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**RESEARCH**

# Internally-headed relative clauses in sign languages

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This chapter considers relative clause data from sign languages in light of their variation with respect to basic word order, nonmanual marking, and presence/absence of internally-headed and externally-headed relative clauses. Syntactically, a double merge cartographic model (Cinque 2005a; b), following Brunelli (2011), is adopted. The differences across sign languages are suggested to result from differences in raising requirements with respect to the relative clauses themselves and with respect to their heads, rather than basic word order, use of complementizers, relative pronouns, or nominalizers, or (type of) nonmanual marking. Typologically, it is noted that several of the SVO SLs have IHRCs, that at least one SOV SL does not have IHRCs, and that three of the SLs have both internally-headed (IHRCs) and externally-headed (EHRCs) relative clauses.

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**Keywords:** sign language; non-manual marking; internally-headed; externally-headed; relative clause

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## 1 Background on sign language structures

Typology of sign languages and their contributions to our understanding of language typology in general is a relatively recent endeavor (Zeshan 2008; 2013). While it is quite clear that sign languages, like spoken languages, are syntactically complex and typologically varied, it is also the case that there are certain things that occur in sign languages as a result of the opportunities presented by the visual modality in which they are produced, such as increased use of simultaneous information channels (everything is visible and therefore potentially available to be grammaticalized) and widespread use of locations in space (horizontally and vertically). Thus, a general introduction is needed before issues related specifically to IHRC can be addressed. The most relevant areas for understanding the structure of IHRCs are (1) typological variation in word order, (2) grammatical use of non-manual marking in addition to the manual parameters of sign structure, and (3) use of space for referential purposes (nouns and anaphors, verb agreement).

### 1.1 Typological variation across SLs

This article presents some of what is known about relative clauses in sign languages (SLs). This requires a qualification at the outset – SLs as a group are understudied: many do not yet even have their basic word order established, much less more complex syntax like RCs. Among those with established word order typology, even fewer have clear studies on relativization strategies. American Sign Language (ASL), Italian Sign Language (*Lingua Italiana dei Segni*, LIS) and German Sign Language (*Deutsche Gebardensprache*, DGS) are possibly the best studied, and therefore will serve as the prototypes. However, there are significant differences among SLs that indicate that they are as varied in their syntax as spoken languages. Thus, generalizations from the descriptions given here should be made

with utmost caution. In addition, it is clear that even the best studied RCs are subject to extensive debate with respect to the facts and the analyses. As an example of debate over the facts, Brunelli (2011) carefully reviews the literature and data on word order and RCs in Sign Language of the Netherlands (*Nederlandse Gebarentaal*, NGT) and concludes that there is no clear evidence that NGT has RCs despite suggestions from previous research (Van Gijn et al. 1998). As an example of ongoing changes in analysis, LIS RCs have been alternately characterized as (1) correlatives (Cecchetto et al. 2006), (2) nominalized clauses (Branchini & Donati 2009), and (3) ordinary IHRCs and EHRCs (Brunelli 2011) (further details below).

It has been observed that basic word orders in SLs are either SVO or SOV, although the reason why other orders have not been identified is not clear (Leeson & Saeed 2012; Napoli & Sutton-Spence 2014). ASL is SVO, whereas both LIS and DGS are SOV. Zeshan (2006) provides a concise discussion of difficulties associated with establishment of basic word order for SLs.<sup>1</sup> The status of RCs themselves is thus much less well understood than in spoken languages. Even among the various SLs investigated by my own research team over the last 15 years (ASL; Croatian SL, *Hrvatski Znakovni Jezik*, HZJ; Austrian SL, *Osterreichische Gebardensprache*, ÖGS; Turkish SL, *Türk İşaret Dili*, TİD), two (Croatian, Austrian) will play no role in the following discussion because there has not yet been any attempt to determine if RCs are possible, given all the other unanswered syntactic questions requiring attention before RCs can be addressed (for example, how to determine sentence boundaries or conduct constituent testing). That said, as will be shown below, there are IHRCs in ASL, despite its being an SVO language, which are claimed not to have IHRCs, indicating that SLs can contribute to our understanding of language structure typology.

To begin, the better-studied SLs are typologically diverse with respect to relativization strategies. ASL, LIS, and TİD have been shown to have both internally- (IHRC) and externally- (EHRC) headed RCs (ASL: Liddell 1978; 1980; LIS: Cecchetto et al. 2006; Branchini 2007; 2014; Branchini & Donati 2009; Brunelli 2011; Cecchetto & Donati 2016; TİD: Kubus 2010; 2014; Kubus & Rathmann 2011).<sup>2</sup> Brazilian Sign Language (*Lingua de Sinais Brasileira*, Libras) and German Sign Language (DGS) have so far only been shown to have EHRC (Libras: Nunes & de Quadros 2004; DGS: Pfau & Steinbach 2005). Hong Kong Sign Language (HKSL) has so far only been shown to have IHRC (HKSL: Tang et al. 2010). Thus, not all SLs have IHRC, and despite initial thoughts to the contrary, SLs are as varied in structure as spoken languages, at least in this domain.<sup>3</sup> Furthermore, those SLs that have been shown to have IHRC, whether the only strategy or not, do not all have

<sup>1</sup> For some SLs, basic word has been claimed to be ‘topic-comment’. This suggests some confusion on how basic word order should be determined for typological purposes. Undoubtedly the comment portion itself displays word order preferences, and presumably there is some basic word order not dependent on introduction of a topic that it is a comment about. There is also confusion in the SL literature on use of the term ‘topic’ with respect to different levels of function (e.g. discourse, sentence, focus) (Wilbur 2012). Coulter (1979) claims that ASL is a ‘topic prominent’ language, but provides neither data nor argumentation in support of this claim; the claim continues to permeate the literature in various guises despite continuing lack of support (see also Sze 2015).

<sup>2</sup> For the sake of completeness, Sign Language of the Netherlands (*Nederlandse Gebarentaal*, NGT, formerly SLN; Van Gijn et al 1998) should be mentioned. The basic word order is disputed (SVO: Van Gijn et al 1998; SOV: Baker 2008, discussed in Brunelli 2011). Brunelli (2011) reports that he is unable to support previous claims that RCs on main clause subjects are IHRCs and those on main clause objects are EHRCs, with ‘wrinkled nose/tensed upper lip’ as the NMM over the whole IHRC. Since he could not firmly establish what the RC situation really is in NGT, it will not be discussed further.

<sup>3</sup> Newport & Supalla (2000) observe that SLs tend to look more similar to each other than spoken languages do. Wilbur (2008) argues that this similarity in form reflects the recruitment by SLs of available physical resources from physics (duration, displacement, velocity, acceleration) and geometry (point, line, plane) for lexical and grammatical purposes.

the same basic word order: ASL and HKSL are SVO, whereas LIS and TID are SOV. Despite this variation, Tang & Lau (2012) suggest that no SLs have yet demonstrated prenominal RCs, only postnominal. However, Ichida (2010) indicates that Japanese Sign Language (*Nihon Shuwa*, NS) has both postnominal and prenominal RCs, and that the typical EHRC is prenominal. Further, Kubus (2014) points out clearly in his survey of 9 SLs that it is not the case that it has been shown that these do not exist, but that some SLs simply have no data available; much the same point was made by Brunelli (2011) with respect to the existence of RCs in NGT. Thus, the existence of prenominal RCs should be considered an open question until much more investigation has been conducted.

Separate from the issue of word order typology and relativization strategies, the data show that many strategies that are used by IHRC in spoken languages also are used in sign languages. These include doubling of the head, special marking of the head for what might be focus or specificity, and clause external determiners. Due to the overview nature of this article, these will necessarily be of less importance than the bigger issues of confirming that relative clauses are indeed not adjuncts or conjuncts to the main clause, that the head is internal for IHRC, that different languages with IHRC display different syntax and morphology, that not all sign languages have IHRC, and the critical role played by non-manual marking.

## **1.2 Relevant structural commonalities of sign languages**

There are two characteristics that all mature natural sign languages studied to date display: use of grammatical non-manual marking (NMM), including face, head, and body; and use of space for referential purposes, to introduce nouns into discourse for further reference, or to mark argument agreement on the verb. Only those aspects that are relevant to understanding RCs are presented here.

### **1.2.1 The use of NMM**

Linguistic research has established the separation of grammatical NMM from purely affective facial expressions (Baker & Padden 1978; Liddell 1978; Coulter 1978; 1979; Anderson & Reilly 1998). Weast (2008) established that affective expressions, e.g. happy vs angry, set the range of motion within which the grammatical markers are produced. That is, a happy face will allow a greater excursion of grammatical brow raising than an angry face. Grammatical NMM has a sharper onset (timing of the start) and offset than affective facial expressions, and is tightly coordinated with the syntactic constituents that it marks. Also, there is a clear distinction between co-speech facial gestures used by non-signing hearing people (for example, negative headshake) and the grammatical NMM produced during signing (Wilbur & Patschke 1999), as well as a different developmental progression in signing vs non-signing children (Anderson & Reilly 1998). Thus, the use of NMM for syntactic purposes like RCs as discussed below must be understood as part of the grammar of each SL.

NMM includes the head, eyes, nose, mouth, and shoulder/body. Within these areas, specific articulators can be recruited for specific functions; for example, within the eye area, the brows, lids, and eyeballs (gaze) can serve different functions. Similarly in the mouth area, the upper lip, lower lip, lip corners, tongue and cheek are potentially assigned different functions. In addition, these markers may be edge markers (for example, a single eyeblink) or they may be domain markers, holding over a syntactic or prosodic domain. At least in ASL, although not yet well-documented for other sign languages, non-manuals are divided into upper and lower face articulations, with the lower face generally marking smaller adverbial/adjectival functions within phrases, and the upper face scoping larger clausal domains. Liddell (1978) provided illustration of this difference (1) – the question

NMM ‘q’ (a cluster of articulations) scopes the entire question, while the lower mouth face adverbial marking ‘mm’, meaning ‘with ease/enjoyment’, only scopes the verb, which carries manually-shown continuous inflection (morphological reduplication, Wilbur 2009):<sup>4</sup>

(1)

$$\frac{\text{q}}{\text{mm}}$$
 MAN FISH[I:continuous]  
 “Is the man fishing with relaxation and enjoyment?”

One of the articulations included in the cluster ‘q’ is brow raise ‘br’. We will see ‘br’ marking portions of RCs in different SLs with varying degrees of regularity and support in the literature. For ASL, the function of ‘br’ has been shown to be more general than ‘q’ and RCs, occurring also in topics, conditional clauses, the *wh*-clause of *wh*-clefts, focus associates of lexical focusers, and generic readings of bare singular subjects, among others. Wilbur (1995; 2011a) argues that ‘br’ in ASL is the overt marking of the semantic restriction of dyadic [-*wh*]-operators, thus not licensed to spread over the c-command domain. This behavior stands in sharp contrast to that of monadic operators like negative and [+*wh*]; for both of these, their associated NMM, headshake and brow lowering, respectively, scope over the c-command domain of each operator. In constituents marked with ‘br’, the reading is restrictive, limiting the interpretation of the main clause/nuclear scope (following Partee 1991). Thus it makes sense that restrictive RCs would carry the ‘br’ marking in ASL. At the same time, it is important to understand that while the system in ASL for use of ‘br’ is well-studied, for other SLs that display ‘br’ on RCs, their system of ‘br’ usage may differ from that of ASL, as will be seen for LIS in Section 4.1.

### 1.2.2 Use of space

Two important uses of space are for nominal reference and verb agreement. For nominal reference, the introduction of a referent that will be subsequently referred to in a narrative (specific or definite reference) is usually accompanied by the identification of that referent at an index point (locus) in space. This can be accomplished by a variety of means, all of which make clear to the viewer that the locus is being identified: (1) sign the noun at the locus (not always possible, given the place of articulation (POA) of signs), (2) accompany the noun sign with a pointing sign (glossed IX for index), which may follow, precede, or occur simultaneous to the noun sign (for discussion of pointing and agreement, see Wilbur 2013), and/or (3) accompany the noun sign with an eyegaze or head/shoulder/body shift towards the locus, again either before, during, or after the noun sign. Subsequent reference to that referent is made by using that locus, which can be done with pronominal/classifier signs, index signs (pointing), eyegaze, and so on, just as long as it is clear to the viewer which referent is intended.

Some verbs permit their starting and/or ending locations to be modified to include a referential locus for indicating the subject or object. These are often referred to as ‘agreeing verbs’ (or sometimes ‘depicting verbs’) (for an overview of agreement, see Mathur & Rathmann 2012). The problem that has arisen with the treatment of these verbs as standard ‘verb agreement’ results from the observations that (1) not all verbs are able to do this modification (‘plain verbs’), apparently on phonological (body contact) rather

<sup>4</sup> Standard notation of signs are given in small capitals. Since most sign glosses (with the exception of e.g., LIS PE, LSC MATEIX) are in English, I will give only an occasional interlinear gloss for clarity. Furthermore, glosses are chosen by the research community to reflect the meaning rather than morphology or phonology (e.g., no verb tense shown), and some are fairly arbitrary with respect to possible translations, for example whether the verb is labeled GIVE or GIVE-TO, since both <sub>1</sub>GIVE<sub>3</sub> or <sub>1</sub>GIVE-TO<sub>3</sub> would indicate an act of giving (of something) by first person to third person (with number separately marked).

than morphological, syntactic, or semantic bases, and (2) unlike spoken language agreement systems, SLs generally show agreement most frequently with the object, and subject agreement is only allowable in combination with object agreement; that is, there is no subject-only agreement, which is the most common type reported for spoken languages. Agreeing verbs vary across SLs, for example, the ASL sign ‘love’ is plain but its LIS counterpart is (object-)agreeing. There are two important subsets of agreeing verbs. One is the group of verbs that shows agreement with locative arguments rather than personal referent arguments (‘spatial verbs’). The other is a group of verbs that display ‘backwards agreement’, in which the locus of the starting point of the verb is that of the object and the ending pointing is the subject (‘backwards verbs’). Across SLs, backwards verbs vary such that knowing a verb is backwards in one SL does not entail that it will be backwards in another SL. Finally, sentences that involve plain verbs use other strategies to mark agreement, such as stricter word order, NMM, and/or special agreement marker signs (for example, NGT, DGS, and ÖGS have agreement marker signs).

## 2 Strategies for RC Identification

Aside from obvious semantic restrictiveness, there are generally three strategies that can be used to identify RCs in SLs: two manual markers (complementizers and relative pronouns), and non-manual marking (NMM). Cecchetto (2012) observes that no known SL uses *wh*-movement to form RCs.

### 2.1 Manual markers: complementizers and pronouns

For discussion here, we will take complementizer signs to be, by definition, unable to show modification for locus agreement with any established referent, and pronouns (and demonstratives) to be, by definition, required to show such modification. This distinction will be relevant to separation of uses of the ASL sign THAT, and the subsequent analysis of the PE sign in LIS.

#### 2.1.1 Complementizers

Liddell (1978; 1980) initially identified the ASL demonstrative and relative complementizer THAT (one-handed variant only). This sign occurs at the end of the RC (more details below). As a complementizer, THAT does not show spatial agreement with any nouns in the RC or in the main clause, that is, it does not move towards, or orient towards, any referential location nor is it made at that location but remains neutral in its formation with respect to direction of movement, orientation, and place of formation – which are the features that *could* be changed to show agreement. In contrast, in the focuser use, THAT may show such agreement but it is not required, and in the demonstrative use such agreement is required. Also, as a general rule, use of ‘that’ as a complementizer for straightforward embedded clauses (not RCs) are not overt in ASL nor, to my knowledge, other SLs. A sentence with an overt ‘that’ complementizer is usually branded as ‘Englishy’ by native signers, reflecting the influence of the dominant spoken language; the literature suggests similar situations across better-studied SLs.

#### 2.1.2 Relative pronouns

In contrast to more neutral complementizers, the use of relative pronouns as RC markers may involve agreement morphology. Both German SL (DGS) and Italian SL (LIS) have been shown to use relative pronouns. Relative pronouns show person agreement by moving or orienting toward a noun locus. Such person agreement is generally notated for SLs with subscripts using ‘1’ for first person, ‘2’ for second, and ‘3’ for third, with third further modified to disambiguate different third person referents, e.g. ‘3a’, ‘3b’. If only coreference is of interest, these are usually written with subscript ‘*i, j, k*’ etc.

DGS uses the relative pronoun labeled RPRO (for Relative PRONoun) which shows different formation for Human (RPRO-H) and Non-human (RPRO-NH) referents. In addition, these relative pronouns may show person agreement.

LIS uses a relative pronoun with multiple labels in the literature. Cecchetto et al. (2006) called it PROREL, and offer a correlative analysis for the RCs. Branchini & Donati (2009) refer to it as PE, and provide a counterargument that the LIS RCs are restrictive IHRC and analyze them as nominalized clauses with PE as a determiner. Brunelli (2011) subsequently analyzes PE as a demonstrative and explains its role in RCs and beyond (Section 4.1).

## 2.2 NMM of RCs

There is so far one common feature of all RCs in SLs: languages clearly mark the clause (or relative pronoun) with an identifiable and grammatical facial expression (NMM). As Tang & Lau (2012) note, the spreading domain of these NMMs is a clue to the analysis of relativization strategies, as well as to verb complementation, embedded negation, among others. Before the syntax of either the RC or the RC head noun can be discussed, the identification of RCs through NMM morphology needs to be understood.<sup>5</sup> The two main issues are (1) the relevant non-manual markings (the articulators and their positions or movements), and (2) the overt spreading domain of the RC NMM.

Of relevance to the discussion of IHRC, and RCs in general, is the upper face/larger domain marking. While SLs differ as to the functions assigned to each NMM articulation (which may be a single articulator or a combination of articulators), and the clear separation of upper and lower face may not hold in other SLs (or may also provide cues to other functions, Bross & Hole 2015), RCs are commonly marked by a larger domain NMM articulation. In ASL, this is brow raising ('br'). When researchers are not specific about which articulators are involved, they may simply mark the RC with an indicator 'r' to show that it has some NMM that clearly identifies the syntactic constituent as RC. All reports of RCs show at least some NMM domain marking over the whole RC in some types of RCs, with other options such as over only the relative pronoun possible. The importance of this marking is fairly well established – Liddell (1978) demonstrated that non-restrictive (appositive) RCs in ASL do not show brow raise marking, and without some such marking in other SLs, the clause is either not an RC (i.e., is an independent clause) or it is ungrammatical. Details will be discussed for each SL when possible below.

In ASL, RCs are marked with 'br', with co-occurring backward tilt of the head and muscle contraction that raises the cheek and upper lip (Liddell 1978; 2003). Coulter (1983) argues that the RC marking 'r' should be treated as a combination of topic ('br' plus chin up) and definite (raised upper lip), but he also argued for a conjoined analysis rather than embedded relativization, and this latter analysis has been rejected. However, his analysis of the NMM, specifically the definiteness marking, has not yet been revisited.

Other SLs have been reported to use 'br' either as a main marker or as an optional marker, although none of them have yet been shown to have the more general use of 'br' for operators described for ASL. For example, Kubus (2010; 2014) reports that TID RCs are marked with cheek raise and tensed upper lip and a squint that behaves like the 'shared knowledge' squint discussed for Israeli SL (ISL) in Dachkovsky & Sandler (2009). He indicates that optional 'relativizer/nominalizer' marking includes raised eyebrows ('br') and optional open mouthing /o/. For LIS relative clauses, Branchini & Donati (2009) report the use of a complex marker consisting of both 'br' and 'tensed eyes' (the upper area of the face including eyes and cheeks, also possibly equivalent to the 'squint' reported for ISL).

<sup>5</sup> Readers are referred to Pfau et al. (2012) for specialty chapters explaining pronouns, word order, and NMM in addition to specific chapters cited here.

They note that ‘br’ occurs in several syntactic environments, including yes/no questions, conditionals, topics, and focus constructions, and that ‘tensed eyes’ seems to be used only in extraposed constituents. However, Brunelli (2011) determines that in fact ‘tensed eyes’ is the primary marker of RCs, and that ‘br’ occurs only on those RCs that are also moved to TopicP in the left periphery, making it clear that ‘br’ marks topics and conditionals, but not specifically RCs unless they are also topics. If Brunelli is correct about LIS ‘tensed eyes’, then this language would not parallel ASL NMM in that the job performed by ‘br’ in ASL is split between ‘br’ and ‘tensed eyes’ (and perhaps other NMM). Another analysis explaining how the NMM functions are divided will be needed, reinforcing the need for further research in NMM typology.

### 3 ASL RCs

As indicated, not all SLs have IHRC and some SLs may have only IHRC. ASL can have both types, but they are syntactic-position dependent: sentence-initial RCs cannot have external heads in the sense that if the head is external, the RC portion must be extraposed, leaving the external head in subject position. In addition, the RC complementizer THAT is optional in non-final position, but is obligatory in sentence-final RCs (Liddell 1978: 78).<sup>6</sup> The following examples, adapted from Liddell (1978) and reconfirmed and extended by my own research, illustrate both external (2a, b) and internal (2c, d) heads, RCs on subject (2b, c) and object (2a, d) arguments of the main clause, and the presence of THAT (2a, b, d). (2b) also illustrates extraposition of the RC on the subject of the main clause (DOG) to the right and the requirement of having THAT because the RC itself appears in final position. (2c) shows that an initial IHRC need not have an overt complementizer THAT.

#### (2) ASL EHRC and IHRC

- a.  ${}_1\text{ASK}_3$            $\text{GIVE}_1$            $\text{DOG}$            $\text{[[URSULA KICK } e \text{ ] THAT ]}_{\text{DP}}$   $\text{br}$   
 1SG-ask-3SG    give-1SG    dog    [Ursula kick ]-br    that  
 ‘I asked him to give me the dog that Ursula kicked.’
- b.  $\text{DOG BITE}_1$            $\text{[[e CHASE CAT BEFORE] THAT ]}_{\text{DP}}$   $\text{br}$   
 ‘The dog bit me that chased the cat before.’
- c.  $\text{[[DOG CHASE CAT]}_{\text{CP}}]_{\text{DP}}$            $\text{BARK}$   $\text{br}$   
 ‘The dog that chased the cat barked.’
- d.  $\text{IX}_1$            $\text{FEED}$            $\text{[[DOG BITE CAT ] THAT ]}_{\text{DP}}$   $\text{br}$   
 ‘I fed the dog that bit the cat.’

As (2a-d) illustrate, the RC is marked by the extent of ‘br’. Note that complementizer THAT is outside of the domain of ‘br’ marking.<sup>7</sup> This fact suggests that it occupies the RC head-

<sup>6</sup> Tang & Lau (2012) provide an overview of the different forms of THAT discussed by Liddell.

<sup>7</sup> To be clear, the ‘br’ only marks the *restriction* of the relative clause operator (or any other operator that requires ‘br’ in ASL), and does not spread over the c-command domain; thus, the entire CP is not in the scope of the ‘br’, rather only the specifier position is so marked. As the head, THAT is not included in the ‘br’ marking. This is the point of the discussion in §3.3.3. that shows how a relative clause with THAT can be taken as the focus of a focuser THAT, in which case the focus operator takes everything (which includes the entire CP) that is in the specifier of D (the second THAT is in head D) and puts ‘br’ on it. As a result, this second process puts the RC THAT under ‘br’, whereas without focuser THAT, the RC THAT does not get ‘br’ marking.

final C position. It should be noted that ASL also has C on the right in main clauses, thus RCs, whether IHRC or EHRC, behave like main clauses in this respect.<sup>8</sup>

**3.1 Determining the head of ASL IHRC**

Liddell (1978; 1980) demonstrated that ASL IHRCs are sometimes ambiguous, as (3a, b, c) show. (3c) also provides the evidence that these are internal heads, as the temporal adverb RECENTLY that precedes DOG, the head of the RC, scopes the verb CHASE in the RC, not the main verb COME.

(3) ASL IHRC with ambiguous head<sup>9</sup>

- a.  $\overline{\text{r}}$   
 [CAT WATCH [DOG EAT HAMBURGER]] IX<sub>1</sub> BUY  
 ‘I bought the cat that watched the dog eat the hamburger.’  
 ‘I bought the dog that the cat watched eat the hamburger.’  
 ‘I bought the hamburger that the cat watched the dog eat.’
- b.  $\overline{\text{r}}$   
 CAT DOG BITE COME HOME  
 ‘The cat that the dog bit came home.’  
 ‘The dog that bit the cat came home.’
- c.  $\overline{\text{r}}$   
 RECENTLY DOG THAT CHASE CAT COME HOME  
 ‘The dog that recently chased the cat came home.’  
 ‘The cat that the dog recently chased came home.’

Critically, Liddell (1978) shows that THAT when used as the complementizer cannot be separated from the RC and can therefore not be mistaken for other uses of THAT, such as the demonstrative in subject position (4), because it is ungrammatical if THAT is separated from the RC.

- (4)  $\overline{\text{r}}$  { ANYWAY }  
 \*DOG BITE CAT { IX<sub>1</sub> THINK } THAT BRING HOSPITAL  
 (‘The cat the dog bit – { anyway } that’s the one that was brought to the hospital.)  
 { I think }

Liddell observed that there are several strategies that can be used to disambiguate the head in cases like (3a-c).<sup>10</sup> One strategy is to use intensification of the NMM: the muscle groups should be contracted more severely along with either thrusting the head slightly forward

<sup>8</sup> After years of dispute concerning the syntactic structure of ASL, especially the location of Spec, CP, the fact that all involved have concluded that the head of C is final is a rare point of agreement. That said, it is clear that ASL can be recast using a Cinque cartography, following Kayne’s (1994) principles of leftward only movement and all phrases having the structure Specifier-Head-Complement, and indeed Brunelli (2011) has done this for LIS and NGT, in part because he needs the subsequent ‘roll-ups’ to obtain the correct order with inversions inside the DP. ASL does not need such inversions, and the point here is ultimately that ASL is an SVO language with IHRCs, thus for legibility purposes (keeping track of the RC complementizer), I will leave the trees as shown here.

<sup>9</sup> The sign THAT in (3c) is labeled as THAT<sub>a</sub> by Liddell, who notes that this sign ‘comes between the subject and the verb’ and differentiates real RCs from sequences of simple sentences and/or questions. There are three phonological variants of demonstrative/relativizer THAT, which Liddell labels THAT<sub>a</sub>, THAT<sub>b</sub>, and THAT<sub>c</sub>; see Tang & Lau (2012) for further discussion. I will follow subsequent tradition and use the gloss THAT for all variants.

<sup>10</sup> In cases where the head is not ambiguous, Liddell reports that head signs are consistently longer than non-head signs, regardless of position effects. That is, final heads are longer than final non-heads, both of which are longer than initial or medial heads which are longer than initial or medial non-heads, respectively.

or quick head nodding or both while signing the head sign (5). This additional marking parallels the use of specific or focus marking of the head in some spoken languages.

- (5) ASL IHRC with disambiguated head

$$\frac{\quad i}{\quad r}$$
 DOG BITE CAT COME HOME  
 ‘The cat that the dog bit came home.’

A second disambiguation strategy is to change the word order to demonstrative-modifier-noun (6) (and also NMM intensification).

- (6) ASL IHRC with disambiguated head

$$\frac{\quad i}{\quad r}$$
 THAT CHASE CAT DOG RUN-AWAY  
 ‘The dog that chased the cat ran away.’

Note that this example is not ambiguous with respect to the agent of ‘chase’ – it can only be interpreted as the dog, reflecting a modification of the more general (S)VO order.

The third head-disambiguating strategy is a combination of intensification, demonstrative THAT, and copying of the RC head. The head can be copied to the end of the RC, where it is also marked with intensifying NMM and preceded by THAT (7).

- (7) ASL IHRC with disambiguated head

$$\frac{\quad i}{\quad r}$$
 [DOG BITE CAT] THAT CAT IX<sub>1</sub> FEED  
 ‘I fed the cat that the dog bit.’

In all these cases it is quite clear that the head is inside the RC in ASL.

Galloway (2011) provides two additional insights into disambiguating IHRC heads. One is that a subsequent pronoun can be useful. (8) illustrates the disambiguating effects of subsequent THAT, SELF, and IX (indexing/pointing). With respect to the non-focusing pronoun IX (8c, 8d), special NMMs occur and the location where they are made (indicated by the subscripts) clearly identifies which antecedent is functioning as the head of the IHRC.<sup>11</sup>

- (8) a. 
$$\frac{\quad r}{\quad r}$$
 GIRL<sub>a</sub> BORROW<sub>b</sub> BOOK THAT GONE  
 ‘It’s [the book the girl borrowed] that’s missing.’
- b. 
$$\frac{\quad r}{\quad r}$$
 GIRL<sub>a</sub> BORROW<sub>b</sub> BOOK SELF GONE  
 ‘It’s [the girl who borrowed the book] who is missing.’
- c. 
$$\frac{\quad r}{\quad r}$$
 GIRL<sub>a</sub> BORROW<sub>b</sub> BOOK IX<sub>b</sub> GONE  
 ‘[The book the girl borrowed] is missing.’  
 tense raised upper lip
- d. 
$$\frac{\quad r}{\quad r}$$
 GIRL<sub>a</sub> BORROW<sub>b</sub> BOOK IX<sub>a</sub> GONE  
 ‘[The girl who borrowed the book] is missing.’  
 lips together

<sup>11</sup> It may appear that THAT indicates inanimate and SELF indicates animate, but this is not a general behavior beyond IHRCs, as SELF may occur in SELF-relatives (Section 3.4.1) with both animate and inanimates, and THAT can occur as a focuser with animates (Wilbur 1994; Wilbur & Patschke 1998).

A second observation from Galloway (2011) is that verb agreement, when possible, can make the head clear. In (9),  ${}_a\text{BORROW}_b$  shows that the girl borrowed the book (from someone else); the verb GONE can then agree in location with the IHRC head shown by  ${}_a\text{BORROW}_b$  – location ‘a’ for the girl, location ‘b’ for the book (its origin).

- (9) a.  $\frac{\text{r}}{\text{GIRL } {}_a\text{BORROW}_b \text{ BOOK GONE}_b}$   
 ‘[The book the girl borrowed] is missing.’
- b.  $\frac{\text{r}}{\text{GIRL } {}_a\text{BORROW}_b \text{ BOOK GONE}_a}$   
 ‘[The girl who borrowed the book] is missing.’

With a verb like READ, which is not an agreeing verb, the resulting form remains ambiguous because there is no coindexing of space to identify an antecedent for the index on GONE (10).

- (10)  $\frac{\text{r}}{\text{GIRL READ BOOK GONE}_{a/b}}$   
 ‘The girl who read the book is missing.’  
 ‘The book that the girl read is missing.’

### 3.2 Determining the head of EHRCs

We now deal with the question of where the external head sits in EHRCs. ASL EHRCs provide a more varied picture of the possible argument options for heads and RCs than IHRCs; whether this is the result of language preference or an accident of the existing literature is hard to say. Galloway (2014) observes that IHRCs can occur in argument positions but that EHRCs cannot, being instead raised to clause-initial/left-peripheral position. (11) presents several ASL EHRCs (including (2a) and (2b) from Liddell, repeated here as (11a) and (11b); the rest from my own field work; ‘t’ is a general indicator of topic NMM). In (11a), the RC modifies the DOG which is the object of KICK and of GIVE; note that ‘br’ does not extend to it. In (11b), the RC modifies the external head and sentence subject DOG, which has no ‘br’; the RC has been rightward extraposed after the verb BITE.

- (11) a.  $\frac{\text{br}}{{}_1\text{ASK}_3 \text{ GIVE}_1 \text{ DOG } [[\text{URSULA KICK } e] \text{ THAT}]_{\text{DP}}}$   
 ‘I asked him to give me the dog that Ursula kicked.’
- b.  $\frac{\text{br}}{\text{DOG BITE}_1 [[e \text{ CHASE CAT BEFORE}] \text{ THAT}]_{\text{DP}}}$   
 ‘The dog that chased the cat before bit me.’ (Lit. ‘The dog bit me that chased the cat before.’)
- c.  $\frac{\text{t}}{\text{DOG IX}_1 \text{ SEE } [[e \text{ CHASE CAT}] \text{ THAT}]}$   
 ‘I saw the dog that chased the cat.’
- d.  $\frac{\text{t}}{\text{DOG IX}_1 \text{ SEE } [\text{JOHN SAY } [e \text{ CHASE CAT}] \text{ THAT}]}$   
 ‘I saw the dog that John said (that) chased the cat.’
- e.  $\frac{\text{t}}{\text{DOG IX}_1 \text{ SEE } [\text{THAT } [\text{JOHN SAY MARY CHASE } e] \text{ THAT}]}$   
 I saw the dog that John said (that) Mary chased

In (11c-e), the head DOG is fronted in topic position. (11d, e) show that the position of the unmoved head can be either subject or object and that it can be in an RC that is itself embedded under another clause (note presence of ‘br’ over the whole RC and the presence of THAT at the end). As indicated earlier, if DOG were extracted from the RC and fronted, as argued by Liddell (1978; 1980), this would be a violation of the Complex NP Constraint, which would prohibit extraction of the head out of the construction. It is possible to argue, following Lillo-Martin (1985; 1986; 1991) that DOG is a base-generated topic which licenses a null head inside the RC, or at least that they can involve long-distance dependencies. But the situation is more complicated than these examples illustrate. (12) shows that inside the RC can be an indirect *wh*-question containing the internal head (position marked by ‘e’); note how the ‘br’ that would normally cover the whole RC is interrupted by the presence of the [+*wh*], resulting in part of the RC being marked with ‘*wh*-q’ (brow lowering, among other NMMS). Nonetheless, the RC begins with ‘br’, and ends with the obligatory THAT, outside of both the ‘br’ and the ‘*wh*-q’. We will see that this is as would be predicted by our arguments on ‘br’ behavior and the function of THAT (Section 3.3).

(12)

- a.  $\begin{array}{c} \text{t} \\ \text{DOG IX}_1 \text{ SEE [THAT JOHN ASK [WHERE MARY CHASE e] THAT] } \end{array}$   
‘I saw the dog that John asked where Mary chased.’
- b.  $\begin{array}{c} \text{t} \\ \text{DOG IX}_1 \text{ SEE [THAT JOHN ASK [MARY CHASE e WHERE] THAT] } \end{array}$   
‘I saw the dog that John asked where Mary chased.’
- c.  $\begin{array}{c} \text{br} \\ \text{IX}_1 \text{ SEE DOG [THAT JOHN ASK [WHERE MARY CHASE e] THAT] } \end{array}$   
‘I saw the dog that John asked where Mary chased.’

These examples make it harder to maintain an extraction analysis. Instead, we would want to have in (12a, b) an external head DOG after the verb SEE (as in (12c)), with that external one being fronted in ((11c, d); (12a, b)) to avoid constraint violations. While these data establish that the head can be external, they raise a number of questions that now must be addressed. In particular, the following questions regarding IHRCs require special attention:

1. What is the general structure of ASL IHRCs?
2. How do we account for the location of ‘br’ in the RC?
3. How do we know that THAT is a complementizer in C and not a demonstrative/nominalizer in D?

After these questions have been addressed, other SL RCs will be reviewed to fill in the pieces and provide a broader picture. Finally, we return to the larger question of the global structure of IHRCs and EHRCs in Section 4.5 following Cinque (2005a; b), showing that a cartographic analysis can be adopted across those SLs studied to date, as suggested by Brunelli (2011) (Section 4.3).

### 3.3 The structure of ASL IHRC

#### 3.3.1 What is the general structure of the ASL relative clause?

Liddell (1980) argued that the ASL RC is a complex NP. He also argued that if a single source analysis for both EHRCs and IHRCs was desirable, then it was preferable for EHRCs to be derived from IHRCs with external heads resulting from raising. Subsequently, MacLaughlin (1997) argued for an articulated DP in ASL, but rejected Kayne’s (1994) ‘raising analysis’ in which the RC CP itself is the complement of the head. If we were to follow MacLaughlin, we would begin with the structure in (13), with D and N empty. However, even though D is empty, MacLaugh-

lin argues that it is still definite. For her analysis to work, the N slot needs to be available for extraction of the head from inside the CP to create EHRCs. As just discussed, such extractions are undesirable because they lead to violations of the Complex Noun Phrase constraint.

- (13) ASL RC  
 $[_{DP} D [_{NP} N CP ]$

It is preferable instead to follow Brunelli (2011), who provides a general analysis for LIS and NGT RCs using Cinque (2005a; b) as a model. The relevant difference here is the assumption that there are two Merges, one for the internal head in the RC and another for the external head. This assumption is congruent with the often observed fact that the head may serve one function in the main clause and another in the RC (allowing separate theta role assignments). Whether an IHRC or an EHRC results then follows from whichever head is higher after syntactic processes are completed, with the lower head being deleted. For our purposes, the difference compared to previous analyses of ASL is that neither the internal nor the external head is empty (and, it should be noted, that following Cinque, the head need not be a N, but could be a full NP itself).

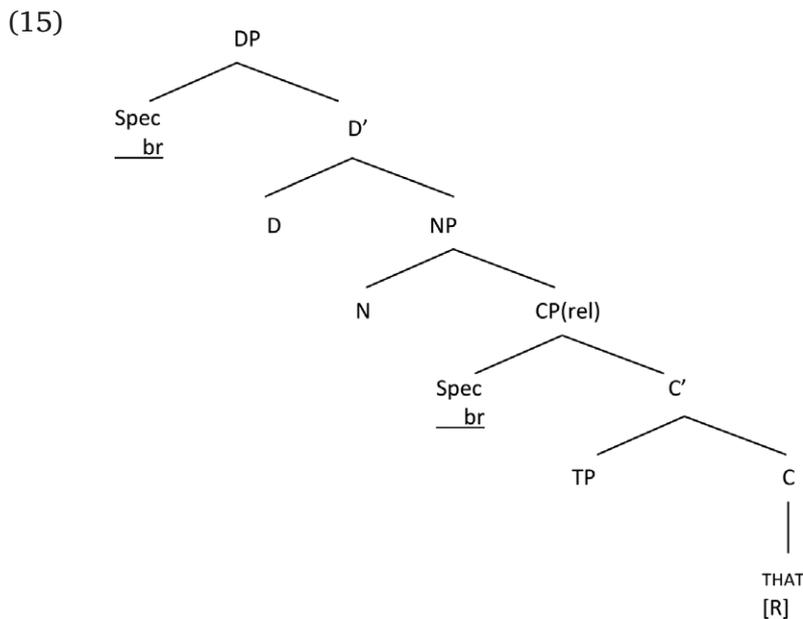
That said, we will continue with the general structure in (13) for the purpose of establishing the facts concerning the location of NMM and the function of THAT. To reformulate all of the examples in the form of Cinque’s trees would be cumbersome for the reader and would make the discussion of the data from the original sources unrecognizable; readers are referred to Brunelli (2011) for the full derivations.

**3.3.2 How do we account for the location of ‘br’ in the RC?**

In Section 2.2 on NMM marking and its role with respect to the grammar of SLs, we indicated that the literature supports the idea that RCs have some type of clear NMM, and that a frequent mention was raised brows ‘br’ which covered the relative pronoun (if present) or whole RC.

For ASL, when (13) is expanded, the structure of CP is with the head C on the right, as shown in (14) with the tree in (15).<sup>12</sup>

- (14)  $[_{DP} \emptyset_D [_{NP} N [_{CP} TP [_{C} [_{CP} TP ]_{NP} ]_{DP} ]_{NP} ]_{DP}$



<sup>12</sup> There is a long literature on the syntax of ASL, which concludes that ASL has mixed headedness, C is on the right, but D and other heads are on the left. ASL syntacticians agree that C is on the right, and with the exception of Neidle et al. (2000), accept Spec, CP on the left. That said, to be consistent in a cartographic analysis, C would have to be on the left, and various leftward movements would be needed to achieve the C-final configuration. For now, we will assume that some portion of the derivation has already taken place to arrive at this configuration. See also fn 8.

The key to understanding ‘br’ in ASL is that it is associated with a dyadic, that is, restrictive, operator reflecting a special operator-variable relationship between the RC and its head (shown in the tree as the [R] feature on C). Spec, CP and Spec, DP are the traditional operator positions. I have argued that ‘br’ covers the restriction of the operator (following Partee 1991; the RC is the restriction, the nuclear scope is the head) and does not spread over the c-command domain, in contrast to NMM associated with monadic operators like negation and [+wh]. Thus, we expect to see ‘br’ on the material in Spec, CP but not on the material in C (Wilbur 1999; Wilbur 2011a). For RCs, this means we expect to see ‘br’ on TP (raised to Spec, CP), but not on THAT; this yields (16), which is applied to (2d) to give (17).

$$(16) \quad [_{DP} \emptyset_D [_{NP} N [_{CP} [\overline{\text{br}}]_{\text{Spec, CP}} \text{ THAT } ]_{NP} ]_{DP}]_{TP}$$

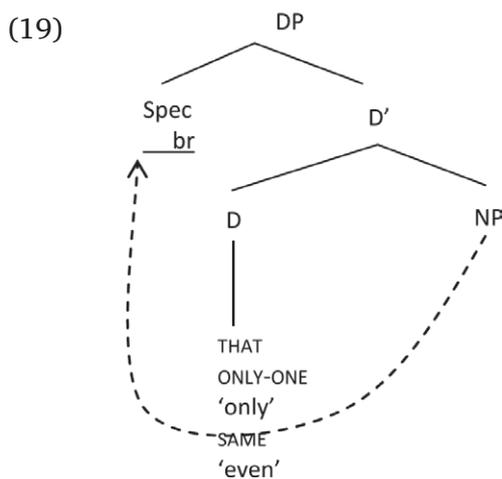
$$(17) \quad \text{IX}_1 \text{ FEED } [_{DP} \emptyset_D [_{NP} N [_{CP} [\overline{\text{br}}]_{\text{Spec, CP}} \text{ THAT } ]_{NP} ]_{DP}]_{TP} \text{ DOG BITE CAT}$$

**3.3.3 How do we know that THAT is in C and not in D?**

Given that C is on the right in ASL, it is conceivable that the D head could also be on the right and THAT could actually be located in D, with the restriction located in Spec, DP. We are able to reject this hypothesis based on the behavior of focuser signs, which sit in the D head, and their focus associates, which are the complements of D that have been moved to Spec, DP (this movement being overt) (18). THAT as a focuser is in a class that also includes the signs SAME ‘even’ (not as predicate), ONLY ‘only’, and SELF ‘self’ (emphatic, not reflexive), which have DP focus domains, with the focus associate located in Spec, DP and the focuser THAT outside of the ‘br’ (Wilbur 1994).

$$(18) \quad \overline{\text{br}} \text{ KIM ONLY-ONE GET-A}$$

‘Only Kim got an A.’



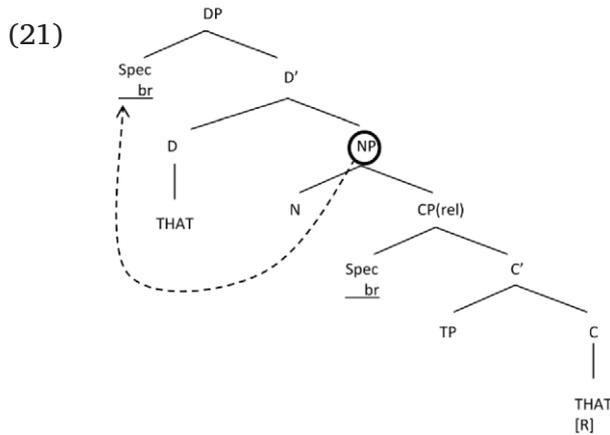
When RCs are themselves the complements of focuser D THAT, sequences of THAT THAT can occur, that is, the complementizer THAT followed by the focuser THAT. One difference between them *in this sequence* is that complementizer THAT is marked with lean forward, whereas focuser THAT has lean back (Wilbur & Patschke 1998).<sup>13</sup> (20) shows the effect

<sup>13</sup> Wilbur & Patschke (1998) describe the use of leans as NMM for semantic and pragmatic functions: forward for inclusion/assertion; backward for exclusion/rejection. Like [neg] and [wh], they have c-command domain.

of putting the IHRC in (17) into focus ((20a) adapted from Liddell 1978: 76; analysis in (20b, c) from Wilbur 1995). Note that now the complementizer THAT, which is normally outside the domain of ‘br’, is covered by ‘br’ – this is a result of moving the entire RC to the focus operator restriction in Spec, DP, where it gets ‘br’ from focuser THAT. In addition, intensification (‘i’) of the non-manual also appears. In (20b, c) we see confirmation that the RC complementizer THAT is not in D because it occurs inside the CP clause that the determiner THAT selects as its complement.

- (20)
- a.  $IX_1$  FEED  $\left[ \left[ \text{DOG BITE CAT THAT} \right] \right] \text{ THAT}$
- b.  $IX_1$  FEED  $\left[ \left[ \text{Spec, DP} \right] \left[ \text{THAT} \right]_{D[+foc]} \left[ \text{NP} \right] \text{ N} \left[ \left[ \left[ \text{TP} \text{ DOG BITE CAT} \right]_{\text{TP}} \right]_{\text{Spec, CP}} \left[ \text{THAT} \right]_C \right]_{\text{CP}} \right]_{\text{NP}} \right]_{\text{DP}}$
- c.  $IX_1$  FEED  $\left[ \left[ \text{Spec, DP} \right] \left[ \text{NP} \right] \text{ N} \left[ \left[ \left[ \text{TP} \text{ DOG BITE CAT} \right] \left[ \text{THAT} \right]_C \right]_{\text{CP}} \right]_{\text{NP}} \right]_{\text{Spec, DP}} \left[ \text{THAT} \right]_{D[+foc]} \left[ \text{e} \right]_{\text{NP}} \right]_{\text{DP}}$

(21) shows the focusing of RC, creating sequence of THAT (in RC C) and THAT (focuser in D).



In addition, we also have examples where D is not null but is occupied by demonstrative THAT, as well as the presence of THAT in the RC complementizer slot. This was shown in (11e), repeated as (22), and the RC portion is labeled below it to identify the location and function of each THAT.

- (22)  $\text{DOG } IX_1 \text{ SEE } \left[ \text{THAT } \left[ \text{JOHN SAY MARY CHASE e} \right] \text{ THAT} \right]$   
 $\text{DOG } IX_1 \text{ SEE } \left[ \left[ \text{DP} \left[ \text{D} \text{ THAT} \right] \right] \left[ \text{NP} \text{ } t_N \left[ \left[ \text{CP} \left[ \text{JOHN SAY } \left[ \text{MARY CHASE e} \right] \right] \text{ THAT} \right]_{\text{CP}} \right]_{\text{NP}} \right]_{\text{DP}}$   
 ‘I saw that dog that John said (that) Mary chased.’

### 3.4 Other relativization strategies

Other articles in this special issue deal with several target questions that we can only comment on briefly here. In particular, we note that (1) ASL IHRCs cannot stand alone (are not main clauses) as long as the ‘br’ marking is present (only yes/no questions can be main clauses with brow raise covering the entire clause); (2) it is not likely (but not yet demonstrated) that ASL IHRCs can conjoin, because ASL generally does not use overt

conjunctions so separating a conjoined IHRC from a complex/stacked IHRC would not be easy; and (3) it is not likely that ASL IHRCs can stack. Conjunction and stacking require more explicit investigation not only for ALS but for other SLs as well.

### 3.4.1 SELF relatives

In previous research on ASL structures containing nominal markers, Fischer & Johnson (1982) observed a variety of structures with SELF other than reflexives and suggested that the primary function of SELF for most signers is to mark definiteness. They also identified a scale of specificity, with classifiers as the least specific and pointing/indexing as the most specific. There is a ‘plain’ form of SELF and a variant form, which they gloss as SELF<sub>G</sub> (SELF hitting the index finger of the non-dominant hand), which they suggested tends to be used in more specific references than plain/single-handed SELF. Ferro (1992) addressed the general relationship of reflexives and other uses of ‘self’ in spoken languages, noting that contrastive focus marking is a significant cross-linguistic function of ‘self’ and that the reflexive use in English is a historically later development. SELF does participate in the contrast focus system in ASL (Wilbur & Patschke 1998).

Fischer and Johnson (1982) observed that SELF is used to introduce RCs containing new information.<sup>14</sup> SELF RCs can have an animate head (23, from Fischer & Johnson) or inanimate head (24, from Fischer & Johnson, and with ‘br’ marking from my own field work).

(23) LONG-TIME-AGO HAVE SMALL GIRL **SELF** LIVE YONDER FOREST<sup>15</sup>

‘A long time ago there was a small girl who lived in the woods.’

(24) a. br  
TABLE **SELF** IX<sub>3</sub> TRUE WOOD IX<sub>3</sub> EXPENSIVE  
‘A table that is made from real wood is very expensive.’

b. br  
DEAF PEOPLE AROUND PREFER [MOVIE **SELF** ACTION LIKE QUOTE #RAIDERS  
OTHER QUOTE SEARCH-FOR FIRE DIFFERENT + + ] TEND-TO PEOPLE  
LOVE ACTION  
‘Deaf people generally prefer movies that have action like “Raiders of the  
Lost Ark”, “Chariots of Fire”, etc.’

c. IX<sub>1</sub> WANT HUSBAND **SELF** RESPECT IX<sub>1</sub>  
‘I want a husband who will respect me.’

d. IX<sub>1</sub> HATE DREAM **SELF** IX<sub>1</sub> NAKED IN (FS)PUBLIC  
‘I hate dreams where I am naked in public.’

These sentences do not display the same consistency in NMM as IHRCs, and the location of SELF(G) in the sentence is less predictable, hence they are bolded. Whereas (24a) has the same marking as other IHRCs, and indeed has an IH ‘table’, the others do not show ‘br’ on the SELF-RC at all. Other NMM, such as ‘mouth corners down’ and nose wrinkle, tend to occur with these constructions but more investigation is necessary to fully understand the structure of these clauses and the different functions that they may perform (Wilbur 2011b). So far, nothing equivalent has been reported for other SLs.

<sup>14</sup> Mathur (1996) presents an interesting analysis of SELF -RCs with SELF marking presuppositionality.

<sup>15</sup> SELF is actually signed two-handed with the dominant hand hitting a non-dominant extended index finger; this is sometimes annotated SELF -1 or SELF -G, but the use of this sign compared to the single-handed SELF is still under investigation. Both versions appear to be acceptable in this example.

**3.4.2 Free relatives**

Another issue is the question of free relatives. Citko (2009) argues that free relatives share an underlying structure with headed relatives, and that both are dominated by DP. The difference is that free relatives fill the DP with a moved *wh*-DP, whereas headed relatives have the DP externally generated. These similarities lead to the issue of whether ASL, or other SLs, have free relatives. In this regard, Cecchetto (2012: 309) notes that in “no known sign language are (full) relative clauses formed by *wh*-movement”. This is certainly true for all of the ASL RCs above and, as will be seen, for the other SLs discussed in Section 4 below.

However these languages do have *wh*-signs and various *wh*-movement and in situ options (see summary in Cecchetto 2012: 307). In addition, ASL makes very common use of the pseudocleft or *wh*-cleft, as shown in (25) (Wilbur 1996; Wilbur & Patschke 1999).

- (25) a.  $\frac{\text{br}}{\text{MARY PROFESSION IN-PAST WHAT, IX TOYS BROKEN MARY BUILD AGAIN FOR CHILDREN}}$   
 ‘What Mary used to do as a profession was repair children’s broken toys.’
- b.  $\frac{\text{br}}{\text{PAUL BUY WHICH COMPUTER, MAC}}$   
 ‘The computer which Paul bought is a Mac.’
- c.  $\frac{\text{br}}{\text{PAUL BUY COMPUTER WHICH, MAC}}$
- d.  $\frac{\text{br}}{\text{COMPUTER, PAUL BUY WHICH, MAC}}$
- e.  $\frac{\text{br}}{*COMPUTER, WHICH PAUL BUY, MAC}$

Note the right edge preference for *wh*-word in (25c–e). (25b) shows that the *wh*-word does not have to be at the right edge if it appears as part of a d-linked complex NP (which computer), and (25e) demonstrates that when separated from its NP by topicalization, the *wh*-word cannot appear elsewhere (even when fronted by a process that is acceptable in otherwise full-fledged *wh*-clauses). This preference may be overridden when the *wh*-word can appear in situ, although versions with *wh*-sign on the right also occur (26):

- (26) a.  $\frac{\text{br}}{\text{ANNE SEE WHO IN GARAGE, BILL}}$
- b.  $\frac{\text{br}}{\text{ANNE SEE IN GARAGE WHO, BILL}}$   
 ‘The person who Anne saw in the garage was Bill.’

That the examples in (25) and (26) are not sequences of (rhetorical) questions followed by answers but constitute a complex structure dominated by a single CP at the top is seen clearly by their embeddability (27).

- (27) a.  $\frac{\text{br}}{\text{ELLEN TELL}_1 \text{ WHICH COMPUTER PAUL BUY, MAC}}$
- b.  $\frac{\text{br}}{\text{ELLEN TELL}_1 \text{ COMPUTER, PAUL BUY WHICH, MAC}}$   
 ‘Ellen told me that the computer which Paul bought is a Mac.’



- \_\_\_\_\_ r
- c. ONE CAN'T SIGN KNOW POSS-1 MOTHER  
'The one who can't sign knows my mother.'

It is also possible that the difference is related to the use of ONE in RC object position in (31a) versus RC subject position in (31c). Another possibility is an animacy distinction, with ONE being preferred for animate referents (31c). Kubus (2010) observes that in TĪD, there is a Subject Relativization preference if the referent is animate, whereas there is an Object Relativization preference if the referent is inanimate. This remains to be further investigated for ASL and for other SLs in general.

#### 4 Typological perspective on RCs in SLs

In this section, the analyses of RCs in several other SLs will be presented, with an eye primarily on the total picture of RCs in the signed modality. At the end of this section, the descriptions will be summarized, and then compared to typological generalizations that have been proposed based on spoken languages. After that, we can conclude by addressing the question of how to relate ASL IHRCs and EHRCs.

##### 4.1 Italian Sign Language (LIS)

The RCs in LIS have undergone several linguistic analyses in a rather short period of time.<sup>17</sup> LIS differs from ASL in several ways. As a reminder, LIS has SOV order, whereas ASL has SVO. Unlike ASL which uses a relative complementizer THAT which must remain neutral (cannot show agreement with any NPs), LIS uses a sign glossed PE which can show agreement with the head.<sup>18</sup> ASL complementizer THAT must remain outside the RC NMM (except for cases where it is inside focus; Section 3.3.3), whereas LIS PE can appear inside the RC NMM as well as outside. The status of PE, that is, whether it is a relative pronoun or nominalizer, has been part of the reason for the various analyses and the presentation here will follow Brunelli (2011).

Example (32) (from Branchini & Donati 2009) illustrates the difference between a conjoined structure (32a) and an IHRC (32b). The optional IX<sub>i</sub> is a second clause subject pronoun. In (32b), PE is coindexed with the head noun DOG and shows agreement (formed in or oriented toward the same location in space) with it.

- (32) a. DOG<sub>i</sub> CAT CHASE (IX<sub>i</sub>) HOME COME DONE  
'The dog chased the cat and came home.'
- \_\_\_\_\_ rel
- b. DOG<sub>i</sub> CAT CHASE PE<sub>i</sub> (IX<sub>i</sub>) HOME COME DONE  
'The dog that chased the cat came home.'

Another example with NMM that is not completely spread suggests that an externally-headed RC (STUDENT) is possible in LIS, in contrast to Branchini & Donati's claim (33).<sup>19</sup>

- \_\_\_\_\_ rel
- (33) STUDENT<sub>i</sub> EXAM DONE PE<sub>i</sub> ALL<sub>i</sub> PASS  
'The students that took the exam all passed.'

<sup>17</sup> Cecchetto et al. (2006) as correlatives; Branchini & Donati (2009) as IHRCs which are always located to the left of the main clause; Brunelli (2011) as both in situ IHRCs not always to the left of the main clause and as EHRCs.

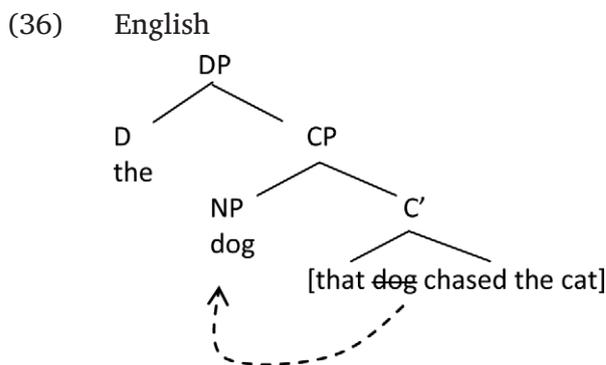
<sup>18</sup> Cecchetto et al. (2006) label this as PROREL. I will follow Branchini & Donati (2009) and call it PE, so-named because of the co-occurring silent articulation of a labial stop.

<sup>19</sup> And indeed Brunelli (2011) argues that LIS has EHRCs and provides a clear derivation that differs from IHRCs.

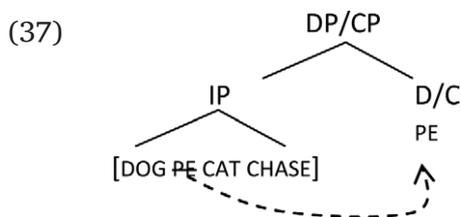
Branchini & Donati (2009) argue that LIS RCs are internally-headed and obligatorily fronted to the left, citing island sensitivity as evidence for movement (the grammaticality of (34) in contrast to the ungrammaticality of (35)).

- (34)  $\overline{\text{rel}}$   
 [CHILD<sub>i</sub> COMPETITION WIN PE<sub>i</sub>] [IX<sub>1</sub> KNOW TEACHER PRIZE ~~CHILD COMPETITION WIN PE~~ GIVE]  
 ‘I know that the teacher gave a prize to the child who won the competition.’
- (35) \*[ CHILD<sub>i</sub> COMPETITION WIN PE<sub>i</sub>] [TEACHER<sub>k</sub> PRIZE ~~CHILD COMPETITION WIN PE~~ GIVE PE<sub>k</sub>] [IX<sub>1</sub> KNOW]  
 ‘I know the teacher that gave a prize to the child who won the competition.’

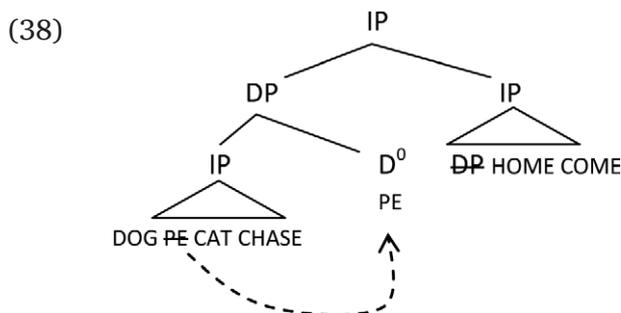
They adopt the raising analysis from Kayne (1994) with modifications needed to accommodate the facts of LIS. In Kayne’s analysis, the RC CP is the complement of D (36), and its dependency on the noun is achieved by movement of an NP from inside the RC to a position outside.<sup>20</sup>



An unusual aspect of their analysis for LIS is that they ‘co-label’ the DP and D nodes with CP and C, respectively (37). PE then moves to the phrasal head position.<sup>21</sup>



They argue that PE is a determiner and that the “C head of the clause derivationally acquires the status of a D head (projecting DP) by hosting the PE head which has head-moved to that position” (Cecchetto & Donati 2015: 175). This DP then serves as the subject of the main clause (38).



<sup>20</sup> Development of Kayne’s raising model from NP to DP can be found in Branchini (2007).  
<sup>21</sup> In their analysis, PE is the determiner that heads DP with the RC as its complement. It is assumed that A’-bar movement is minimality-relativized (Donati & Cecchetto 2011; Cecchetto & Donati 2015), so that Head Movement Constraint effects should not be an issue.

Like English restrictive RCs, LIS relatives do not allow a pronominal head, do not permit sentential adverbs to appear inside them, do not permit proper names to serve as heads, and restrict the scope of an ordinal appearing before the RC antecedent (‹the first woman that I kissed works in a bank› as opposed to ‹the first woman, that I kissed, works in a bank›). Also like English RCs, LIS relatives can occur inside the scope of matrix negation, can be stacked, can occur in the scope of intensional verbs, and may occur in the antecedent for VP ellipsis.<sup>22</sup> Branchini and Donati take this total parallel of LIS relatives with English restrictive RCs as evidence that the LIS relatives are restrictive rather than non-restrictive as Cecchetto et al had argued in their correlative analysis.

They also argue against an analysis with the same LF representation for both IHRC and EHRC. Instead, they trigger the restrictive interpretation of the IHRC by movement of the determiner PE from the RC to the C head of the RC CP, where it projects a DP of which it is head. The behavior of PE-clauses as a left-extraposited nominal which leaves a trace optionally spelled out by a resumptive pronoun is taken as additional support for this approach.

Brunelli (2011) objects to this analysis, calling it ‘counterintuitive’ that the determiner of one argument should at the same time act as the ‘determiner-like element’ of the entire clause.<sup>23</sup> He argues that the LIS DP has the structure Specifier-Head-Complement and, following Bertone (2007), exhibits ‘roll-up’ to achieve the (inverted) surface order N – Adj – Num – Dem (if all are present; Cinque 2005a) so that Spec, DP is filled.<sup>24</sup> He points out that, if this is so, it raises difficulties for prior analyses of PE because (1) PE can agree with the head N, which is problematic if it is also the head of CP; (2) CP is also Specifier-Head-Complement, which leaves the position of PE in clause-final position unexplained; and (3) clause-final PE should be outside RC NMM if it is in C, but it falls under the NMM. Brunelli considers various movement and in situ options, and ultimately decides that (at least some) LIS PE -IHRCs are in fact circumnominal. For this, two analyses are offered. First, PE raises leftward and is subsequently crossed over by leftward remnant movement of the remaining RC, such that PE ends up in RC final position, under the NMM, and the rest of the clause precedes it. Alternatively, either the whole RC raises (no PE extraction) or else no raising takes place, giving in situ PE -RCs. Brunelli’s idea, then, is that EHRCs differ from IHRCs in one respect, namely that the external head is raised.

It is worth pursuing Brunelli’s argument further, because he ultimately recognizes what the previous analyses of LIS RCs have missed. Perhaps the most critical observation is that in his attention to the details of the NMM, he is able to demonstrate that the RC NMM in LIS is ‘tensed eyes’, and that ‘brow raise’ only occurs on those RCs that are fronted – indeed, he argues that ‘brow raise’ is the NMM for Topics, so that fronted RCs are in essence being moved to Topic position where they receive ‘brow raise’. Crucially, those RCs that stay in situ do not display ‘brow raise’, only ‘tensed eyes’. Unlike ASL, which associates ‘brow raise’ with all restrictive operators (which includes topics, conditionals, and RCs, among others), apparently LIS has developed a different system which separates

<sup>22</sup> They provide example (i) as evidence of stacking:

(i)  $\frac{\text{VASE}_i \text{ SEE DONE PE}_i \text{ TODAY I BUY PE}_i \text{ EXPENSIVE}}{\text{The vase that I saw that I bought today is expensive.}}$

<sup>23</sup> Cecchetto & Donati (2016) provide additional arguments for the nominalizing behavior of the movement of PE, so this discussion is continuing. Nonetheless, they do not reference Brunelli (2011) and all of the examples they discuss are sentence-initial, that is, there are no examples which are RCs but not topics. It is possible that PE is marking definiteness, since topics must be definite, but it is not possible to confirm or refute that with the data given.

<sup>24</sup> According to Bertone (2007), Spec, DP must be filled by the N with whatever pied-pipes with it because Spec, DP is where definiteness is encoded and LIS (and other SLs) lack determiners to indicate definite/indefinite. Instead, definite nouns tend to be articulated in a definite spatial position, the features of which are hosted in D.

restrictive ('tensed eyes') from topic – the exact characterization of this NMM operator system awaits further investigation.

Another insight is how Brunelli analyzes the observation that PE is not restricted to RCs (reported in Branchini 2006), and therefore is better analyzed as a demonstrative (even though this conflicts with his own previous analysis of PE as a quantifier, Brunelli 2006). He accounts for the behavior of PE in RCs by suggesting, first, that whether PE moves is related to focus features, and second, that PE can raise with the RC head NP, or alone (although there may still be subsequent movements of the RC, yielding a different surface order), or not at all, that is, it may stay in situ with an in situ RC, or it may stay in situ inside the RC when the whole RC is moved. This accounts for all the possibilities that are attested.

The full analysis that Brunelli proposes follows Cinque (2005a; b) using a cartography and leftward-only movement. One immediate benefit of doing this is Cinque's notion that RCs involve double merge of the head NP. Given that the head NP has a role in the main clause and also a role in the RC, and that the roles need not be identical, double merge permits the NP to be entered in both of its role-playing positions. Which one actually shows up in a sentence, that is, whether the RC is EHRC (head outside) or IHRC (head inside), is a result of the final linearization of the sentence – whichever of the two NPs ends up higher in the tree causes the other one to delete. Thus, the end result for LIS are the following possibilities:

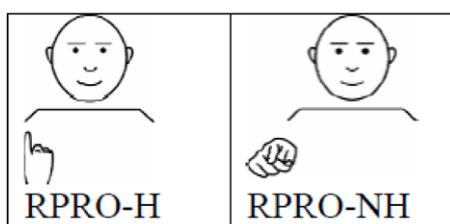
- a. The RC internal head raises (leftward above the RC), resulting in the external head deleting: int. head – RC – (~~ext.head~~)
- b. The whole RC raises with internal head in situ, the external head deletes: RC[...int.head...] – (~~ext.head~~)
- c. The external head raises, the internal head deletes, a post-nominal RC results: ext.head – (~~int.head~~) – RC
- d. An overt relative pronoun or demonstrative is present with the head and is unaffected by deletion:  
ext.head – rel.pron. (~~int.head~~) – RC  
or  
ext.head – [(~~int.head~~) rel.pron. – RC]

The options shown in (d) cover the cases with PE for LIS, as well as for the relative pronouns in DGS, to which we now turn. After covering details of DGS, we will present trees adapted from Brunelli showing both EHRC and IHRC structures (Section 4.3).

#### 4.2 German Sign Language (DGS)

Pfau & Steinbach (2005) demonstrate that DGS RCs are externally-headed, appear post-nominally, and use clause-initial relative pronouns.<sup>25</sup> The EHRC itself may appear fronted, extraposed, or in situ. In addition, the relative pronoun (RPRO) differs in form for human (H) and non-human (NH) referents (39).

(39) Two relative pronoun forms



<sup>25</sup> Pfau & Steinbach report that RPRO is marked with 'br' NMM that does *not* spread over the whole RC; Branchini et al (2007) report that it can spread.

Unlike ASL, with RC-final complementizer *THAT*, and LIS, with generally-final *PE*, the DGS relative pronoun is RC-initial (40).

- (40) a.  $\frac{\text{br}}{[\text{MAN (IX}_3) [\text{RPRO-H}_3 \text{ CAT STROKE}]_{\text{CP}}]_{\text{DP}}}$   
 ‘the man who is stroking the cat’
- b.  $\frac{\text{br}}{[\text{BOOK} [\text{RPRO-NH}_3 \text{ POSS}_1 \text{ FATHER READ}]_{\text{CP}}]_{\text{DP}}}$   
 ‘the book which my father is reading’

Pfau & Steinbach provide an explicit test showing that the head is external, namely that if a temporal adverb precedes the head, the adverb scopes the main verb rather than the embedded verb (41).

- (41)  $\frac{\text{br}}{\text{YESTERDAY} [\text{MAN (IX}_3) [\text{RPRO-H}_3 \text{ CAT STROKE}]_{\text{CP}}]_{\text{DP}} \text{ ARRIVE}}$   
 ‘The man who is stroking the cat arrived yesterday.’  
 \*‘The man arrives who stroked the cat yesterday.’

Given this, they assume that the head is base-generated outside the RC. Comparing DGS and ASL, they assume that the RC is adjoined to DP in the base position. For them, the next step is (optional) topicalization of the whole DP including the RC, accounting for the topic NMM.<sup>26</sup> Topicalization of the RC without its (external) head is ungrammatical; however the RC by itself can be extraposed to the right.

DGS differs from ASL in that the NMM in DGS covers only the relative pronoun. Pfau & Steinbach (2005) assume that in DGS *RPRO* moves to the specifier of the highest Topic Phrase to check a [+rel] feature, which is then realized as NMM ‘br’ on the *RPRO*. However, Brunelli (2011) observes that the same derivation that he proposes for LIS (Section 4.1) works as well for DGS. RC initial *RPRO(NH)* is a variation of what he observed for LIS (ext.head – *PE* – RC), namely ext.head – *RPRO* – RC. If this is the case, then a detail to be resolved is how the ‘br’ marking is given only to *RPRO* and not to the external head.<sup>27</sup>

### 4.3 Brunelli’s combined analysis of LIS and DGS

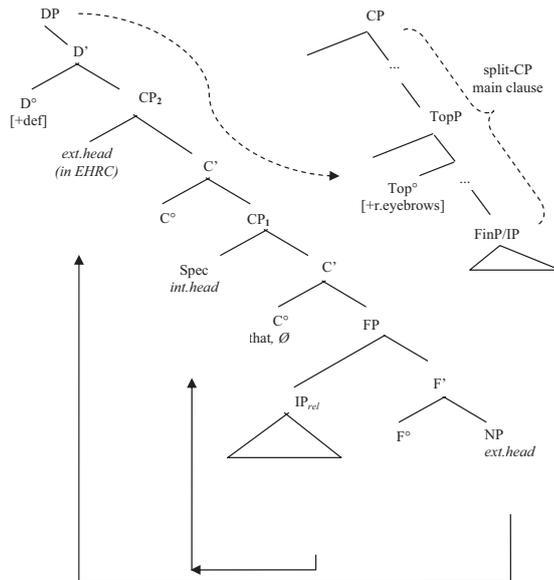
Brunelli observes that one account can cover LIS initial-*PE* EHRCs, DGS initial- *RPRO(NH)* EHRCs, and LIS EHRCs without *PE*. The basic outline is given in (42a) and with partial examples of these in (42b). Initially there is a merge for the external head in the NP position (shown at the bottom of the DP). In addition, there is a second merge of the internal head inside the IP that is the modifying RC. There is a functional phrase that contains both the external head NP and the modifying RC IP; the head of this phrase contains the feature responsible for the ‘tensed eyes’ NMM on the RC. The external head NP raises to the speci-

<sup>26</sup> Our account of NMM marking argues that it is not topic per se, but the marking of the restriction of the dyadic semantic operator in order to explain the occurrences of ‘br’ beyond RCs and topics in ASL. Whether this holds for DGS remains to be determined.

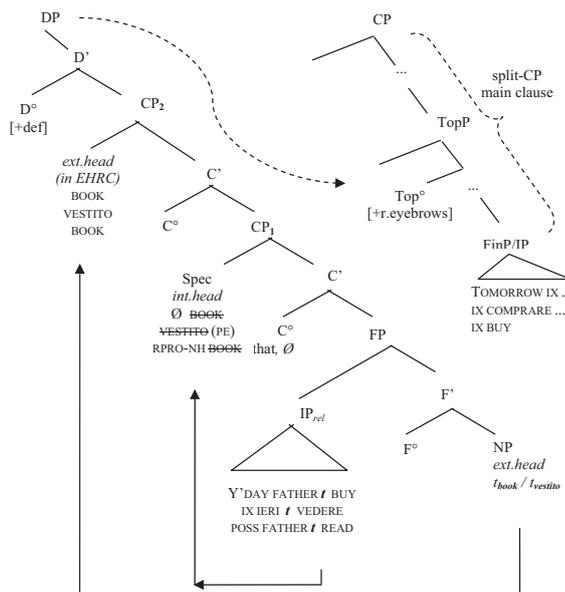
<sup>27</sup> Brunelli’s account for LIS puts the NMM over the entire RC, not just *PE*. Branchini & Donati (2009) provide examples with NMM only on *PE*, but Brunelli says he is unable to verify these cases or explain how they would arise. Likewise, the problem with DGS is that applying Brunelli’s analysis for LIS to DGS should yield NMM over the entire RC in DGS and not only on the *RPRO*. Thus, the word order works correctly, but the NMM still requires additional attention.

fier of one of Cinque’s RC CPs (the top one shown) to give postnominal RCs. The RC IP or just its internal head can raise to the specifier of the lower RC CP; this gives clause-initial PE or RPRO as needed. The end result is the linear order ext.head – PE/RPRO – RC for those with PE/RPRO, or ext.head – Ø – RC for LIS EHRCs without PE. Brunelli provides evidence for each of these movements. Note finally, that if the entire DP is moved to Spec, Top (in the main clause left periphery), the RC will also receive ‘raised eyebrows’. However, if it remains in situ, no ‘br’ will join ‘tensed eyes’.

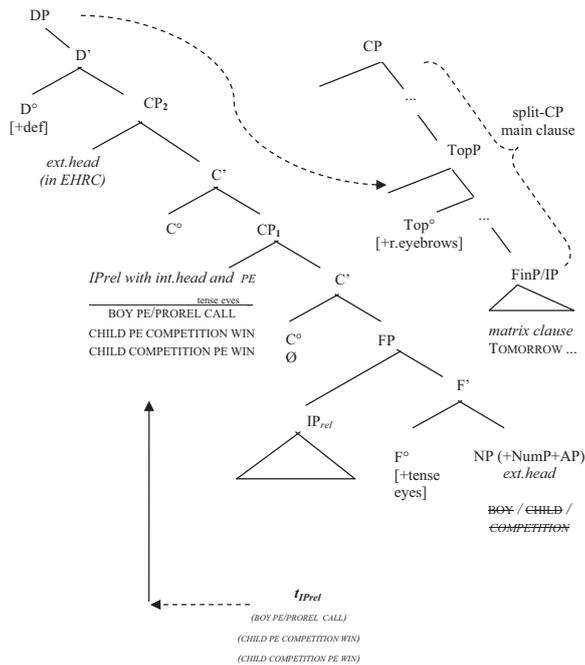
(42) a. Basic structure of double merge EHRC (adapted from Brunelli 2011: 269)



b. Structure filled with partial examples from LIS and DGS (from Brunelli 2011: 269)



(43) Basic structure of IHRC (adapted from Brunelli 2011).



With respect to the structure of IHRCs, the same double merge takes place (43). The RC IP obtains ‘tensed eyes’ from the feature in the head of FP (Spec-Head agreement), then raises to Spec, CP. It is higher than the external head, so the external head deletes. PE does not move out of the RC and remains in whatever position it was originally merged in. Movement to Spec, Top results in ‘br’ as with EHRCs. The resulting order is internal head – RC – Ø.

4.4 Turkish Sign Language (TİD)

Additional support for Brunelli’s analysis comes from Kubus (2014), who analyzes TİD, an SOV language, as having both EHRC in situ, and IHRCs that can be fronted or extraposed. The only clear manual RC marker is (optional) clause-final IX which seems most similar to a nominalizer. Another special sign ANYI only occurs optionally in restrictive RCs. Kubus notes that there is a distinction in NMM on the head noun and on the RC itself. Restrictive RCs have tensed face in general – tensed eyes (squint), lips, cheeks, as well as head forward, body lean, and possibly a special headshake. Importantly, non-restrictive RCs do not show this NMM but use a variety of other strategies. His analysis of ‘brow raise’ is that it marks topicalization, parallel to what is observed for LIS by Brunelli (2011).

4.5 Catalan Sign Language (LSC)

LSC, an SVO language (Forcadell 2013), provides a novel signed RC marker that has not been reported for other SLs (Mosella Sanz 2011). This is the sign MATEIX ‘the same’, which has apparently been grammaticalized into a nominalizer, and can be used outside of RCs in constructions like RED MATEIX ‘the red one’ or POSS-1 MATEIX ‘mine’. If it occurs with an RC, the RC precedes it. However it is not required (compare (44 a, b)):

- (44) a.  $\overline{\text{rel}}$   
TEACHER IX1 SON HELP + + + MATEIX IX1 PLANT GIVE  
‘I gave a plant to the teacher who has helped my son a lot.’
- b.  $\overline{\text{rel}}$   
TEACHER IX1 SON HELP + + + IX1 PLANT GIVE

The NMM cluster ‘rel’ includes raised eyebrows, body lean and squinted/tensed eyes. In his discussion of Mosella Sanz, Brunelli (2011) notes that it is possible that in fact RCs have squint/tensed eyes like LIS, and that the brow raise may be the result of fronting (again to topic as in LIS). It is difficult to tell because RCs cannot occur in situ but must be either fronted or extraposed.

**4.6 The relationship of ASL EHRCs and IHRCs given a double merge analysis**

If we return to ASL in light of the data from these other sign languages and Brunelli’s analysis of them, we see that ASL fits the picture very nicely. If we assume, following Cinque and as shown in (42) and (43) modified from Brunelli (2011) that all RCs are generated above the external heads, and that the RCs also contain an internal head, we find the following options for the ASL data shown in Section 3.<sup>28</sup>

(45) ASL EHRCs

a. External head in situ, RC extraposed

- i.  $\text{DOG BITE}_1$   $\overbrace{[[e \text{ CHASE CAT BEFORE}]]}^{\text{br}} \text{ THAT ]}_{\text{DP}}$  (Liddell’s formulation)  
 ‘The dog that chased the cat before bit me.’  
 $[[\text{int.head\_DOG CHASE CAT BEFORE}]] \text{ THAT ]}_{\text{DP}}$  ext.head\_DOG BITE<sub>1</sub>  
 (Following Brunelli 2011)  
 $t_{\text{IHRC}}$  ext.head\_DOG BITE<sub>1</sub>  $[[\text{int.head\_dog CHASE CAT BEFORE}]] \text{ THAT ]}_{\text{DP}}$   
 $t$  ext.head\_DOG BITE<sub>1</sub>  $[[\text{int.head\_dog CHASE CAT BEFORE}]] \text{ THAT ]}_{\text{DP}}$   
 $t$  ext. head\_subject VP  $[[\text{int.head} - \text{RC}]] \text{ Comp}$ -extraposed

b. External head raised, RC in situ

- i.  $\text{IX}_1$  SEE DOG  $\overbrace{[\text{THAT JOHN ASK}]}^{\text{br}} \overbrace{[\text{WHERE MARY CHASE } e]}^{\text{wh-q}} \text{ THAT]}$   
 ‘I saw the dog that John asked where Mary chased.’  
 $\text{IX}_1$  SEE ext.head\_DOG  $[\text{THAT JOHN ASK} [\text{WHERE MARY CHASE int.head\_DOG}]]$ -Comp]  $t_{\text{ext head}}$

c. External head topicalized (with cyclic raising), RC in situ

- i.  $\overbrace{\text{DOG IX}_1 \text{ SEE}}^t$   $\overbrace{[\text{THAT JOHN ASK}]}^{\text{br}} \overbrace{[\text{WHERE MARY CHASE } e]}^{\text{wh-q}} \text{ THAT]}$   
 ‘I saw the dog that John asked where Mary chased.’  
 ext.head\_DOG -raised  $\text{IX}_1$  SEE  $t$   $[\text{THAT JOHN ASK} [\text{WHERE MARY CHASE int-head\_DOG}]]$ -Comp]  $t_{\text{ext head}}$

(46) ASL IHRCs

a. In situ RC with internal head in situ, external head deleted, subject position

- i.  $\overbrace{[[\text{DOG CHASE CAT}]]_{\text{CP}}}_{\text{br}} \text{ BARK}$   
 $[[\text{int.head\_DOG} \dots \text{RC}]] \text{ } \emptyset_{\text{Comp}}]_{\text{DP}}$  ext.head\_DOG BARK
- ii.  $\overbrace{\text{GIRL}_a \text{ BORROW}_b \text{ BOOK GONE}_b}^r$   
 ‘[The book the girl borrowed] is missing.’  
 $[\text{RC int.head\_BOOK}] \text{ ext.head\_BOOK GONE}$

<sup>28</sup> As an SVO language, typologically ASL has VO and NRel (Cinque 2005b and references therein). That said, Cinque assumes that such order is derived by movement, and I have kept my analysis consistent with the trees in (42) and (43).

- iii.  $\overline{\text{r}}$   
 GIRL<sub>a</sub> BORROW<sub>b</sub> BOOK GONE<sub>a</sub>  
 ‘[The girl who borrowed the book] is missing.’  
 [int.head\_GIRL RC] ext.head\_GIRL GONE
- b. In situ RC with internal head in situ, external head deleted, object position  
 $\overline{\text{br}}$   
 IX<sub>1</sub> FEED [[DOG BITE CAT ] THAT]<sub>DP</sub>  
 IX<sub>1</sub> FEED [[int.head\_DOG ...RC] Comp]<sub>CP</sub> ext.head\_DOG
- c. Ambiguous IHRC with internal head, external head deleted<sup>29</sup>
- i.  $\overline{\text{r}}$   
 CAT DOG BITE COME HOME  
 ‘The cat that the dog bit came home.’  
 [int.head\_CAT ...RC] ext.head\_CAT CAME HOME  
 ‘The dog that bit the cat came home.’  
 [CAT ... int.head\_DOG ...RC] ext.head\_DOG CAME HOME
- ii.  $\overline{\text{r}}$   
 GIRL READ BOOK GONE<sub>a/b</sub>  
 ‘The girl who read the book is missing.’  
 [int.head\_GIRL RC] ext.head\_GIRL GONE  
 ‘The book that the girl read is missing.’  
 [RC int.head\_BOOK] ext.head\_BOOK GONE

Finally, it bears mentioning that there are still ASL examples which do not neatly fit with this analysis. This includes those with special measures for disambiguating the head, such as a copy of the head inside the RC (cf. example 7). Such examples await further investigation.

## 5 Typological generalizations and SLs

Let us turn finally to how the SLs fit with the existing typological generalizations and what they can contribute to this discussion. The literature on IHRCs contains a number of proposed generalizations regarding possible correlations with language structures and the presence of IHRCs in a language. Here some of the most relevant are presented and discussed.

### 5.1 Structural generalizations

The relative rarity of IHRCs across languages led Cole (1987) to suggest a Word Order generalization, namely that IHRCs only occur in languages which have basic SOV word order and the possibility of null anaphors. This is apparently not the case, as Hiraiwa (in press) documents a long list of studies of languages that have IHRCs and strictly or predominantly SVO order. From the SL data, we see that ASL is also an SVO language that has IHRCs (as well as EHRCs). Following the search for an adequate generalization, Watanabe (1992) suggested that IHRCs are restricted to *wh*-in situ languages. He speculated that the movement of *wh*-relative pronouns or operators in EHRCs is paralleled in IHRCs, but that only the null operator is moved, leaving everything else in situ. This would also provide an explanation for why in situ IHRCs behave like syntactic islands. However since such island effects are only found in some languages, this mechanism cannot be a cross-linguistic generalization for IHRCs (further discussion of this issue may be found in Hiraiwa in press). That said, at this point, to my knowledge, no SLs IHRCs have been carefully tested to see whether they show island effects, identifying an area in need of extensive further research.

<sup>29</sup> It appears that this occurs primarily in subject position.

Taking the sign languages together (ASL, LIS, DGS, TID, and LSC), one gets the impression that they differ more along the lines of what raising options are possible and required than on how their ERHCs and IHRCs are formed. From this perspective, Cinque's model performs very well, and the question of why many languages do not have IHRCs could be reframed in terms of their raising requirements on (1) the head and (2) on the RC itself. If fronting of the whole RC along with its internal head in situ inside it is required, then a language will not have EHRCs, as the moved IHRC will always be higher than the in situ external head, leading to deletion of the external head (e.g. LSC). If fronting of the RC is not required, then the possibility of either IHRC or EHRC remains. If the external head must raise, only EHRCs will occur (e.g. DGS). Note that DGS illustrates that the RC portion itself may raise along with its head (but not alone), remain in situ or be extraposed (Pfau & Steinbach 2005). Thus it is clear that there are two separate raising constraints involved: RC Raise (required or not), and Head Raise (required or not). But this is also not the end of the story, because as can be seen in Brunelli's trees for EHRCs (42a), both the external head and the internal head raise, each to the specifier of a CP (both built into Cinque's model). What is critical is that the external head must raise to a higher CP than the internal head. So it is likely that Head Raise comes in two flavors: External Head Raise and Internal Head Raise.

Another possible structural generalization regarding IHRCs is that a language will only have them if it also has similarly structured complement clauses or nominalized sentences (Gorbet 1977; Culy 1990). The idea is that an IHRC is a sentence that has been 'turned into' a nominal, and for that to happen, there should be other similar nominalizing processes in the language. Hiraiwa (in press) observes that cross-linguistic data so far support this generalization in languages with IHRCs without exception and notes that it is not clear why this should be. Some of the SLs appear to support this generalization, as they have parallel structures with IHRCs and independent clauses, but this must be qualified in that the IHRCs are marked with NMM which can be viewed as overt morphological marking of the presence of a restrictive operator. Gorbet's (1977) observation was that IHRCs should be 'morphologically identical' to complement clauses, and that was clearly too strong even for spoken languages. Culy's (1990) modification softened the generalization to say that languages would have IHRCs only if it had 'similar nominalized sentences'. For ASL, the question would be how similar would a structure have to be to count. IHRCs (and some EHRCs) have the complementizer *THAT*, which is required when the RC is not the subject or topicalized. Yet, complement clauses, for example, simple embedded clauses equivalent to English 'I told him that ...', 'he knows that ...', do not have overt *THAT* complementizers, and when the English-influenced use of overt *THAT* does occur, it occurs in the English position and not in the clause-final RC position. Likewise, ASL has sentential subjects (Lillo-Martin 1986), but these do not use *THAT* or any overt complementizer. Thus it is not clear how ASL would be assessed with respect to this structural generalization.

## 5.2 Contextual generalizations

There are two semantic/pragmatic conditions that SLs appear to support. One is that IHRCs should have indefinite heads (Williamson 1987). The other is that the IHRC must be able to be interpreted pragmatically as relevant to the context of the matrix clause (Kuroda 1975). Both of these generalizations make sense in light of the functions performed by RCs. Restrictive RCs serve to narrow the domain of possible interpretation of its head NP, which wouldn't need narrowing if the referent were already sufficiently definite/specific. Likewise, one wonders how a restrictive RC could perform its narrowing function if it was not somehow pragmatically related to the context that the speaker believes the listener might attempt to determine the referent of the NP within. All of the extant SL examples fit with these generalizations.

## 6 Summary

This section provides a summary of cross-linguistic generalizations concerning SL RCs for which the data seems relatively clear.

### 6.1 Word order and RC type

Table 1 presents those sign languages discussed here for which the reviewed literature has reached a consensus with respect to word order and the presence of EHRCs and IHRCs. Note that of the four SLs in this table with SVO order, three have IHRCs, supporting the typological idea that IHRCs do occur in SVO languages (Cinque 2005b). For those languages with EHRCs, so far no data indicates that prenominal RCs are possible, only post-nominal, but just for these languages, as Ichida (2010) notes prenominal EHRCs in Japanese Sign Language.

### 6.2 NMM systems and RCs

Table 2 (modified from Kubus 2014) presents a summary of the NMM reported in the literature for RCs in 8 SLs. I have argued that the omnipresence of ‘brow raise’ cannot be construed as a general/universal marker of RCs. The facts of both LIS and TİD clearly argue against this, and other SLs may also provide counterevidence once their NMM is more carefully investigated. In particular what is needed is an answer to the question ‘does ‘brow raise’ mark all dyadic operator restrictions like ASL or is there a separation between uses of ‘brow raise’ and another marker (e.g. ‘tensed eyes’) that shows up on in situ RCs as in LIS?’ Once such data become available, it should be possible to construct a typology of NMM that reflects the possible ways in which dyadic operators can be subdivided across languages. Such a typology for SLs would then predict that careful investigation of spoken languages will reveal similar divisions. If such divisions are then not

	ASL	HKSL	Libras	LSC	LIS	TİD	DGS
Word order	SVO	SVO	SVO	SVO	SOV	SOV	SOV
EHRC	+	-	+	n.d.	+	+	+
IHRC	+	+	-	+	+	+	-

**Table 1:** SL basic word order and presence of EHRC and IHRC.

	ASL	DGS	LIS	LSC	HKSL	ISL	NGT	TİD
Upper face								
Brow raise	+	+	(+)*	+	+	?	+	(+)
Tensed eyes/ squint			+	+		+		+
Lower face								
Tensed cheeks			+					+
Tensed lips	+					+		+
Head								
Back head tilt	+							
Head forward					+	+		+
(Headshake)								+
Body								
Body lean		+		+				+

**Table 2:** SL RC NMM.

\*I have added parentheses around ‘brow raise’ for LIS, given Brunelli’s conclusion that it is present only when the RC is topicalized.

found, it could be concluded that SLs are unique in this respect, but such a conclusion is definitely premature given the current lack of data.

## 7 Conclusion: IHRCs and EHRCs across SLs

I have shown that ASL fits without further modification (with noted exception) into a Cinquean model as applied by Brunelli (2011) to several other SLs. Using the double merge model, internal and external heads can appear in the various positions where they are seen in ASL without risking constraint violations that are endemic to extraction models.

That said, one unanswered question that requires further investigation is what factors condition whether an EHRC or an IHRC will be chosen.<sup>30</sup> I have suggested that one direction for exploration is the different types of raising requirements across languages. If we take it as a Cinquean theory-internal requirement that the external head must raise above the internal head (as shown in (42a)), if there were no further movement, all RCs would be externally-headed, and clearly that is an undesirable result. If the entire IHRC must be raised, as in LSC, then there will be no EHRCs. We need some kind of raising parameter, call it IHRC\_Raise, that must be positively set for languages like LSC. Languages that do not permit IHRCs would have it negatively set, causing all internal heads to delete; this would be the case for DGS which has only EHRCs. But languages like ASL, which has both IHRCs and EHRCs, remain a puzzle. Presumably, IHRC\_Raise would need another setting option (underspecified, perhaps). While we attempt to untangle this knot, there is also the other issue of Head Raise, perhaps separately specified for external and internal heads (beyond what is needed to reach the stage shown in (42a)). Finally, there needs to be extensive testing of all SL RCs for island effects to determine whether relevant movements can be documented. So while it feels that we are making some progress towards understanding IHRCs, it is clear that our journey is still ongoing.

## List of Abbreviations

EHRC	Externally-headed relative clause
IHRC	Internally-headed relative clause
SLs	Sign Languages
ASL	American Sign Language
DGS	German Sign Language ( <i>Deutsche Gebardensprache</i> )
HKSL	Hong Kong Sign Language
HZJ	Croatian Sign Language ( <i>Hrvatski Znakovni Jezik</i> )
Libras	Brazilian Sign Language ( <i>Lingua de Sinais Brasileira</i> )
LIS	Italian Sign Language ( <i>Lingua Italiana dei Segni</i> )
NGT	Netherlands Sign Language ( <i>Nederlandse Gebarentaal</i> )
NS	Japanese Sign Language ( <i>Nihon Shuwa</i> )
ÖGS	Austrian Sign Language ( <i>Osterreichische Gebardensprache</i> )
TİD	Turkish Sign Language ( <i>Türk İşaret Dili</i> )

<sup>30</sup> The data presented here does not support Galloway's (2014) contention that EHRCs cannot occur in argument positions. Example (11b), from Liddell (1978), presents an in situ external head as subject, with its RC extraposed; (11a), also from Liddell, and (12c) from my own field data, present externally-headed RCs as direct objects. In his table of RC positions across languages (his Table 5.24), Kubus (2014) also indicates that ASL has EHRC in situ. (At the same time, it should be noted that he also has a question mark for whether ASL can have extraposed RCs, but as we have seen here, it certainly does.) If I have understood correctly, the discrepancy between the current report and Galloway (2014) appears to stem from two sources. First, she assumes an analysis in which ASL has no DPs (despite arguments in MacLaughlin 1997; Neidle 2003; Neidle & Nash 2012), thereby forcing raising of the head of EHRCs to Spec, CP ('external head raise' in my terms) and with subsequent topicalization of the entire EHRC required ('RC raising' in my terms). Second, her disallowed 'EHRCs in object position' involve definite heads extracted from the RC; that they must be fronted as topics is not surprising. The examples from Liddell and my own data are standard EHRCs with indefinite heads and clearly appear in argument positions.

NMM	Non-manual marking
<u>br</u>	Brow raise
<u>mm</u>	Facial adverbial meaning ‘with ease/relaxation’
<u>q</u>	Yes/no question non-manual marking
<u>r/rel</u>	Relative clause non-manual marking
<u>t</u>	Topic (generic) non-manual marking
<u>wh-q</u>	Wh-question non-manual marking
IX	index (pointing sign)
POA	place of articulation

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The author has no competing interests to declare.

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