBER WER
plate lick clean who
'Who licked the plate clean?'

d) Finite complement clauses
ASL

hf
wh
i. t_{WHO} SUSPECT JOHN KISS MARY WHO
'Who suspects that John kissed Mary?'

cu
wh
ii. t_{WHO} THINK JOHN EAT WORM WHO
'Who thinks that John ate a worm?'

DGS

wh

iii. t_{WER} GLAUB HANS WURM ESS WER
believe Hans worm eat who
'Who believes that Hans ate a worm?'

wh

iv. t_{WER} VERMUT HANS WURM ESS WER
suspect Hans worm eat who
'Who suspects that Hans ate a worm?'

To ensure that participants were not basing their decisions on the length of an utterance rather than its syntactic complexity, I had two DGS signers judge the acceptability of a simple ditransitive clause with both direct and indirect object intervening between the *wh*-word and its trace (28). Both participants accepted the sentence. Another pointer that utterance length is not the relevant factor here is that control clauses equal full subordinate clauses in the number of signs but, as we shall see in the next sections, differ from them in acceptability judgments.

(28) t_{WER} SUSI IX-fr TASCHE GEBURTSTAG GEB-fr WER
Susi she purse birthday give who
'Who gave Susi a purse for her birthday?'

4.3.3 Task & procedure

An acceptability judgment task using the stimuli in 4.3.2 was created and administered during one-on-one or one-on-two interview sessions. After filling out a brief language background questionnaire, participants watched an introductory video in either ASL or DGS explaining both the task and the rating procedure. Acceptability judgments were elicited as responses to the question whether a given target sentence felt like natural DGS/ASL or not. Participants rated acceptability on a 5-point Likert scale populated by emoticons ranging from ☹ to ☺.

4.4 Results and discussion

In the next step, a linear mixed effects model was fit separately to the DGS and ASL data sets using R (R Core Team 2016) and *lme4* (Bates et al. 2012). Since the prediction was that finite complement clauses followed by final *wh*-words should receive significantly lower acceptability ratings than simple clauses, resultatives, and control complements with final *wh*-words, sentence type was treated as a fixed effect, and a random intercept for participant and item was included. Visual inspection of residual plots did not reveal any obvious deviations from normality. Pairwise comparisons of acceptability ratings for the different sentence types were obtained through least square means contrasts using *lsmeans* (Lenth 2016) and controlling for Type I error rate in pairwise comparisons using Bonferroni-adjusted alpha levels with a starting $\alpha = 0.017$ (0.05/3).

Table 1 summarizes the means and standard deviations for acceptability ratings listed by sentence type and language. While the mean acceptability ratings for rightward *wh*-movement in simple and control clauses are lower in DGS than in ASL, the same statistical generalizations emerge. In both DGS and ASL, we can confirm that rightward *wh*-movement across finite complement clauses is significantly less acceptable than movement within a simple clause ($p = 0.020$ (DGS), $p = 0.009$ (ASL)), across an object control clause ($p = 0.033$ (DGS), $p = 0.014$ (ASL)), or across the result clause of a resultative construction ($p = 0.0013$ (DGS), $p = 0.0029$ (ASL)). In contrast, ratings for *wh*-movement across simple clauses do not differ significantly from those for control clauses or resultatives.

Table 1: Means and standard deviations for acceptability ratings of final *wh*-words in different sentence types for DGS and ASL.

	DGS		ASL	
Sentence	***M***	***SD***	***M***	***SD***
Simple	4.00	1.48	4.36	1.01
Control Comp	3.83	1.03	4.25	1.16
Resultative	4.25	1.07	4.20	1.08
Finite Comp	2.18	1.47	2.93	1.44

The low acceptability ratings for finite complements can be corroborated by informally collected judgments from two DGS signers on *wh*-subjects following extraposed adverbial clauses. Introduced by the complementizer-like signs GRUND 'reason' and BIS 'until', the causal (a) and temporal (b) adverbial clauses in (29) cannot intervene between probe and goal of the *wh*-movement.

(29) a. *t_{wer} WEIN GRUND W-M VORBEI WER
cry reason worldcup over who
'Who is crying because the (soccer) world cup is over?'

b. *t_{WER} SCHLAF BIS WINTER VORBEI WER
sleep until winter over who
'Who sleeps until the winter is over?'

In summary, locality constraints on rightward *wh*-movement hold in both DGS and ASL such that movement is significantly more acceptable within a clause and across an infinitival complement than across a finite clause. Consequently, the phenomenon can serve as a clause size diagnostic by detecting the finiteness of a clause projected by a given predicate in a multi-verb construction.

Before concluding, let me offer a brief processing account for why *wh*-movement across finite complements is significantly less acceptable than over infinitival clauses. In Gibson's (1998; 2000) dependency locality theory, sentence comprehension involves the syntactic integration of incoming words/morphemes into an existing structure while at the same time storing said structure. How costly the structural integration is depends on how far the elements that need to be integrated, in our case the *wh*-antecedent and its trace, are from each other. Locality of dependent elements is determined not by the number of intervening words but in terms of the complexity of structure building and discourse integration that occurs in the interim. Since discourse integration includes constructing or accessing discourse referents, and new discourse referents are less accessible and therefore require more resources than anaphoric elements such as PRO subjects, the filler-gap dependency between *wh*-word and trace is "easier" to maintain over an infinitival complement clause than over a finite one.[21]

5 Conclusion

The goal of this paper was to examine the toolbox currently at our disposal for investigating the syntactic relationship between clauses in a signed utterance across different sign languages. Specifically, rightward *wh*-movement was proposed as a new diagnostic

[21] One could argue that the gap in rightward movement is not created until the parser encounters a moved *wh*-word (e.g. Ackema & Neeleman 2002) and therefore, no such dependency needs to be maintained. However, the syntactic dependency between *wh*-probe and goal is marked overtly at the perceptual-articulatory interface by non-manual *wh*-marking (Cecchetto et al. 2009), which spreads over the entire sentence and thus clearly identifies the location of the sentence-initial *wh*-trace.

for finiteness, the applicability of center-embedding in DGS was confirmed, and existing coordination vs. subordination tests were revisited and, where advisable, modified. Table 2 lists the tests discussed in this paper, omitting those that are not applicable to DGS or ASL due to their language- or construction-specific nature. The first three diagnostics distinguish coordination from any type of dependent structure, while the remaining two tests gauge the size of complement clauses. 'X' indicates that a given diagnostic results in unacceptability for a sentence type; for example, subject pronoun copies cannot occur at the end of a coordinate clause while center-embedding is unacceptable with coordinated and finite CPs.

In terms of coordination versus subordination tests, I showed that manual negation has no diagnostic potential in DGS and pointed to non-manual negators and NPI licensing as potential diagnostics in ASL. Further, limitations of (leftward) A'-movement to test for coordination were identified in that the phenomenon can only apply where verbs whose arguments have been fronted do not show agreement. Lastly, I proposed to embed subject pronoun copies in polar questions to avoid problems with contextual emphasis requirements and in order to benefit from brow raise as an additional prosodic cue for intonational boundaries in the target utterance. I further confirmed the diagnostic potential of the test via acceptability judgment data. Interestingly, final pronouns differ in informativeness as a diagnostic across signed languages: While they are sensitive to infinitival clauses in NGT and may identify CP-level constituents in Libras, they can only differentiate coordination from any type of embedding in ASL. In a third type of signed languages, represented by TİD, the acceptability of a final pronoun signals that the utterance does not consist of more than one full clause, but it may still contain smaller clause-like constituents such as control or raising structures.

The sign language literature on complex clauses to date has focused more on distinguishing coordination from embedding than on determining the syntactic status of embedded clauses (e.g. Tang & Lau 2012; Pfau et al. 2016). The present paper takes a first pass at this problem by presenting rightward *wh*-movement as a new diagnostic distinguishing finite from infinitival complement clauses in both SOV and SVO languages. Further, the diagnostic potential of center-embedding a complement clause was established for DGS. Given the importance of clause size diagnostics for investigating language structure, in particular clause type inventory and selectional requirements and restrictions on clausal embedding, further studies should develop more fine-grained clause size diagnostics for signed languages that allow us to identify which projections in the functional sequence are present in any given embedded clause.

Table 2: Summary of clausehood and –size diagnostics in ASL and DGS.

Diagnostic/Clause type	Coordinated	Finite complement	Infinitival complement
Coordination vs. Embedding			
Negation	×	✓	
A' movement (left)	×	✓	
Subject pronoun copy	×	✓	
Clause Size			
Center-embedding	×		✓
Rightward *wh*-movement	×		✓

Abbreviations and notational conventions

Manual signs

M-I-A	a name that is fingerspelled
BIRD-CAGE	single sign represented by more than one word in the gloss
CL-1: move_in_circles	classifier predicate (CL) – handshape of the predicate: movement description
lf-GIVE-1	agreeing verb moving from one location in signing space (lf = left) to another (1 = the signer)
IX-1/2/3/pl/lf/rt	pointing sign with pronominal or determiner-like functions 'lf' = the signer points to their left 'rt' = the signer points to their right 'pl' = the signer points to multiple referents via an arc movement '1, 2, 3' = pointing to signer, addressee, or a third person whose location in space is not identified
POSS	possessive pronoun
LICK-plate	a verb that agrees in (end) location with its object argument
LICK +	reduplication of a sign to express durativity or aspect
RS	role shift

Non-manual syntactic markers

top	topic marker
hs	headshake, negation marker
hn	head nod
hf	head moves forward
bl-lf	body lean to the left
bl-rt	body lean to the right
y/n	polar question marker
wh	complex marker for wh-questions, includes one or more of the following: furrowed eyebrows, squint or widened eyes, wrinkled nose
cu	chin up (usually accompanied by eye gaze to the addressee)

Additional File

The additional file for this article can be found as follows:

- **Appendix.** Target resultative constructions with final *wh*-subjects in ASL and DGS (includes context for each target question; reprinted here in English for ease of representation). DOI: https://doi.org/10.5334/gjgl.633.s1

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Competing Interests

The author has no competing interests to declare.

References

Aarons, Debra, Ben Bahan, Judy Kegl & Carol Neidle. 1992. Clausal structure and a tier for grammatical marking in American Sign Language. *Nordic Journal of Linguistics* 15(2). 103–42. DOI: https://doi.org/10.1017/S0332586500002560

Abner, Natasha. 2010. WH-words that go bump in the right. Paper presented to the 28th West Coast Conference on Formal Linguistics.

Aboh, Enoch, Roland Pfau & Ulrike Zeshan. 2005. When a wh-word is not a wh-word: The case of Indian Sign Language. In Rajendra Singh & Tanmoy Bhattacharya (eds.), *Yearbook of South Asian Languages and Linguistics*, 11–43. Berlin: Mouton de Gruyter. DOI: https://doi.org/10.1515/9783110186185.11

Ackema, Peter & Ad Neeleman. 2002. Effects of short-term storage in processing rightward movement. In Sieb Noteboom, Fred Weerman & Frank Wijnen (eds.), *Storage and computation in the language faculty*, 219–56. Dordrecht: Kluwer Academic Publishers. DOI: https://doi.org/10.1007/978-94-010-0355-1_8

Bader, Markus, Jana Häussler & Tanja Schmid. 2013. Constraints on intra- and extraposition. In Gerd Webelhuth, Manfred Sailer & Heike Walker (eds.), *Rightward movement in a comparative perspective*, 63–98. Amsterdam/Philadelphia: John Benjamins.

Barberà, Gemma & Patricia Cabredo Hofherr. 2017. Backgrounded agents in sign language: Passives, middles, or impersonals? *Language* 93(4). DOI: https://doi.org/10.1353/lan.0.0028

Bates, Douglas M., Martin Maechler & Ben Bolker. 2012. lme4: Linear mixed-effects models using S4 classes.

Benedicto, Elena, Sandra Cvejanov & Josep Quer. 2008. The morphosyntax of verbs of motion in serial constructions: A crosslinguistic study in three signed languages. In Josep Quer (ed.), *Signs of the time*, 111–132. Seedorf: Signum.

Braze, David. 2004. Aspectual inflection, verb raising and object fronting in American Sign Language. *Lingua* 114. 29–58. DOI: https://doi.org/10.1016/S0024-3841(03)00034-2

Brentari, Diane, Joshua Falk & George Wolford. 2015. The acquisition of prosody in American Sign Language. *Language* 91(3). e144–e68. DOI: https://doi.org/10.1353/lan.2015.0042

Büring, Daniel & Katharina Hartmann. 1997. Doing the right thing. *The Linguistic Review* 14. 1–42. DOI: https://doi.org/10.1515/tlir.1997.14.1.1

Carrier, Jill & Janet Randall. 1992. The argument structure and syntactic structure of resultatives. *Linguistic Inquiry* 23(2). 173–234.

Cecchetto, Carlo, Carlo Geraci & Sandro Zucchi. 2009. Another way to mark syntactic dependencies. The case for right-peripheral specifiers in sign languages. *Language* 85(2). 278–320. DOI: https://doi.org/10.1353/lan.0.0114

Chen Pichler, Deborah. 2010. Using early ASL word order to shed light on word order variability in sign language. In Merete Anderssen, Kristine Bentzen & Marit Westergaard (eds.), *Variation in the input: Studies in the acquisition of word order*, 157–77. Springer Netherlands. DOI: https://doi.org/10.1007/978-90-481-9207-6_7

Chomsky, Noam. 2001. Derivation by phase. In Michael Kenstowicz (ed.), *Ken Hale: A life in language*, 1–52. Cambridge, MA: MIT Press.

Cinque, Guglielmo. 2004. "Restructuring" and functional structure. In Luigi Rizzi (ed.), *The structure of CP and IP*, 132–191. New York: Oxford University Press.

Coulter, Geoffrey. 1993. Phrase-level prosody in ASL: Final lengthening and phrasal contours. In Geoffrey Coulter (ed.), *Current issues in ASL phonology*, 263–72. San Diego, CA: Academic Press, Inc. DOI: https://doi.org/10.1016/B978-0-12-193270-1.50017-0

Crasborn, Onno. 2007. How to recognize a sentence when you see one. *Sign Language & Linguistics* 10(2). 103–11.

Crasborn, Onno, Els van der Kooij, Johan Ros & Helen de Hoop. 2009. Topic agreement in NGT (Sign Language of the Netherlands). *The Linguistic Review* 26. 355–70. DOI: https://doi.org/10.1515/tlir.2009.013

Davidson, Kathryn. 2013. 'And' or 'or': General use coordination in ASL. *Semantics and Pragmatics* 6. 1–44. DOI: https://doi.org/10.3765/sp.6.4

de Quadros, Ronice Müller. 1999. *Phrase structure of Brazilian Sign Language*. Porto Alegre: Pontífica Universidade Católica do Rio Grande do Sul dissertation.

Engberg-Pedersen, Elisabeth. 1993. *Space in Danish Sign Language: The semantics and morphosyntax of the use of space in a visual language*. Hamburg: Signum.

Fenlon, Jordan, Tanya Denmark, Ruth Campbell & Bencie Woll. 2007. Seeing sentence boundaries. *Sign Language & Linguistics* 10(2). 177–200.

Fischer, Susan. 1975. Influences on word order change in American Sign Language. In Charles Li (ed.), *Word order and word order change*, 1–25. Austin: University of Texas Press.

Fleckenstein, Kristen & Suwon Yoon. To appear. Negation in ASL: On the role of Jespersen's Cycle and semantic restructuring. *Chicago Linguistic Society (CLS)*.

Geraci, Carlo & Carlo Cecchetto. 2013. Neglected cases of rightward movement. When wh-phrases and negative quantifiers go to the right. In Gerd Webelhuth, Manfred Sailer & Heike Walker (eds.), *Rightward movement in a comparative perspective*, 211–79. Amsterdam/Philadelphia: John Benjamins. DOI: https://doi.org/10.1075/la.200.08ger

Geraci, Carlo, Carlo Cecchetto & Sandro Zucchi. 2008. Sentential complementation in Italian Sign Language. Paper presented to the proceedings of the 38th Western Conference on Linguistics, Department of Linguistics University of California at Davis, 2008.

Geraci, Carlo & Valentina Aristodemo. 2016. An in-depth tour into sentential complementation in Italian Sign Language. In Roland Pfau, Markus Steinbach & Annika Herrmann (eds.), *A matter of complexity: Subordination in sign languages*, 95–150. Boston/Berlin and Preston, UK: de Gruyter/Ishara Press. DOI: https://doi.org/10.1515/9781501503238-006

Gibson, Edward. 1998. Linguistic complexity: Locality of syntactic dependencies. *Cognition* 68. 1–76. DOI: https://doi.org/10.1016/S0010-0277(98)00034-1

Gibson, Edward. 2000. The dependency locality theory: A distance-based theory of linguistic complexity. In Yasushi Miyashita, Alec P. Marantz & Wayne O'Neil (eds.), *Image, language, brain*, 95–126. Cambridge, MA.: MIT Press.

Glück, Susanne & Roland Pfau. 1997. Einige Aspekte der Morphologie und Morphosyntax in Deutscher Gebärdensprache. *Zeitschrift für Sprachwissenschaft* 16(1). 181–208.

Göksel, Aslı & Meltem Kelepir. 2016. Observations on clausal complementation in Turkish Sign Language. In Roland Pfau, Markus Steinbach & Annika Herrmann (eds.), *A matter of complexity: Subordination in sign languages*, 65–94. Boston/Berlin/Preston, UK: de Gruyter. DOI: https://doi.org/10.1515/9781501503238-005

Grin, Konstantin. 2014. W-Fragen in der Deutschen Gebärdensprache. Hamburg: Universität Hamburg BA thesis.

Grosjean, François & Harlan Lane. 1977. Pauses and syntax in American Sign Language. *Cognition* 5(2). 101–17. DOI: https://doi.org/10.1016/0010-0277(77)90006-3

Guéron, Jacqueline & Teun Hoekstra. 1995. The temporal interpretation of predication. In Anna Cardinaletti & Maria Teresa Guasti (eds.), *Small clauses*, 77–107. San Diego, CA: Academic Press.

Hansen, Martje. 2007. *Warum braucht die deutsche Gebärdensprache kein Passiv?: Verfahren der Markierung semantischer Rollen in der DGS*. Frankfurt am Main: Lang.

Hansen, Martje & Jens Heßmann. 2007. Matching propositional content and formal markers: Sentence boundaries in a DGS text. *Sign Language & Linguistics* 10(2). 145–75. DOI: https://doi.org/10.1075/sll.10.2.05han

Happ, Daniela & Marc-Oliver Vorköper. 2006. *Deutsche Gebärdensprache: Ein Lehr- und Arbeitsbuch*. Frankfurt a.M.: Fachhochschulverlag.

Hawkins, John A. 2004. *Efficiency and complexity in grammars*. New York: Oxford University Press. DOI: https://doi.org/10.1093/acprof:oso/9780199252695.001.0001

Herrmann, Annika. 2010. The interaction of eye blinks and other prosodic cues in German Sign Language. *Sign Language & Linguistics* 13(1). 3–39. DOI: https://doi.org/10.1075/sll.13.1.02her

Hodge, Gabrielle. 2013. *Patterns from a signed language corpus: Clause-like units in Auslan (Australian sign language)*. Sydney: Macquarie University dissertation.

Hoekstra, Teun. 1988. Small clause results. *Lingua* 74(2–3). 101–39. DOI: https://doi.org/10.1016/0024-3841(88)90056-3

Jahnke, Sina & Elisabeth Volk. 2015. *Zur Syntax und Informationsstruktur der w-Bewegung in DGS: Eine empirische Untersuchung zur Position von w-Wörtern in Fragen und Frage-Antwort-Sequenzen*. Göttingen: Georg-August-Universität Göttingen MA thesis.

Janzen, Terry, Barbara O'Dea & Barbara Shaffer. 2001. The construal of events: Passives in American Sign Language. *Sign Language Studies* 1(3). 281–310. DOI: https://doi.org/10.1353/sls.2001.0009

Kegl, Judy. 1990. Predicate argument structure and verb-class organization in the ASL lexicon. In Ceil Lucas (ed.), *Sign language research*, 149–75. Washington, DC: Gallaudet University Press.

Kentner, Ashley. 2014. *Event structure of resultatives in ASL*. West Lafayette, IN: Purdue University MA thesis.

Koulidobrova, Elena. 2017. Elide me bare: Null arguments in American Sign Language. *Natural Language and Linguistic Theory* 35. 397–446. DOI: https://doi.org/10.1007/s11049-016-9349-5

Kratzer, Angelika. 2005. Building resultatives. In Claudia Maienborn & Angelika Wöllstein (eds.), *Event arguments*, 177–212. Tübingen: Max Niemeyer Verlag. DOI: https://doi.org/10.1515/9783110913798.177

Kroeger, Paul. 2005. *Analyzing grammar: An introduction*. New York: Cambridge University Press. DOI: https://doi.org/10.1017/CBO9780511801679

Lau, Sin Yee Prudence. 2012. *Serial verb constructions in Hong Kong Sign Language*. Shatin: Chinese University of Hong Kong dissertation.

Lenth, Russell V. 2016. Least-Squares Means: The R Package lsmeans. *Journal of Statistical Software* 69(1). 1–33. DOI: https://doi.org/10.18637/jss.v069.i01

Liddell, Scott. 1980. *American Sign Language syntax*. The Hague: Mouton Publishers.

Liddell, Scott. 1995. Real, surrogate, and token space: Grammatical consequences in ASL. In Karen Emmorey & Judy S. Reilly (eds.), *Language, gesture, and space*, 19–41. Hillsdale, NJ: Lawrence Erlbaum Associates.

Liddell, Scott. 2000. Indicating verbs and pronouns: Pointing away from agreement. In Karen Emmorey & Harlan Lane (eds.), *The signs of language revisited: An anthology to honor Ursula Bellugi and Edward Klima*, 303–320. Mahwah, NJ: Lawrence Erlbaum Associates.

Lillo-Martin, Diane. 1986. Two kinds of null arguments in American Sign Language. *Natural Language and Linguistic Theory* 4(4). 415–44. DOI: https://doi.org/10.1007/BF00134469

Lillo-Martin, Diane. 1991. *Universal grammar and American Sign Language: Setting the null argument parameters*. Dordrecht: Kluwer. DOI: https://doi.org/10.1007/978-94-011-3468-2

Lillo-Martin, Diane. 1992. Sentences as islands: On the boundedness of A'-movement in American Sign Language. In Helen Goodluck & Michael Rochemont (eds.), *Island constraints*, 259–74. Dordrecht: Kluwer. DOI: https://doi.org/10.1007/978-94-017-1980-3_9

Lillo-Martin, Diane. 1995. The point of view predicate in American Sign Language. In Karen Emmorey & Judy S. Reilly (eds.), *Language, gesture, and space*, 155–70. Hillsdale, N.J.: Lawrence Erlbaum Associates.

Lillo-Martin, Diane. 1998. The acquisition of English by deaf signers: Is Universal Grammar involved? In Suzanne Flynn, Gita Martohardjono & Wayne O'Neil (eds.), *The generative study of second language acquisition*, 131–150. Mahwah, NJ: Lawrence Erlbaum Associates.

Lillo-Martin, Diane. 2012. Utterance reports and constructed action. In Roland Pfau, Markus Steinbach & Bencie Woll (eds.), *Sign language: An international handbook*, 365–386. Berlin: De Gruyter. DOI: https://doi.org/10.1515/9783110261325.365

Lillo-Martin, Diane & Richard Meier. 2011. On the linguistic status of 'agreement' in sign languages. *Theoretical Linguistics* 37(3/4). 95–141. DOI: https://doi.org/10.1515/thli.2011.009

Loos, Cornelia. 2014. A class of their own: Adjectives in ASL. Ms. University of Texas, Austin.

Loos, Cornelia. 2017. *The syntax and semantics of resultative constructions in Deutsche Gebärdensprache (DGS) and American Sign Language (ASL)*. Austin, TX: University of Texas at Austin dissertation.

Mayberry, Rachel. 1993. First language acquisition after childhood differs from second language aquisition: The case of American Sign Language. *Journal of Speech and Hearing Research* 36(6). 1258–70. DOI: https://doi.org/10.1044/jshr.3606.1258

McFadden, Thomas & Sandhya Sundaresan. 2011. Nominative case is independent of finiteness and agreement. Paper presented at the BCGL Brussels.

Neidle, Carol. 2002. Language across modalities: ASL focus and question constructions. *Linguistic Variation Yearbook* 2(1). 71–98. DOI: https://doi.org/10.1075/livy.2.05nei

Neidle, Carol, Judy Kegl, Dawn MacLaughlin, Ben Bahan & Robert G. Lee. 2000. *The syntax of American Sign Language: Functional categories and hierarchical structure*. Cambridge, MA: MIT Press.

Newport, Elissa L. 1990. Maturational constraints in language learning. *Cognitive Science* 14. 11–28. DOI: https://doi.org/10.1207/s15516709cog1401_2

Padden, Carol. 1983. *The interaction of morphology and syntax in American Sign Language*. San Diego, CA: University of California, San Diego dissertation.

Petronio, Karen. 1993. *Clause structure in American Sign Language*. Washington, DC: University of Washington dissertation.

Petronio, Karen & Diane Lillo-Martin. 1997. Wh-movement and the position of spec-CP: Evidence from American Sign Language. *Language* 73(1). 18–57. DOI: https://doi.org/10.2307/416592

Pfau, Roland. 2001. Typologische und strukturelle Aspekte der Negation in Deutscher Gebärdensprache. In Helen Leuniger & Karin Wempe (eds.), *Gebärdensprachlinguistik 2000: Theorie und Anwendung*, 13–31. Hamburg: Signum.

Pfau, Roland & Markus Steinbach. 2005. Relative clauses in German Sign Language: Extraposition and reconstruction. In *NELS Proceedings* 35. 507–521.

Pfau, Roland, Markus Steinbach & Annika Herrmann (eds.). 2016. *A matter of complexity: Subordination in sign languages*. Preston, UK: Ishara Press. DOI: https://doi.org/10.1515/9781501503238

Quer, Josep. 2005. Context shift and indexical variables in sign languages. In *Semantics and linguistic theory proceedings* 15. 152–168.
R Core Team. 2016. R: A language and environment for statistical computing. Vienna, Austria: R Foundation for Statistical Computing.
Reis, Marga & Wolfgang Sternefeld. 2004. Review article: Susanne Wurmbrand: Infinitives. Restructuring and clause structure. *Linguistics* 42(2). 469–508.
Rizzi, Luigi. 1982. *Issues in Italian syntax*. Dordrecht: Foris. DOI: https://doi.org/10.1515/9783110883718
Ross, John R. 1967. *Constraints on variables in syntax*. Cambridge, MA: MIT dissertation.
Rothstein, S. 2004. *Structuring events*. Oxford: Blackwell. DOI: https://doi.org/10.1002/9780470759127
Sabel, Joachim. 2001. Das deutsche verbum infinitum. *Deutsche Sprache* 29. 148–75.
Sandler, Wendy. 2010. Prosody and syntax in sign languages. *Transactions of the philological society* 108(3). 298–328. DOI: https://doi.org/10.1111/j.1467-968X.2010.01242.x
Sandler, Wendy & Diane Lillo-Martin. 2006. *Sign language and linguistic universals*. Cambridge: Cambridge University Press. DOI: https://doi.org/10.1017/CBO9781139163910
Schembri, Adam, Jordan Fenlon & Kearsy Cormier. 2018. On verb 'agreement' in sign languages: Indicating verbs as typologically unique constructions. *Glossa* 3(1):89. 1–40. DOI: https://doi.org/10.5334/gjgl.468
Schlenker, Philippe. 2017a. Super monsters I: Attitude and action role shift in sign language. *Semantics and Pragmatics* 10. DOI: https://doi.org/10.3765/sp.10.9
Schlenker, Philippe. 2017b. Super monsters II: Role shift, iconicity and quotation in sign language. *Semantics and Pragmatics* 10. DOI: https://doi.org/10.3765/sp.10.12
Simpson, Jane. 1983. Resultatives. In Beth Levin, Malka Rappaport & Anne Zaenen, *Papers in lexical-functional grammar*, 143–57. Bloomington, IN: Indiana University Linguistics Club.
Slobin, Dan & Nini Hoiting. 1994. Reference to movement in spoken and signed languages: Typological considerations. *Berkeley Linguistic Society (BLS)* 20. 487–505.
Stowell, T. 1983. Subjects across categories. *The Linguistic Review* 2. 285–312.
Stowell, Tim. 1995. Remarks on clause structure. In Anna Cardinaletti & Maria Teresa Guasti (eds.), *Small clauses*, 271–86. San Diego, CA: Academic Press.
Supalla, Ted. 1990. Serial verbs of motion in ASL. In Susan Fischer & Patricia Siple (eds.), *Theoretical issues in sign language research*, 127–52. Chicago, IL: University of Chicago Press.
Sze, Felix. 2008. *Topic Construction in Hong Kong Sign Language*. Bristol: University of Bristol dissertation.
Sze, Felix Yim Binh. 2012. Right-dislocated pronominals in Hong Kong Sign Language. *Journal of Pragmatics* 44. 1949–65. DOI: https://doi.org/10.1016/j.pragma.2012.08.011
Tang, Gladys & Prudence Lau. 2012. Coordination and subordination. In Roland Pfau, Markus Steinbach & Bencie Woll (eds.), *Sign language: An international handbook*, 340–64. München: Walter de Gruyter. DOI: https://doi.org/10.1515/9783110261325.340
Truckenbrodt, Hubert. 2012. The semantics of intonation. In Claudia Maienborn, Klaus von Heusinger & Paul H. Portner (eds.), *Semantics: An international handbook of natural language meaning*, 2039–69. Berlin: Mouton de Gruyter.
van Gijn, Ingeborg. 2004. *The quest for syntactic dependency: Sentential complementation in Sign Language of the Netherlands*. Utrecht: LOT dissertation.
Wilbur, Ronnie. 1994. Eye blinks and ASL phrase structure. *Sign Language Studies* 84(1). 221–40. DOI: https://doi.org/10.1353/sls.1994.0019
Wilbur, Ronnie & Cynthia Patschke. 1999. Syntactic correlates of brow raise in ASL. *Sign Language & Linguistics* 2(1). 3–41. DOI: https://doi.org/10.1075/sll.2.1.03wil

Wurmbrand, Susanne. 2001. *Infinitives: Restructuring and clause structure.* Berlin: Mouton de Gruyter. DOI: https://doi.org/10.1515/9783110908329

Zeshan, Ulrike. 2004. Interrogative constructions in signed languages: Crosslinguistic perspectives. *Language* 80(1). 7–39. DOI: https://doi.org/10.1353/lan.2004.0050

Zeshan, Ulrike (ed.). 2006. *Interrogative and negative constructions in sign languages.* Nijmegen: Ishara Press. DOI: https://doi.org/10.26530/OAPEN_453832

Zeshan, Ulrike & Waldemar Schwager. 2008. Word classes in sign languages. *Studies in Language* 32(3). 509–45. DOI: https://doi.org/10.1075/sl.32.3.03sch

Zucchi, Sandro. 2009. Along the time line: Tense and time adverbs in Italian Sign Language. *Natural Language Semantics* 17. 99–139. DOI: https://doi.org/10.1007/s11050-008-9032-4

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