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Generalized Quantification and Anaphora Across Ontological Domains: Evidence from ASL*

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Introduction

It was shown in Schlenker (to appear) that in ASL one and the same anaphoric element has nominal, temporal, and modal uses, and that in all three domains generalized quantifiers can introduce loci (= positions in signing space) that denote what is often called the 'maximal set', i.e. the maximal set of objects that satisfy both the restrictor and the nuclear scope. But the anaphoric status of restrictors proper was only mentioned in passing, with no convincing examples. Here we summarize our earlier results about maximal set anaphora, and we suggest that in all three ontological domains (i) sign language restrictors can introduce discourse referents, which can also be overtly realized by loci, and that (ii) these loci can be made available for further anaphoric uptake. As a result, 'restrictor set' and 'maximal set' anaphora are sometimes overtly distinguished in ASL in the nominal, temporal and modal domains alike.[1]

1 Maximal Set, Restrictor Set and Complement Set Anaphora in ASL: Nominal Case (summary of previous work)

In Schlenker 2012, Schlenker and Lamberton to appear, and Schlenker et al. 2012, two findings were reported concerning the interaction between anaphora and generalized quantification in ASL, depending on whether the quantifier introduces one or several loci. This section borrows from these earlier works in both form and content.

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[1] In the following, sign language sentences are glossed in capital letters. Non-manual markings are omitted. Subscripts correspond to the establishment of loci in signing space – thus *[POSSIBLE IX-1 LOSE]*$_b$ transcribes the sequence of words 'POSSIBLE IX-1 LOSE' signed in or near locus *b*. Letters encoding loci are assigned from right to left from the signer's perspective – and in some examples we give a rough representation of the loci's positions using a diagram. Pronouns, glossed as *IX* (for 'index'), can point back to previously established loci. In such cases, the locus is suffixed to the pronoun, so that *IX-a* is a pronoun that points towards (or 'indexes') locus *a*; the numbers *1* and *2* correspond to the position of the signer and addressee respectively. Importantly, indexes can also be used to *establish* a locus.

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(i) When a quantificational antecedent just introduces a single (default) locus, standard data from spoken language, illustrated in (1), are replicated in ASL, as in (2).[2]

(1) **Maximal Set Anaphora**

a. Few of my students came to class, but they asked good questions.	a'. Most of my students came to class, and they asked good questions.

Restrictor Set Anaphora

b. Few students came to class. They aren't a serious group.	b'. Most students came to class. They are a serious group.

Complement Set Anaphora

c. ?Few students came to class. They stayed home instead.	c'. #Most students came to class. They stayed home instead.

(2) a. 6.7 POSS-1 STUDENT FEW a-CAME CLASS. a'. 6 POSS-1 STUDENT MOST a-CAME CLASS.
'Few of my students came to class.' 'Most of my students came to class.'
IX-arc-a a-ASK-1 GOOD QUESTION IX-arc-a a-ASK-1 GOOD QUESTION
'They asked me good questions.' 'They asked me good questions.'

b. 6 POSS-1 STUDENT FEW a-CAME. b'. 6.7 POSS-1 STUDENT IX-arc-a MOST a-CAME CLASS.
'Few of my students came.' 'Most of my students came to class.'
IX-arc-a NOT SERIOUS CLASS. IX-arc-a SERIOUS CLASS.
'They are not a serious class.' 'They are a serious class.'

c. POSS-1 STUDENT FEW a-CAME CLASS. c'. POSS-1 STUDENT MOST a-CAME CLASS.
3.6 IX-arc-a a-STAY HOME 2.8 IX-arc-a a-STAY HOME
Intended: 'Few/Most of my students came to class. They [the students that didn't come] stayed home.'

Specifically, one can obtain in ASL instances of 'maximal set anaphora', whereby a pronoun refers to the maximal set of objects that satisfy both the restrictor (= NP) and the nuclear scope (= VP), as in (1)a-a' and (2)a-a' – so that in the present case the pronoun refers to the students who came to class. Similarly, instances of 'restrictor set anaphora' can be obtained: in (1)b-b' and (2)b-b', the pronoun refers to the set of objects that satisfy the restrictor NP, hence in this case it refers to the entire set of students. But as was argued for spoken language in Nouwen 2003, 'complement set anaphora' is very degraded: in (1)c-c' and (2)c-c', it is difficult for the pronoun to refer to the students who did *not* come to class (the acceptability of (1)c(i) might be due to a collective reading 'with exceptions', whereby the students collectively, *with the exception of a few of them,* stayed home). Ratings for the sentences in (2) are (as always in this work) on a 7-point scale (7 = best), and in the present case they represent averages per trial over 3 informants.

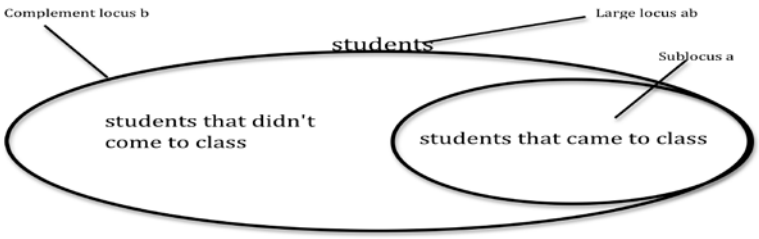
(ii) While the examples in (3) roughly replicate spoken language data, another anaphoric strategy is possible in ASL: it consists in establishing a large plural locus *A* for the restrictor set [= the set of all students], and a sublocus *a* for the maximal set [= the set of students who came]. Remarkably, this strategy automatically makes available a locus

[2] When numerical ratings are provided at the beginning of examples, they are on a 7-point scale (7 = best). Depending on the examples, they may be averages over several informants (average per trial, often with different numbers of trials per informant), or just our main informant's ratings (which might be repeated and hence averaged over several trials).

A-a for the complement set. As a result, *all three readings become equally available*, though with different indexings (and importantly, all involve normal plural pronouns, and not the word *OTHER*). In (2), we provide our main consultant's judgments (3 iterations) based on this second anaphoric strategy ('embedded loci'). For perspicuity, we notate the large area *A* as *ab* to indicate that it comprises subloci *a* and *b* – but it is essential to keep in mind that it is just signed as a large circular area, as is schematically represented in (4).

(3) POSS-1 STUDENT IX-arc-ab MOST IX-arc-a a-CAME CLASS.
'Most of my students came to class.'
a. 7 IX-arc-b b-STAY HOME 'They stayed home.'
b. 7 IX-arc-a a-ASK-1 GOOD QUESTION 'They asked me good questions.'
c. 7 IX-arc-ab SERIOUS CLASS. 'They are a serious class.'

(4)



In the papers cited in the introduction, the emergence of the 'complement set reading' in (3) was taken to be due to a condition of 'structural iconicity' whereby the relations of inclusion and relative complementation among loci in signing space are preserved in the space of denotations. Briefly, the reasoning was as follows:
–since *a* is a proper sublocus of a large locus *ab*, we can infer by a closure condition on the space of loci that *(ab-a)* (i.e. *b*) is a locus as well;
–by the requirement that inclusion be preserved in the space of denotations, we can infer that for the initial assignment function s, $s(a) \subset s(ab)$;
–finally, by the requirement that relative complementation should be preserved as well, we can infer that $s(b) = s(ab)-s(a)$.

In this way, the complement set locus ends up denoting the set of the students who didn't come to class. Importantly, the proposal was that besides this condition of structural iconicity, the *grammar* of ASL does not differ much from that of English in the case at hand (modulo the visibility of formal indices as loci in sign language but not in spoken language): in both cases, no discourse referent is initially made available for the complement set, though one does become available through other means in ASL (namely through structural iconicity).

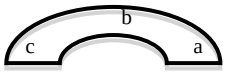
(iii) In the case of embedded loci considered in (ii), the maximal set locus was signed as a subpart of the restrictor set locus. By contrast, in the case of default loci considered in (i) above, the two loci appeared to be collocated. We now turn to a third strategy: in (5), the two loci are disjoint – despite the fact that their *denotations* are in a subset-superset relation.

(5) POSS-1 STUDENT [SOME AMERICAN]$_a$. BUT [HAVE FOREIGN]$_c$. IX-arc-a LAZY. IX-arc-c WORK-WORK. UNDERSTAND-UNDERSTAND, **IX-arc-c [SOME SHORT]$_b$. IX-arc-b GENIUS.**
'[Some of my students]$_a$ are American. But I also have [foreign students]$_c$. They$_a$ [= my

American students] are lazy, while they$_c$ [= my foreign students] are hard-working. See, among them$_c$, some$_b$ are short. They$_b$ [= the short foreign students] are geniuses.' (14, 162; 163)

Inferences:
(i) The speaker's students who are geniuses are those that are foreigners and are short.
(ii) The speaker's students who are hard-working are those who are foreigners (whether short or not).

(6) Approximate areas associated with the loci in (5) (from the signer's perspective)



(5) involves three loci, whose positions are represented in (6): locus *a* refers to the speaker's American students, and locus *c* to the speaker's foreign students. Both are introduced by way of existential constructions, and retrieved by the plural pronouns *IX-arc-a* and *IX-arc-c* respectively. In addition, *IX-arc-c* serves as the restrictor of the existential construction *[SOME SHORT]*$_b$, which ends up meaning 'some of my foreign students are short' (since *c* denotes the set of the speaker's foreign students), and introduces a maximal set locus *b* denoting the speaker's short foreign students. Inferential data were obtained by way of a multiple choice question as in (7):

(7) Which of the speaker's students are geniuses?
(i) those that are Americans (whether short or not)
(ii) those that are foreigners (whether short or not)
(iii) those that are Americans and are short
(iv) those that are foreigners and are short

As is clear in the part of (5) which appears in bold, restrictor set and maximal set loci are clearly distinguished and are not embedded within each other, despite the fact that their denotations are in a subset-superset relation. It is this anaphoric strategy that we now going to investigate in the temporal and modal domains.

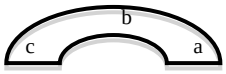
2 Maximal Set and Restrictor Set Loci in ASL: Temporal and Modal Case

It is a traditional idea that *when*- and *if*-clauses can function as restrictors of temporal and modal generalized quantifiers respectively (e.g. Lewis 1979, Kratzer 1986, de Swart 1995). We show that besides the maximal set loci described in Schlenker, to appear, temporal and modal restrictors – specifically: *when*- and *if*-clauses – can establish loci of their own in ASL.[3] The examples we consider rely on the last of the three mechanisms we saw in the previous section: the maximal set locus and the restrictor locus are signed as disjoint. (We have not been able to create felicitous examples in which the maximal set locus is a subpart of the restrictor set locus with *when*- and *if*-clauses; more work is needed to determine whether the relevant examples are impossible or just harder to construct).

Let us start with the temporal case, illustrated in (8), with the loci as shown.

[3] A preliminary example is discussed in Schlenker to appear (example (21b)). Inferential data were discussed, but the acceptability of the sentence was left unclear.

(8) *Context:* I often compete with you or with others.



6.3 [SOMETIMES IX-1 PLAY WITH OTHER PEOPLE]$_a$. BUT [WHEN THE-TWO-1,2 PLAY TOGETHER]$_c$ [SOMETIMES IX-1 LOSE]$_b$. IX-b IX-1 NOT HAPPY BUT IX-c GET-PILE MUCH MONEY, IX-a LITTLE MONEY.
'Sometimes$_a$ I play with other people. But [when you and I play together]$_c$, sometimes$_b$ I lose. Then$_b$ [= when you and I play together and I lose] I am not happy, but then$_c$ [= whenever you and I play together] I make a lot of money; then$_a$ [= when I play with other people] I just make a little money.' (12, 161; 12, 162; 12, 167; 14, 15)

Inferences:
(i) The speaker gets lots of money under the following condition: the speaker and addressee play together.
(ii) The speaker is unhappy under the following condition: the speaker and addressee play together and the speaker loses.

Three temporal loci are introduced in (8), with an opposition between times at which the speaker plays with other people – denoted by locus *a* – and times at which he plays with the addressee – denoted by locus *c*, which is explicitly introduced by a *when*-clause. A third locus, *b*, is introduced by a main clause with the temporal adverb *SOMETIMES*. An inferential task shows that the pronoun indexing *c* yields a 'restrictor set' reading, and ends up denoting the times at which the speaker and addressee play together; while the locus indexing *b* yields a 'maximal set' reading, and denote the times at which it is both the case that the speaker and addressee play together, and the speaker loses.

A structurally analogous modal example appears in (9). While the quantifiers and restrictors are modal rather than temporal, the main facts are as in (8): *IX-b* yields a 'maximal set' reading, and ends up referring to *those accessible worlds in which the speaker and addressee play together and the speaker loses*; while *IX-c* yields a 'restrictor set' reading, and refers to the set of *all accessible worlds in which the speaker and the addressee play together*.

(9) 6.5 [TOMORROW POSSIBLE IX-1 PLAY WITH OTHER PEOPLE]$_a$. BUT [IF THE-TWO-1,2 PLAY TOGETHER TOMORROW]$_c$ [POSSIBLE IX-1 LOSE]$_b$. IX-b IX-1 NOT HAPPY BUT IX-c MUCH MONEY, IX-a LITTLE MONEY.
'Tomorrow I might$_a$ play with other people. But [if you and I play together tomorrow]$_c$, I might$_b$ lose. Then$_b$ [= if you and I play together and I lose] I won't be happy, but then$_c$ [= if you and I play together] I will make a lot of money; then$_a$ [= if I play with other people] I will just make a little money.' (12, 150; 12, 151; 12, 152; 12, 166; 14, 14)
Inferences:
(i) The speaker gets lots of money under the following condition: the speaker and addressee play together.
(ii) The speaker is unhappy under the following condition: the speaker and addressee play together and the speaker loses.[4]

[4] The multiple choice question for the second inference was the following:

(i) Under what condition am I unhappy? In case: (i) I play with other people; (ii) we play together; (iii) I play with other people and I lose; (iv) we play together and I lose?

Conclusion

We conclude that in the nominal, temporal and modal domains alike, (i) loci can be the overt manifestation of discourse referents denoting the 'maximal set' of objects satisfying both the restrictor and the nuclear scope of a general quantifier; and that in addition (ii) loci can be established by restrictors in general, and by *if*- and *when*-clauses in particular – and indexing these loci gives rise to truth conditions that are clearly distinct from 'maximal set' readings.

In the study of spoken language, it took a relatively complex semantic analysis to come to the conclusion that (a) distinct discourse referents are introduced for maximal set readings and restrictor set readings, and that (b) *when*- and *if*-clauses behave like restrictors of generalized temporal and modal quantifers. In ASL, we see that both facts are made a bit more transparent by the existence of loci, which are the overt manifestation of discourse referents.

Finally, the fact that the same quantificational and anaphoric resources are available in the nominal, temporal and modal domains further strengthens the case for a uniform grammatical approach to individual, temporal and modal reference, as suggested in Schlenker 2006 and Bittner 2001, among others.

References

Bittner, M. 2001: Topical Referents for Individuals and Possibilities. In Hastings R. et al. (eds.) *Proceedings from SALT XI*, Cornell University, Ithaca, pp. 36-55.

Kratzer, Angelika: 1986, ‘Conditionals’, Chicago Linguistics Society, 22, 1- 15.

Lewis, D. 1975. Adverbs of Quantification. In *Formal Semantics of Natural Language*, ed. E. Keenan. 3--15

Nouwen, Rick: 2003, *Plural pronominal anaphora in context.* Number 84 in Netherlands Graduate School of Linguistics Dissertations, LOT, Utrecht.

Schlenker, Philippe: 2006, "Ontological Symmetry in Language: A Brief Manifesto", *Mind & Language* 21, 4: 504-539

Schlenker, Philippe: 2012, Complement Set Anaphora and Structural Iconicity in ASL. *Snippets* 25: 15-17.

Schlenker, Philippe: to appear, Temporal and Modal Anaphora in Sign Language (ASL). To appear in *Natural Language and Linguistic Theory.*

Schlenker, Philippe and Lamberton, Jonathan: to appear, “Formal Indices and Iconicity in ASL”. To appear in Maria Aloni, Vadim Kimmelman, Floris Roelofsen, Galit Weidman Sassoon, Katrin Schulz and Matthijs Westera (eds.), *Logic, Language and Meaning*: *18th Amsterdam Colloquium*, Springer.

Schlenker, Philippe, Lamberton, Jonathan and Santoro, Mirko: 2012, Iconic Variables. Accepted for publication with minor revisions in *Linguistics & Philosophy.*

Our informant picked (iv) twice, but the second time also added: *(iii also possible but iv is the more precise reading)*. We have no explanation for this fact.

de Swart, Henriëtte. 1995. Quantification over time. In J. van der Does and J. van Eijck (eds.), Quantifiers, Logic, and Language, 311–336. Stanford: CSLI.

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