

Gestural Grammar*

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Abstract. We argue that some properties of sign language grammar have counterparts in non-signers' intuitions about gestures, including ones that are probably very uncommon. Thus despite the intrinsic limitations of gestures compared to full-fledged sign languages, they might access some of the same rules. While gesture research often focuses on *co-speech gestures*, which co-occur with spoken words, we focus instead on *pro-speech gestures*, which fully replace spoken words and thus often make an at-issue semantic contribution, like signs. We argue that *gestural loci* can emulate several properties of sign language loci (= positions in signing space that realize discourse referents): there can be an arbitrary number of them, with a distinction between speaker-, addressee- and third person-denoting loci. Gestural loci may be free or bound, and they may be used to realize 'donkey' anaphora, including with antecedents under negation. Some gestural verbs include loci in their realization, and for this reason they resemble some 'agreement verbs' found in sign language (Schlenker and Chemla, to appear). As in sign language, gestural loci can have rich iconic uses, with high loci used for tall individuals. Furthermore, one may co-opt a location-denoting locus to refer to an individual found at that location, a phenomenon known as 'Locative Shift' in sign language. Turning to plurality, we argue that repetition-based gestural nouns replicate some properties of repetition-based plurals in ASL (Schlenker and Lamberton 2017): unpunctuated repetitions provide vague information about quantities, punctuated repetitions are often semantically precise, and rich iconic information can be provided in both cases depending on the arrangement of the repetitions; we discuss some possible extensions to continuous repetitions found with some mass terms. We further suggest that gestural verbs can give rise to repetition-based pluractional readings, as their sign language counterparts (Kuhn 2015). Following Strickland et al. 2015, we further argue that a distinction between telic and atelic sign language verbs, involving the existence of sharp boundaries, can be replicated with gestural verbs. Turning to attitude and action reports, we briefly ask (following Lillo-Martin 2012) whether 'Role Shift', which serves to adopt another agent's perspective in sign language, has gestural counterparts. Finally, we suggest that some means of focus realization in sign language can be used with pro-speech gestures and can affect truth conditions.

Keywords: gestures, co-speech gestures, pro-speech gestures, sign language, loci, iconicity, locative shift, plurality, unpunctuated repetitions, punctuated repetitions, telicity

* Readers who wish to see cartoonized versions of 20 videos with examples discussed below are encouraged to write to the author: philippe.schlenker@gmail.com.

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1 Introduction

1.1 *The importance of gestures for formal linguistics*

While there has been considerable work on the interaction between language and gestures, only recently have there been attempts to study the formal semantics of gestures, as well as aspects of their formal grammar (Lascarides and Stone 2009, Giorgolo 2010, Ebert and Ebert 2014, Schlenker to appear d, Chemla and Schlenker, to appear). This research direction has intrinsic interest because gestures offer a rich source of new data for linguistics and allied fields. Gestures are also important for a proper understanding of iconicity in language, since in the spoken modality they are the main means of iconic enrichment. For this reason, gestures also matter for a proper comparison between spoken and sign languages. There is no doubt that sign languages are full-fledged languages with the same general grammatical and semantic properties as spoken languages (with some modality-specific specificities [e.g. Sandler and Lillo-Martin 2006]). But some researchers have raised the possibility that, along certain dimensions at least, sign languages might be expressively *richer* than spoken languages because they have the same logical spine but richer iconic resources (e.g. Schlenker, to appear c). Other researchers have countered that the role of iconicity in this comparison cannot be properly assessed unless co-speech gestures are taken into account; in the words of Goldin-Meadow and Brentari (to appear), "sign should not be compared with speech – it should be compared with speech-plus-gesture". Still, it has also been argued that *even* when co-speech gestures are re-integrated in the comparison, there remain systematic differences between the two modalities because the contributions made by co-speech gestures are usually not at-issue, whereas iconic modulations in sign languages often can be. By contrast, some gestures ('pro-speech gestures) that fully replace words (rather than accompanying them) make at-issue contributions, and for this reason they will play a prominent role in the present comparison between gestural and sign language grammar (Schlenker 2017b; see also Slama-Cazacu 1976, Clark 1996, Frick 2008, Ladewig 2011). But being gestures, they lack the conventional character, semantic richness, and sophisticated grammatical rules of sign languages; thus we can at best hope to uncover a 'proto-grammar' for gestures.

Still, gestures in general and pro-speech gestures in particular might be important to understand the origins of sign languages. It is noteworthy that home signers, who grow up without access to sign language, do end up developing gestural languages that share some properties of sign languages (e.g. Abner et al. 2015), although they are also expressively and communicatively far less rich (hence the importance, emphasized in much research, of providing deaf children will full access to sign language, e.g. Mellon et al. 2015). It is thus natural to ask whether pro-speech gestures might display some grammatical-like properties.

On the syntactic side, Goldin-Meadow et al. 2008 showed that hearing speakers asked to use gestures to silently represent complex actions preferentially adopted an SOV order (subject - object - verb, or actor - patient - action) irrespective of the syntax of their native language. Furthermore, they did so both in communicative tasks (gesturing an entire action for an audience) and in non-communicative tasks (involving the arrangement of transparencies representing an event and its participants), which suggests that the preference is cognitive in nature.

In this piece, we attempt to investigate the acceptability of pro-speech gestures using a different method: we embed them in full-fledged spoken sentences, so that the grammatical spine remains that of English, with gestures 'imported' to fulfill certain syntactic and semantic functions. As an example of this method, Schlenker and Chemla, to appear, argue that some pro-speech 'verbs'¹ involving (among others) slapping and punching can be realized as targeting the addressee (*SLAP-2*, *PUNCH-2*) if the object is second person, or as targeting some other position (*SLAP-a*, *PUNCH-a*) if the object is third person. As Schlenker and Chemla argue, this property is shared with verbs that display object agreement in ASL (American Sign Language). Strikingly, in sign language and

¹ We will henceforth drop the scare quotes: a 'gestural verb' is just a gesture that replaces a verb. This terminology does not commit one to the view that such gestures have further formal properties of verbs.

gestures alike, the object agreement marker can be disregarded under ellipsis and under the focus-sensitive particle *only*, a behavior that is shared with *phi*-features in spoken language. This raises a question: can further properties of sign language grammar be replicated with pro-speech gestures?²

1.2 Main goals

We argue that several non-trivial properties of sign language grammar can be found in non-signers' intuitions about pro-speech gestures (on similarities between signs and *co*-speech gestures, see for instance Perniss et al. 2015). Indirectly, then, they know some properties of sign language grammar (although they usually don't know that they do, as these properties have nothing to do with common and often incorrect representations of sign language in non-signers). These results should be seen in the context of a broader comparison between sign language and gestures, and in particular of the finding that there are clear connections between the iconicity of signs and of gestures (Ortega et al. to appear).

We suggest that *gestural loci* can emulate several properties of sign language loci (= positions in signing space that realize discourse referents): there can be an arbitrary number of them, with a distinction between speaker-, addressee- and third person-denoting loci. Gestural loci may be free or bound, and they may be used to realize 'donkey' anaphora, including with antecedents under negation. Some gestural verbs include loci in their realization, and for this reason resemble some 'agreement verbs' found in sign language (Schlenker and Chemla, to appear). As in sign language, gestural loci can have rich iconic uses, with high loci used for tall individuals. Furthermore, one may co-opt a location-denoting locus to refer to an individual found at that location, a phenomenon known as 'Locative Shift' in sign language (Schlenker 2017e). Turning to plurality, we argue that repetition-based gestural nouns replicate some properties of repetition-based plurals in ASL (Schlenker and Lamberton 2017): unpunctuated repetitions provide vague information about quantities, punctuated repetitions are often semantically precise, and rich iconic information can be provided in both cases depending on the arrangement of the repetitions; we discuss some possible extensions to continuous repetitions found with some mass terms. We further suggest that gestural verbs can give rise to repetition-based pluractional readings, as their sign language counterparts (Kuhn 2015). Following Strickland et al. 2015, we argue that a distinction between telic and atelic sign language verbs, involving the existence of sharp boundaries, can be replicated with gestural verbs. Turning to attitude and action reports, we briefly ask (following Lillo-Martin 2012) whether 'Role Shift', which serves to adopt another agent's perspective in sign language, has gestural counterparts. Finally, we suggest that some means of focus realization in sign language can be used with pro-speech gestures and can affect truth conditions.

1.3 Gesture typologies

McNeill 2005 (chapter 2) distinguishes between four types of gestures: *iconic*, *metaphoric*, *deictic* and *beat*, defined as follows.

(i) "*Iconic*: such gestures present images of concrete entities and/or actions. They are gestures in which the form of the gesture and/or its manner of execution embodies picturable aspects of semantic content."

(ii) "*Metaphoric*: Gestures can also present *images of the abstract*."

(iii) "*Deictic*: Although the prototypical deictic gesture is the hand with an extended index finger, almost any extensible body part or held object can be used for pointing."

(iv) "*Beats*: Levy and I called gestures 'beats' when they took the form of the hand beating time."

Some authors, such as Giorgolo 2010 (pp. 4-5), have a subcategory of 'emblems', which 'are "typically culture specific gestures, associated with a fixed meaning" – for instance the 'thumb up' 👍 gesture used in Western culture. We will primarily focus on iconic and 'deictic' gestures, although we will argue that some of the latter have anaphoric uses in addition to their deictic ones.

² See Ebert, to appear for a highly relevant discussion that centers around *co*-speech gestures. For a discussion of gestures in sign language, see Emmorey 1999.

Schlenker 2017b proposes a pragmatic typology in which different types of gestures make different types of semantic/pragmatic contributions depending in part on whether (i) they are syntactically eliminable and (ii) they have a separate time slot. This typology is represented in (1). Co-speech/sign gestures and facial expressions *co-occur* with the words they modify; post-speech/sign *follow* the words they modify; iconic modulations are modifications of the words; and pro-speech gestures are gestures that fully replace some words (see Section 1.4 for transcription conventions). Some pro- and post-speech gestures are more natural if accompanied with an onomatopoeia, which might be because silent words are uncommon in spoken language, and/or because the onomatopoeia makes the iconic representation more complete.³ We do not usually encode these, and the reader should try to pick all-purpose onomatopoeias that minimally affect the semantic contribution of the relevant gestures.

(1) **Typology of iconic enrichments** (from Schlenker 2017b)

	External enrichments (= syntactically eliminable)		Internal enrichments (= syntactically ineliminable)	
	No separate time slot: Co-speech/co-sign gestures	Separate time slot: Post-speech/post-sign gestures	No separate time slot: Iconic modulations	Separate time slot: Pro-speech/pro-sign gestures
Speech	John  punished his son.	John punished his son – 	The talk was loooooong.	Your brother, I am going to 
Sign	IX-arc-b NEVER  [SPEND MONEY]	IX-arc-b NEVER SPEND MONEY] _b – 	POSS-1 GROUP GROW_ 	[currently unclear]
Meaning	cosuppositions (= presuppositions of a special sort)	supplements	at-issue or not, depending on the case	at-issue, with an additional non-at-issue component in some cases

Schlenker 2017b argues that part of this typology can be derived from the generalization in (2), whose main intuition is that syntactically 'parasitic' iconic enrichments are not at-issue, and that gestures with a separate time slot should not be presupposed, as this would make them semantically trivial.

(2) **Proposed generalization**

a. \pm internal

External enrichments (*-internal*) are not at-issue: because they are external, it should be possible to disregard them without affecting the main, at-issue content of the clause they appear in. By contrast, internal enrichments (*+internal*) can make any semantic contribution – just like standard words.

b. \pm separate time slot

Enrichments that have a separate time slot (*+separate time slot*) cannot be trivial (= presupposed): because they have their own time slot, they must make a non-trivial contribution to the sentence.

Finally, Schlenker 2017c argues that a rich typology of linguistic inferences can be reproduced within pro- and post-speech gestures. Specifically, the proposal is that pro-gestures can trigger scalar implicatures and associated phenomena (Blind Implicatures), presuppositions and associated phenomena (so-called 'anti-presuppositions' due to *Maximize Presupposition*), homogeneity inferences that are characteristic of definite plurals, as well as some expressive inferences that are characteristic of some pejorative terms. In addition, post-speech gestures trigger inferences that are very close to the supplemental inferences obtained with appositive relative clauses.

³ One should not infer that pro- and post-speech gestures are necessarily accompanied with onomatopoeia. This is not the case in (i), which involves a gesture representing a silent action.

(i) None of our ten subjects is about to  DOZE-OFF. (Schlenker 2017d)

By contrast, our focus in the present paper will be on the formal properties of pro-speech gestures, although inferential judgments will sometimes be helpful to establish them.

1.4 Transcription conventions and methods

We turn to out transcription conventions and methods.

Sign language transcription conventions

In the following, sign language sentences are glossed in capital letters, as is standard. Expressions of the form *WORD*–*i* and *WORD*_{*i*} indicate that the relevant expression is associated with the locus (= position in signing space) *i*. A suffixed locus, as in *WORD*–*i*, indicates that the association is effected by pointing; a subscripted locus, as in *WORD*_{*i*} or [*..EXPRESSION..*]_{*i*}, indicates that the relevant expression is signed in position *i*. Locus names are assigned from right to left from the signer's perspective; thus when loci *a*, *b*, *c* are mentioned, *a* appears on the signer's right, *c* on the left, and *b* somewhere in between. *IX* (for 'index') is a pointing sign towards a locus, while *POSS* is possessive; they are glossed as *IX*–*i* and *POSS*–*i* if they point towards (or 'index') locus *i*; the numbers 1 and 2 correspond to the position of the signer and addressee respectively. *IX*–*i* is a standard way of realizing a pronoun corresponding to locus *i*, but it can also serve to *establish* rather than to *retrieve* one. Agreement verbs include loci in their realization – for instance the verb *a*–*ASK*–*1* starts out from the locus *a* and targets the first person locus 1; it means that the third person individual denoted by *a* asks something to the signer. When an expression indexes a default locus, it is usually written without a letter index (e.g. *IX* rather than *IX*–*a* – but note that the distinction between a default and a non-default locus may not be easy to make). *IX*–*arc*–*i* refers to a plural pronoun indexing locus *i*, as it involves an arc motion towards *i* rather than a simple pointing sign.

The suffix *-rep* is used for unpunctuated repetitions, and in such cases *-rep3*, *-rep4*, *-rep≥4*, *-rep5*... indicate that there are 3, 4, at least 4, 5, ... iterations. When relevant, we add a subscript indicating the shape of the repetition, e.g. *-rep3*_{horizontal} for a horizontal repetition (whether in a straight line or as horizontal arc), *-rep3*_{triangle} for a triangular-shaped repetition. The suffix *-cont* is used for continuous repetitions, and subscripts may be used as well to indicate the shape of the movement, such as *-cont*_{horizontal} or *-cont*_{triangle}. Punctuated repetitions of an expression *WORD* are encoded as [*WORD WORD WORD*] if they involve three iterations of that expression; [*WORD WORD WORD*]_{horizontal} and [*WORD WORD WORD*]_{triangle} provide information about the shape of the repetition.

Unless otherwise noted, non-manuals are not transcribed, unless they appeared in the original publications from which the sentences are cited. If so, ^ above a word or expression indicates that it was realized with raised eyebrows. Further conventions are introduced below as they become relevant.

Spoken language transcription conventions

Glossing conventions for gestures were chosen to be reminiscent of sign language: here too, we used capital letters to gloss elements that are produced manually. This choice should definitely not suggest that signs are gestures or conversely.⁴

For legibility, we use a non-standard font to transcribe gestures. A gesture that co-occurs with a spoken word (= a co-speech gesture) is written in capital letters or as a picture (or both) *preceding* the expression it modifies (in some cases, we have added a link to a video to illustrate some gestures). The modified spoken expression will be boldfaced, and enclosed in square brackets if it contains several words.

Examples (from Schlenker 2017b)

John SLAP punished his son.



John SLAP_ punished his son.



John [punished] his son.

⁴ This point is worth emphasizing, for while it is obvious to competent linguists that sign languages are full-fledged – and extremely interesting – languages, and that they have a crucial role to play in the development of deaf children (e.g. Mellon et al. 2015), there are still attempts in some countries to assimilate them to mere gestural codes.

A gesture that follows a spoken word (= a post-speech gesture) is written in capital letters or as a picture *following* the expression it modifies, and preceded by a dash: – .

Examples (from Schlenker 2017b)

John punished his son – SLAP.



John punished his son – SLAP_



John punished his son –

A gesture that replaces a spoken word (i.e. a 'pro-speech gesture') is written in capital letters, if necessary with an onomatopoeic sound following it (with an 'underscore' connection _ between the sound and the gesture, as for words modified by co-speech gestures).

Examples (from Schlenker 2017b)

Your brother, I will SLAP_<phhh>.



Your brother, I will SLAP_<phhh>.



Your brother, I will_<phhh>.

As in sign language, pointing gestures alphabetized from right to left from the speaker's perspective. *IX-a* encodes pointing with a finger towards position *a*, while *IX-hand-a* encodes pointing with an open hand, palm up, towards position *a*. A gestural verb involving slapping was glossed as *SLAP-2* if it was realized towards the addressee, and as *SLAP-a* if it was realized towards a third person position – which we'll also call 'locus' for terminological simplicity. Refining the notation, we will write *SLAP(-2)* if we think that this form is both a second person and a neutral form, usable in all persons. We will use the notation *IX-a* to refer to pointing towards gestural locus *a*.

Methods

Sign language data are usually cited from earlier publications and were elicited by way of the Playback Method, described for instance in Schlenker et al. 2013. When quantitative acceptability judgments appear at the beginning of sign language sentences, they are on a 7-point scale, with 7 = best (references of the form (ASL, 7, 204) are to the videos on which the sentences were recorded).

Unless otherwise noted, gestural data reflect the author's judgments and those of linguists that were consulted (native speakers of American English who are not signers)⁵. While experimental methods will be useful to establish the facts more rigorously, we believe that it is reasonable to adopt standard linguistic methodology and establish fine-grained generalizations on the basis of rich introspective judgments before testing them more systematically when quantitative data become relevant.

1.5 Organization

The rest of this article is organized as follows. We start by discussing nominal as well as temporal/modal uses of loci (Section 2), and then focus on their uses in donkey anaphora (Section 3), on their appearance in gestural agreement verbs (Section 4), and finally on their interaction with iconic conditions and with 'Locative Shift' (Section 5). We then turn to expressions of plurality (Section 7), pluractionality (Section 8) and telicity (Section 9). We end the paper with possible gestural counterparts of sign language Role Shift (Section 10) and with gestural focus (Section 11), before drawing some conclusions (Section 12).

⁵ Some related French data were discussed with French-speaking colleagues but are not reported here.

2 Simple loci

Sign languages typically use positions in signing place, called 'loci', to realize discourse referents (e.g. Sandler and Lillo-Martin 2006, Schlenker 2017a). Loci that denote elements of the discourse situation (including the signer and addressee) must correspond to their real position. Loci that correspond to other elements can be introduced in relatively arbitrary positions of the horizontal plane. One common way to realize pronouns is to 'index', i.e. point towards, the relevant loci. There is no clear upper limit on the number of loci that can be simultaneously used besides limitations of performance; in this respect loci sharply differ from rich discourse referent systems found in spoken language (see for instance Schlenker 2017a). We will now see that several properties of sign language loci can be replicated with pro-speech pointing in gestures (see for instance Cormier et al. 2013 and for a comparison between sign language pronouns and co-speech pointing).

2.1 Nominal loci

While deictic uses of pointing are well-known, one can also establish gestural loci for individuals that are not present in the discourse situation (Schlenker and Chemla, to appear), and furthermore there can be several such loci, as shown in (3). Here we use co-speech gestures to introduce three loci corresponding to John, Mary and Sam. Depending on which locus is indexed by way of pro-speech pointing, we obtain five different meanings for the answer: three pointing patterns correspond the three introduced loci, and two additional ones are obtained by pointing towards the speaker or addressee.

- (3) Yesterday I had a long conversation with IX-hand-a [**John**] and then with IX-hand-b [**Mary**], and then with IX-hand-c [**Sam**]. You know who the company will promote?
 a. IX-a. b. IX-b. c. IX-c. d. IX-2. e. IX-1.
 = John = Mary = Sam = you = me

Importantly, attempts to establish arbitrary loci to elements present in the discourse situation seem to fail, which mirrors the observation that sign language loci denoting elements of the discourse situation preferably correspond to their real position.

- (4) Tomorrow the boss will have a conversation with IX-hand-a [**you**] and with IX-hand-b [**John**]. And you know who the company will promote?
 a. #IX-a. b. IX-b. c. IX-2.
 intended: you = John = you

In (4), a pointing hand towards an arbitrary locus accompanies *you*; using this arbitrary locus to answer the question gives rise to deviance, as in (4)a, unlike what happens if an arbitrary locus for *John* is indexed, as in (4)b, or if the real positions for the addressee is used, as in (4)c.

Although the facts remain to be checked, contrasts can probably be found if an arbitrary locus is used to refer to a non-speech-act participant who is present in the extra-linguistic situation, as in (5). Here we use a head nod to deictically refer to someone (= 'this guy') present somewhere in front of the speaker, hence the central position *b* towards which *HEAD-b* points. But we simultaneously assign to this individual an arbitrary locus on the right by way of *IX-hand-a*. Our impression is that it is difficult to index this locus to answer the question, as in (5)a (and it might already be difficult to establish an arbitrary locus, as in the sequence *IX-hand-a HEAD-b [this guy]*).

Notation: IX-hand-a HEAD-b [this guy] encodes a head movement towards a central position *b*, simultaneously with an open hand on the dominant side *a*.

- (5) Tomorrow the boss will have a conversation with IX-hand-a HEAD-b [**this guy**] and with IX-c-hand [**John**]. And you know who the company will promote?
 a. #IX-a. b. IX-c. c. <> IX-b.
 intended: this guy = John = this guy

Sign language loci can be bound by quantifiers (e.g. Sandler and Lillo-Martin 2006, Schlenker et al. 2013), and the same holds true of gestural loci, as seen in (6): the locus *a* is introduced by a quantifier (which may be *every manager*, *at least one manager*, or *no manager*) and then indexed by the pointing gesture *IX-a*. Sharply different readings are obtained if *IX-2* or *IX-1* is used instead. (We leave open the possibility that bound readings are less good than free readings, but they seem to us to be far better than the deviant sentences discussed in (4) and (5)).

- (6) Whenever there is a Board meeting,
 (i) *IX-hand-a* [**every manager**] (ii) *IX-hand-a* [**at least one manager**] (ii) *IX-hand-a* [**no manager**] ever asks *IX-hand-b* [**the CEO**] to promote
 a. *IX-a* b. <?> *IX-b* c. *IX-2* d. *IX-1*.
 = him = himself = you = me

It is worth pointing out that *IX-b* in (6)b might be expected to give rise to a Condition B effect due to local coreference with the subject of the infinitive. We are not clear on the status of this example and leave a more thorough investigation for future research.⁶

In ASL and LSF (French Sign Language), numerous bound variable readings of pronouns under ellipsis have been described (see for instance Schlenker 2014). We believe that with a proper context some clear examples can be constructed with gestural loci as well, as in (7).

- (7) Whenever there is a Board meeting, the *IX-hand-a* [**first**] and the *IX-hand-b* [**second**] manager both look after their own interests.
 So the *IX-hand-a* [**first manager**] always asks the CEO promote *IX-a*, and the *IX-hand-b* [**second manager**] does too!
 => bound reading ok: the second manager asks the CEO to promote the second manager

If the context is removed, as in (8), we believe that a strict reading becomes very salient.

- (8) Whenever there is a Board meeting, the *IX-hand-a* [**first manager**] always asks the CEO promote *IX-a*, and the *IX-hand-b* [**second manager**] does too!

One key question we leave for future research is whether Binding Theory holds of pro-speech pointing gestures, as foreshadowed in our non-committal discussion of (6)b.

2.2 Temporal and modal loci?

Schlenker 2013 argues that loci can have temporal and modal uses, as is illustrated in (9) (it is uncontroversial that loci can have locative uses as well, a point to which we return in Section 6).

- (9) a. *Context*: Every week I play in a lottery.

⁷ *IX-1* [SOMETIMES WIN]_a, *IX-1* [SOMETIMES LOSE]_b. $\overset{\wedge}{IX-a}$ *IX-1* HAPPY.
 ‘Sometimes I win. Sometimes I lose. Then [= when I win] I am happy.’ (ASL, 7, 204)

- b. a. *Context*: The speaker is playing in a lottery.

^{6,8} NOW *IX-1* [POSSIBLE RICH]_a, [POSSIBLE SAME POOR]_b. $\overset{\wedge}{IX-a}$ *IX-1* LUCKY.
 ‘Now I might be rich. I might also still be poor. Then [= if I am rich] I am lucky.’ (ASL, 7, 196)
 (Schlenker 2013)

Can such uses be replicated with gestural loci? We are not sure about index pointing. But an English speaker finds *hand* pointing acceptable in the following cases:

⁶ In French, strong pronouns give rise to weakened Condition B effects compared to clitics. We conjecture that pro-speech pointing gestures play the role of strong pronouns and might for this reason give rise to attenuated effects as well. Emmanuel Chemla (p.c.) finds amelioration of the Condition B configuration when pointing gesture towards locus *b* doubled by a half-circle from *b* to *b*. The Chemla pronoun could be a gestural reflexive and should be investigated. (Thanks to Amir Anvari, Emmanuel Chemla and Clemens Mayr for discussion of this point.)

- (10) a. Every week John plays in the lottery. Sometimes he IX-hand-a **wins**, and sometimes he IX-hand-b **loses**. And you know when I am nice to him? IX-hand-a.
=> the speaker is nice to John when John wins
- b. John might IX-hand-a **win**, and he might IX-hand-b **lose**. And you know in what case I'll be nice to him? IX-hand-a.
=> the speaker will be nice to John if John wins

Temporal and modal uses of gestural loci should be explored in future research and will not be further discussed in this piece.

3 Dynamic loci

3.1 Initial cases

Schlenker 2011b argues that loci can be the overt realization of dynamic discourse referents, as in the theories of 'donkey anaphora' developed in dynamic semantics (e.g. Kamp 1981, Heim 1982). The argument was based on examples such as (11): each indefinite introduces a locus in the *WHEN*-clause, but affects the value of pronouns found in the main clause. Either indexing is relatively acceptable (with a preference for anaphoric links that follow linear order), as long as the two pronouns index different loci. This is expected on standard theories of loci-*qua*-indices because using the same locus in the subject and object position would yield an odd coreferential reading, which entails that a Frenchman wonders who he lives with.

- (11) WHEN [FRENCH MAN]_a MEET [FRENCH MAN]_b,
'When a Frenchman meets a Frenchman,'
a. IX-a WONDER WHO IX-b LIVE WITH.
'the former wonders who the latter lives with.'
b. ? IX-b WONDER WHO IX-a LIVE WITH.
'the latter wonders who the former lives with.'
c. # IX-a WONDER WHO IX-a LIVE WITH.
'the former wonders who the former lives with.'
d. # IX-b WONDER WHO IX-b LIVE WITH.
'the latter wonders who the latter lives with.'
(ASL, i P1040945; Schlenker 2011b)

Because the indefinites do not c-command the pronouns, standard binding cannot apply in these configurations. Dynamic binding offers one possible analysis (e.g. Kamp 1981, Heim 1982). E-type theories (e.g. Heim 1990, Elbourne 2005) offer another, according to which the pronouns realize concealed definite descriptions. But the examples were picked in order to make such an analysis difficult. Thus in depending on the theory, *IX-a* would have to be paraphrased as *the person* (Elbourne 2005), or *the person that meets a person* (Heim 1990), and *IX-b* would then be analyzed as *the person*, or *the person that a person meets* (these are called 'bishop examples' in the literature because the most famous cases involved a bishop meeting a bishop). Ensuring that the two descriptions denote different individuals is non-trivial. Schlenker 2011b argues that an E-type theory that solves this problem in the case of the sign language data in (11) would come very close to a notational variant of a dynamic analysis.

Basic cases of donkey anaphora with gestural indexes are easy to construct, as in (12).

- (12) Whenever I can hire IX-hand-a [**a mathematician**] and IX-hand-b [**a sociologist**], I pick
a. IX-a. (= the mathematician)
b. IX-b. (= the sociologist)

Cases with symmetric antecedents can be created as well, as shown in (13). As in sign language, using different loci in subject position (co-occurring with *he*) and in object position (as a pro-speech gesture) yields a disjoint reference reading. Using the same locus yields a locally coreferential reading, which might or might not be degraded due a Condition B effect; irrespective of this effect,

the reading with local coreference yields an odd meaning because of the pragmatics of the example. (Note that our main clause has two conjuncts because an informant noted that a main clause with only *IX-hand-a he blesses IX-b* introduces what seems to be an unjustified asymmetry between the two bishop-denoted loci.)

- (13) Whenever *IX-hand-a [a bishop]* meets *IX-hand-b [a bishop]*,
 a. *IX-hand-a he* blesses *IX-b*, and then *IX-hand-b he* blesses *IX-a*.
 b. ... ? *IX-hand-a he* blesses *IX-a* ... *IX-hand-b he* blesses *IX-b*.

Finally, Elbourne 2005 noticed when the two symmetric indefinite antecedents are conjoined, as in (15)b (which contrasts with the original 'bishop' example in (15)a), the result is degraded. Schlenker 2011b argues that this observation does not extend to ASL (and LSF) examples as in (15)

- (14) a. If a bishop meets a bishop, he greets him.
 b. #If a bishop and a bishop meet, he greets him.
- (15) WHEN SOMEONE_a AND SOMEONE_b LIVE TOGETHER, IX-a LOVE IX-b.
 'When someone and someone live together, the former loves the latter.'
 (ASL, i P1040966; Schlenker 2011b)

We believe that pro- and co-speech pointing yields judgments that are closer to the sign language than to the spoken data.⁷ Importantly, however, the amelioration can be observed not just with pro-speech gestures as in (16)d, but arguably also with co-speech pointing as in (16)c.

Notation: capitalized *HE* and *HIM* serve to encode phonological emphasis.

- (16) Whenever *IX-hand-a [a bishop]* and *IX-hand-b [a bishop]* meet,
 a. * he blesses him, and then he blesses him.
 b. *HE blesses HIM, and then HE blesses HIM.
 c. *IX-hand-a HE* blesses *IX-hand-b HIM*, and then *IX-hand-b HE* blesses *IX-hand-a HIM*.
 d. *IX-hand-a HE* blesses *IX-hand-b*, and then *IX-hand-b HE* blesses *IX-a*.

Be that as it may, it is worth noting that a *contrast* between English and ASL can be replicated internal to English, between pure vocal English and English-plus-gesture.

3.2 Refinements

Schlenker 2011b discusses various more sophisticated examples, involving generalized quantifiers as well as antecedents under negation.⁸

3.2.1 Dynamic anaphora to generalized quantifiers

Schlenker 2011b argues that with generalized quantifiers, ASL and LSF loci give rise to readings that resemble those obtained in spoken language, with the difference that the anaphoric links are overt. On the intended reading, in (17), *they_i* refers to the maximal set of linguists that meet psychologists, and similarly *they_k* denotes the maximal set of psychologists that some linguists meet. Similar readings carry over to ASL and LSF, as illustrated for ASL in (18). It is easy to see that similar facts hold of the pro-speech pointing gesture *IX-b* in (19).

- (17) When [more than 10 linguists]_i meet [fewer than 4 psychologists]_k, they_i (each) criticize them_k.

⁷ Special thanks to Salvador Mascarenhas for discussion of these and related points.

⁸ We leave for future research an investigation of singular donkey pronouns with split antecedents, discussed in Schlenker 2011b.

- (18) IF LESS [THREE FRENCH PERSON HERE]_a AND LESS [FIVE AMERICAN PERSON HERE]_b, IX-arc-a WILL GREET-b IX-arc-b.
 ‘If less than three Frenchmen were here and less than five Americans were here, they [= the Frenchmen] would greet them [= the Americans].’ (ASL, 2, 117; Schlenker 2011b)
- (19) Whenever IX-hand-a [**more than 10 linguists**] meet IX-hand-b [**fewer than 4 psychologists**], IX-hand-a **they** (each) criticize IX-b.

3.2.2 *Dynamic anaphora across negation*

Schlenker 2011b further argues that dynamic binding can take place across negation. The existence of such examples in English, as in (20), is not controversial, but their analysis is: the question is whether there is a formal anaphoric link between the donkey pronoun and its antecedent despite the presence of negation. This question is of theoretical interest because early dynamic theories, such as Kamp 1981 and Heim 1982, predicted that negation should ‘break’ dynamic anaphoric links. Schlenker 2011b argues that ASL examples make such a link visible, as in (21) and (22).

- (20) It is not true that John doesn’t have an umbrella. I have just seen it: it is red.
- (21) IX-1 NOT DOUBT SOMEONE_a WILL GO MARS. IX-a WILL FAMOUS
 ‘I don’t doubt that someone will go to Mars. He will be famous.’ (ASL, i P1040982; Schlenker 2011b)
- (22) IX-1 DOUBT [NO DEMOCRAT PERSON IX-open-hand_a_a WILL MATCH SUPPORT HEALTH CARE BILL WITH [REPUBLICAN PERSON]_b. IX-1 THINK IX-a WILL a-GIVE-b A-LOT MONEY.
 ‘I don’t think no Democrat will cosponsor the healthcare bill with a Republican. I think he [= the Democrat] will give him [= the Republican] a lot of money.’ (ASL, 2, 229; Schlenker 2011b).

Schlenker 2011b further argues that anaphora to a *none*-type quantifier is possible if the negative quantifier is itself under a negative operator, so that it ends up having existential force, as in (23).

- (23) IX-1 DOUBT NO ONE_a WILL GO MARS. IX-a WILL FAMOUS.
 ‘I don’t think no one will go to Mars. He [= the person who goes to Mars] will be famous.’ (ASL, i, P1040980; Schlenker 2011b)

We believe that similar patterns can be replicated with pro-speech gestures, but that examples are a bit more natural when two gestural loci are introduced in the same sentence. Under this condition, it seems to be possible to index antecedents across negation, including when the antecedents are themselves negative quantifiers, as in (24)b. If the quantifiers fail to have existential import, as in the control condition in (24)a, we arguably obtain deviance, or an irrelevant reading on which the pro-speech gestures refer to all the Democrats or all the Republicans.

- (24) a. IX-hand-a [**No Democrat**] will strike a deal with IX-hand-b [**a Republican**], but we’ll have to give a lot of money to
- | | |
|--|---------------------------------|
| (i) <#> IX-a | (ii) <#> IX-b. |
| [possibly: = the Democrats (in general)] | = the Republicans (in general)] |
- b. It is not true that IX-hand-a [**no Democrat**] will strike a deal with IX-hand-b [**a Republican**], but we’ll have to give a lot of money to
- | | |
|----------------|------------------|
| (i) IX-a. | (ii) IX-a. |
| = the Democrat | = the Republican |

In English, a donkey pronoun can take as an antecedent a *none*-type quantifier found in a separate disjunct, as in (25). Schlenker 2011b argues that this fact carries over to overt indexing, as in (26). We believe that similar facts hold of gestural loci, as in (27).

- (25) Either there is no bathroom in this house or it is well hidden. (attributed to B. Partee; see also Geach 1962 and Evans 1977)
- (26) EITHER NO [DEMOCRAT IX-open-hand_a]_a WILL MATCH SUPPORT HEALTH CARE BILL WITH [REPUBLICAN PERSON]_b OR IX-a WILL a-GIVE-b A-LOT MONEY.
'Either no Democrat will cosponsor the healthcare bill with a Republican, or he [=the Democrat] will give him [=the Republican] a lot of money.' (ASL, 2, 230; Schlenker 2011b)
- (27) Either IX-hand-a [no Democrat] will strike a deal with IX-hand-b [a Republican], or we'll have to give a lot of money to
a. IX-b.
= the Republican
b. IX-a.
= the Democrat

We conclude that gestural loci might make it possible to replicate several non-trivial formal properties of sign language loci (the examples above pertained to ASL, but related ones are discussed for LSF in Schlenker 2011b).

4 Loci in gestural verbs

4.1 Basic cases

Schlenker and Chemla, to appear argue that sign language 'agreement verbs' (= 'directional verbs'), which include loci in their realization, have gestural counterparts. They further argue that they interact in similar ways with ellipsis and focus-sensitive constructions involving *only*. To introduce their findings, let us start by considering the ASL paradigm in (28), constructed around the agreement verb *1-GIVE-a* or *1-GIVE-2*.

- (28) a. ^{5,5} IX-2 POSS-2 YOUNG BROTHER ONLY BROTHER MONEY IX-1 1-GIVE-a.
'Of your younger brother and yourself, I would give money only to your brother.'
b. ⁷ POSS-2 YOUNG BROTHER MONEY IX-1 1-GIVE-a. IX-2 IX-1 NOT.
'Your younger brother, I would give money to. You, I wouldn't.'
c. ^{4,7} POSS-2 YOUNG BROTHER MONEY IX-1 1-GIVE-a. **IX-2** IX-1 NOT 1-GIVE-a.
d. ⁷ POSS-2 YOUNG BROTHER MONEY IX-1 1-GIVE-a. IX-2 IX-1 NOT 1-GIVE-2.
'Your younger brother, I would give money to. You, I wouldn't give money to.'
(ASL, 34, 1558; 4 judgments)

This verb is realized by way of a movement from the first person locus *1* to the third person locus *a* or to the second person locus *2*. (28)c,d are controls without ellipsis: they establish, unsurprisingly, that a second person object must trigger second person object agreement. But (28)b shows that under ellipsis things are different: on the assumption that the missing verb is copied from the antecedent clause, its mismatched object agreement marker can be disregarded in the elided clause. (28)a suggests that the same effect might hold in the 'focus dimension' under *only*: what gets negated is that the signer would give money to the addressee, which is not expected if the third person object agreement marker is interpreted. Note that the judgment is somewhat degraded, although this is not the case of related examples (with a locus on the antecedent) that are discussed by Schlenker and Chemla.

Related effects are well known in connection with *phi*-features of spoken language pronouns. This is illustrated in (29), where both the third person features and the feminine features of the *her* are ignored under ellipsis and in the 'focus dimension' under *only*.

- (29) [Uttered by a male speaker] In my study group,
a. Mary did her homework, and I did too.
=> available bound variable reading in the second clause
b. Only Mary did her homework
=> available bound variable reading, entailing that *I didn't do my homework*.

- c. Mary did her homework, and I did her homework too.
 => no bound variable reading in the second clause
 (Schlenker and Chemla, to appear)

Now the crucial observation is that the ASL data can to some extent be replicated with gestural verbs in English. Things are somewhat complicated by the fact that something like the second person version seems to do double duty as a neutral form, and hence it is glossed as (-2) in parentheses. Still, using a third person form with a second person object yields deviance, as shown in (30).

- (30) a. Your brother, I am going to SLAP-a_  (/ SLAP(-2)_ ) ,
 and then you, I am going to ??PUNCH-a_  / PUNCH(-2)_  .
 b. Your brother, I am going to PUNCH-a_  (/ PUNCH(-2)_ ) ,
 and then you, I am going to ??SHOOT-a_  / SHOOT(-2)_  .
 (from Schlenker and Chemla, to appear)

Crucially, when the gestural predicate occurs (with a bound variable) under ellipsis-like constructions, third person locus specifications can be ignored, both in VP-ellipsis in the strict sense, as in (31)b, and in the 'stripping' construction in (31)a; similar remarks carry over to the construction with *only* in (32). Schlenker and Chemla further provide experimental evidence for a person contrast in gestures and a obviation of the mismatch effect under ellipsis.

- (31) Your brother, I am going to PUNCH-a / SLAP-a / SHOOT-a, and then
 a. ['stripping'] you, too.
 b. [VP-ellipsis] you, I will as well.
 (32) ['Only'] Your brother and you both betrayed me, but it's only your brother that I am going to PUNCH-a / SLAP-a / SHOOT-a.

4.2 Extensions

Several extensions could be explored. First, can other cases of gestural agreement be found beyond the object case? Some subject agreement cases can probably be found, as in (33): deviance is obtained if the gestural verbs *TAKE-OFF* and *TAKE-OFF-ROTATING* originate from positions that do not correspond to those introduced with *one plane* and *one helicopter* respectively.⁹

- (33) The company has IX-hand-a [**one plane**] and IX-hand-b [**one helicopter**]. When the plane
 a. a-TAKE-OFF the noise is unbearable, but when the helicopter b-TAKE-OFF-ROTATING,
 b. #b-TAKE-OFF the noise is unbearable, but when the helicopter a-TAKE-OFF-ROTATING,
 less so.

⁹ When testing these examples, it could be important to take into account the possibility of 'neutral' uses of gestures, in a central position or towards the speaker's dominant side. For a right-handed speaker, if *IX-hand-a* [**one plane**] appears on the right, using *b-TAKE-OFF* to describe that same plane should be quite odd. But moving instead from the non-dominant to the dominant side might conceivably be more acceptable due to a neutral, non-located use of the gesture, produced close to the speaker's dominant side.

Second, can cases be found which involve more than one third person gestural locus? Examples can easily be found if the gestural loci are introduced by way of co-speech gestures, as in (34).

- (34) When I was a kid, I often got into fights with IX-hand-a [your brother], but also with IX-hand-b [**your sister**]. One morning,
 a. your brother, I tried to PUNCH-a, and then your sister, I tried to SLAP-b / #SLAP-a.
 b. your brother, I tried to PUNCH-a, and then your sister too!

In sum, the existence of loci, the person distinctions they display, and their behavior under ellipsis are reminiscent of sign language loci.¹⁰

5 Iconic Loci

Schlenker et al. 2013 argue, following Liddell 2003 and Kegl 2004, that loci may simultaneously function as variables and as simplified pictures of their denotations: pointing signs can target high loci when the denoted individuals are tall (or powerful or important); and different agreement verbs target different parts of a 'structured locus' depending on their meaning (for Liddell, this was part of an argument that there are gestural elements in loci). Crucially, these examples display 'iconicity in action': if one talks about individuals rotated in various positions, the targeted position gets rotated as well. In addition, Schlenker 2014 argues that the iconic specifications of loci behave like *phi*-features in that they can be ignored in the course of ellipsis resolution and in the 'focus dimension' under *only*, as in the English examples in (29) above.

Schlenker and Chemla, to appear, argue that the same initial facts hold with gestural agreement: in (35), one can use a high gestural locus to talk about a tall person. (36) and (37) show that the height specification can be disregarded in the course of ellipsis resolution and in the 'focus dimension' under *only*.

- (35) *Context*: The speaker is of normal height, and is talking to a very short person, whose brother is very tall.
 a. Your giant brother, I am going to SLAP-a^{high} / SLAP(-2)^{high}, and then you, I am going to ??PUNCH(-2)^{high} / PUNCH(-2)^{low}.
 b. Your giant brother, I am going to PUNCH-a^{high} / PUNCH(-2)^{high}, and then you, I am going to ??SLAP(-2)^{high} / SLAP(-2)^{low}.
 c. Your giant brother, I am going to PUNCH-a^{high} / PUNCH(-2)^{high}, and then you, I am going to ??SHOOT(-2)^{high} / SHOOT(-2)^{low}.

Now the paradigms in (36) suggests that these specifications can be ignored under ellipsis. Consider for instance the case in which the sentence involves a high locus with the gestural verb *PUNCH(-2)^{high}*, unmarked for person. If the missing VP of (36)b were copied from the first sentence, we would obtain something like: *you, I will PUNCH(-2)^{high} as well*, where *PUNCH(-2)^{high}* is the elided gestural verb. But its high locus specification should yield deviance, since the addressee is short, not tall.

¹⁰ Some reciprocal cases can be produced as well, using the gesture for *KISS*, which might be conventionalized. The important point for present purposes is that *KISS* involves a movement that connects two positions – for some speakers, the two index fingers are joined at their tips. We believe that the origin of the movement of the index fingers might correspond to gestural loci, so that a mismatch between established or salient loci and the origin of the *KISS* might yield deviance (there might also be neutral uses of *KISS*, which would complicate the generalizations). We leave a more rigorous investigation of these facts for future research.

- (i) a. When IX-hand-2 **you** and IX-hand-1 **I** meet, we never 1,2-KISS.
 b. When IX-hand-a **Sam** and IX-hand-2 **you** meet, you (guys) never a,2-KISS / #b,2-KISS / #1,2-KISS.

- (36) *Context*: The speaker is of normal height, and is talking to a very short person, whose brother is very tall. Your giant brother, I am going to PUNCH-a^{high} / PUNCH(-2)^{high} / SLAP-a^{high} / SLAP(-2)^{high} / SHOOT-a^{high} / SHOOT(-2)^{high}, and then
- ['stripping'] you, too.
- Possible reading*: you too, I will punch/slapp/shoot.
- [VP-ellipsis] you, I will as well.

The data in (37) that high locus specifications can also be disregarded in the 'focus dimension' in the scope of *only*, for otherwise we should get an inference that not just the addressee's brother but the addressee himself is tall.

- (37) *Context*: The speaker is of normal height, and is talking to a very short person, whose brother is very tall. ['only'] Your giant brother and you both betrayed me, but it's only him / your brother that I am going to PUNCH-a^{high} / PUNCH(-2)^{high} / SLAP-a^{high} / SLAP(-2)^{high} / SHOOT-a^{high} / SHOOT(-2)^{high}.

To go one step further, the genuinely iconic nature of these specifications can be ascertained in a more complex scenario, given in (38): high object agreement is acceptable for the person in upright position but not for the person in upside down position, as in (38)a; but the 'high' specifications can be disregarded in the course of ellipsis resolution, as in (38)b.

- (38) When I was a kid, I often got into fights with your siblings. Once, in a space museum, they were both mock-training to be astronauts:
IX-hand-a [your brother] was 2-FINGERS-ROTATING_a **rotating** in all sorts of weird positions, and
IX-hand-b [your sister] was 2-FINGERS-ROTATING_b [**doing the same thing**].

I waited until your brother was very high, like 2-FINGERS-UP_a **this**, and your sister was very low, like 2-FINGERS-DOWN_b **that**. And then,

- your brother, I tried to PUNCH-a^{high}, and your sister, I tried to (i) #SLAP-b^{high} (ii) SLAP-b_{low}.
- your brother, I tried to PUNCH-a^{high}, and your sister too!

Fortunately, I didn't succeed!

The same scenario could be continued with bound pro-speech pointing gestures, as in (39); the iconic behavior under consideration is thus not just a property of agreement verbs (this conclusion too mirrors generalizations in sign language, see for instance Schlenker et al. 2013).

- (39) I waited until your brother was very high, like FINGERS-UP_a **this**, and your sister was very low, like FINGERS-DOWN_b **that**. They were each worried I was going to hit them. So

IX-hand-a^{high} [your brother] asked me not to hit IX-a^{high}, and of course

- your sister also asked me not to hit (i) #IX-b^{high} / (ii) IX-b^{low}.

b. your sister did too.

=> the addressee's sister asked the speaker not to hit her (= the sister)

The acceptability of (39)b shows that in this case as well the iconic specifications of gestural loci can be disregarded under ellipsis.

We conclude that gestural loci, like sign language loci, can simultaneously behave as logical variables and as simplified pictures of their denotations.

6 Locative Shift

6.1 Basic Locative Shift in sign language

In ASL (and LSF), one may sometimes re-use a locus initially associated with a spatial location to denote an individual found at that location (Padden 1988, Van Hoek 1992, Emmorey 2002, Emmorey and Falgier 2004, Schlenker 2013, Schlenker 2017e). This phenomenon, sometimes called 'Locative Shift', is illustrated in (40). In (40)a(i), locus *b*, associated with *JOHN*, appears as the object agreement marker of *HELP*, whereas in (40)a(ii) loci *a* and *c*, associated with *FRENCH CITY* and *AMERICAN CITY* respectively, are used to refer to John-in-the-French-city and John-in-the-

American-city. The latter sentence exemplifies Locative Shift, which in this case is preferred (in other examples, there is optionality). The operation is constrained, however: indexical loci (here illustrated with a second person locus) usually do not like to undergo Locative Shift, as illustrated in (40)b(ii).

- (40) a. JOHN IX-b WORK [IX-a FRENCH CITY]_a SAME WORK [IX-c AMERICA CITY]_c.
'John does business in a French city and he does business in an American city.'

(i) No Locative Shift

^{4.2} IX-a IX-1 1-HELP-b. IX-c IX-1 NOT 1-HELP-b.

(ii) Locative Shift

⁶ JOHN IX-b WORK [IX-a FRENCH CITY]_a SAME WORK [IX-c AMERICA CITY]_c.
IX-a IX-1 1-HELP-a. IX-c IX-1 NOT 1-HELP-c.
There [= in the French city] I help him. There [= in the American city] I don't help him.'

- b. IX-2 WORK [IX-a FRENCH CITY]_a SAME IX-2 WORK [IX-c AMERICA CITY]_c.
'You do business in a French city and you do business in an American city.'

(i) No Locative Shift

^{6.3} IX-a IX-1 1-HELP-2. IX-c IX-1 NOT 1-HELP-2.

There [= in the French city] I help you. There [= in the American city] I don't help you.'

(ii) Locative Shift

^{2.3} IX-a IX-1 1-HELP-a. IX-c IX-1 NOT 1-HELP-c.

(ASL, 8, 1; 3 judgments; Schlenker 2011c)

6.2 Basic Locative Shift in gestures

A basic case of Locative Shift with pro-speech gestures is illustrated in (41)c. Although the gestural locus *a* is associated with John, it is possible and maybe even obligatory to point towards locus *c*, associated with New York, to refer to John-in-New York. Locative Shift becomes impossible if it is denied that John is or will be in New York, as in (42).

- (41) Since IX-hand-a **John** can't seem to work with IX-hand-2 **you**, I'll have him transferred to IX-hand-c **New York**. And if later I need to downsize, you know who I'll fire?

a. <#>IX-2.

= you (pragmatically odd given the context)

b. ??IX-a.

c. IX-c.

= John

- (42) Since IX-hand-a **John** can't seem to work with IX-hand-2 **you**, I won't have him transferred to IX-hand-c **New York**. And if later I need to downsize, you know who I'll fire?

a. <#>IX-2.

= you (pragmatically odd given the context)

b. IX-a.

= John

c. *IX-c.

By contrast, applying Locative Shift to a second person locus appears to be difficult, as is illustrated in (43)c.

- (43) Since IX-hand-2 **you** can't seem to work with IX-hand-a **John**, I'll have you transferred to IX-hand-c **New York**. And if later I need to downsize, you know who I'll fire?

a. IX-2.

= you

b. IX-a.

= John
c. * IX-c.

We conclude that Locative Shift has a counterpart with gestural loci and targets non-indexical loci more easily than indexical ones. (If Locative Shift is obligatory rather than optional in (41), this could yield a difference with the sign language data reported in Schlenker 2017e. We leave this question for future research.)

6.3 Further questions

Two further points will be important for what follows. First, Locative Shift can affect interpretation: Schlenker 2017e argues that a locative-shifted locus denotes a person-at-a-location, yielding more fine-grained interpretations than a non-locative-shifted locus. Similar gestural examples have yet to be constructed.

Second, in the ASL data reported in Schlenker 2017e, the spatial locus that is co-opted to refer to an individual-at-a-location does not have to be explicitly introduced: the existence of an iconic representation is sufficient to make some of its parts available for Locative Shift (for this reason, Schlenker 2017a argues that Locative Shift and high loci are two sides of the same coin). Both properties are illustrated in (44). *FAMOUS BUILDING LEANING-//* introduces the leaning shape of the tower (pointing rightwards from the signer's perspective). In (44)a,b *SELF-top* targets the top of the tower and denotes John-at-the-top-of-the-tower (the clause with ellipsis shows that *SELF-top* indeed behaves like a bound variable). Without Locative Shift, as in (44)c,d, a different reading is obtained: instead of interpreting that John saw himself being high up, we infer that John saw himself, without spatial specification.

(44) JOHN_a PETER_b IX-1 THE-THREE-1,a,b VISIT PISA FAMOUS BUILDING LEANING-// .

'John, Peter and I visited the famous Leaning Tower of Pisa.

THE-THREE-a,b,1 WALK LONG TOP . IX-1 PHOTO-rep_[wavy line along //], FINISH

The three of us walked towards the top. I took pictures during our ascent, and then

a. ^{6.4} IX-a SEE SELF-top, IX-b NOT.

John saw himself at the top, Peter didn't.'

b. ^{5.6} IX-a SEE SELF-top, IX-b NOT SEE SELF-top. (Judgments: 5, 6, 7, 4, 6)

John saw himself at the top, Peter didn't see himself at the top.'

a, b => only John saw himself being high up

c. ⁷ IX-a SEE SELF-a, IX-b NOT.

John saw himself, Peter didn't.

d. ^{6.6} IX-a SEE SELF-a, IX-b NOT SEE SELF-b

John saw himself, Peter didn't see himself.'

c, d => only John saw himself ([ASL, 20, 82](#); 5 judgments)

Can we find gestural loci (especially bound loci) that undergo Locative Shift in comparable iconic situations? Given the complexity of the examples, we are not in a position to conclude yet.

7 Plurality¹¹

7.1 Three types of repetitions in ASL

Schlenker and Lamberton 2017 (following in part Pfau and Steinbach 2006, Coppola et al. 2013, Abner et al. 2015) argue that three types of repetitions can be found in ASL. *Punctuated repetitions* are made of the discrete iteration of the same nominal sign in different parts of signing space. They are typically interpreted as providing precise information about the number of elements involved, one

¹¹ This section is a summary of some aspects of Schlenker and Lamberton 2017.

for each iteration.¹² *Unpunctuated repetitions* involve iterations with shorter and less distinct breaks between them, which makes the iterations less distinct and sometimes harder to count (similar devices were investigated in home signers by Coppola et al. 2013 and Abner et al. 2015¹³). They provide vague information about the quantity of denoted objects, but larger number of repetitions and quicker repetitions indicate larger quantities. Finally, continuous repetitions can be applied to some (but definitely not all) mass terms, in which case they indicate that an entire area or space was filled with the relevant substance; if several continuous repetitions are involved, they serve to refer to several such areas. In all three cases, the arrangement of the iterations can provide iconic information about the arrangement of the objects or substances.

To illustrate, let us consider the paradigm in (45), which contrasts a horizontal and a triangular arrangement of the repetitions, both punctuated and unpunctuated; pictures have been added to help the reader visualize the two shapes in key conditions. The horizontal version involves repetition of the sign in a left-to-right row in front of the signer, with the shape: ... ; the triangular version involves a vertical triangle signed from left to right, with the two bases on the left and right, and the tip above in the middle, with the shape: ∴. There are clear truth-conditional differences between the two cases, and the iconic contribution is interpreted within the scope of the conditional, which suggests that it can be at-issue.¹⁴

(45) *Context*: The speaker will be renting the addressee's apartment; he knows it contains trophies, but he hasn't seen them.

POSS-2 APT IF HAVE _____, IX-1 ADD 20 DOLLARS.

'If your apartment has _____, I will add \$20.'

a. ⁷ [TROPHY TROPHY TROPHY]_{horizontal}

=> if there at least three trophies in a horizontal line, \$20 will be added. Precise condition about numbers: no hesitation for the 'exactly 3' condition

b. ⁷ [TROPHY TROPHY TROPHY]_{triangle}

=> if there at least three trophies forming a triangle, \$20 will be added. Precise condition about numbers: no hesitation for the 'exactly 3' condition

c. ⁷ TROPHY-rep3_{horizontal}



=> if there at least three or four trophies in a horizontal line, \$20 will be added. Vague condition about numbers: explicit uncertainty for the 'exactly 3' condition (2/4 judgments)

d. ^{6.7} TROPHY-rep3_{triangle}



¹² This condition does not apply when a numeral co-occurs with a punctuated repetition. Number is then given by the numeral, while the unpunctuated nature of the repetition indicates that the objects were spread out.

¹³ Coppola et al. 2013 describe punctuated repetitions in home signers as "series of discrete movements, each referring to an entity or action in the vignette. Each movement was clearly articulated and easily segmentable from the rest of the movements." By contrast, unpunctuated repetitions "were movements produced in rapid succession with no clear break between them. Although the pauses between these iterations were much smaller than those separating the components of Punctuated Movements, they were identifiable and could be easily counted. These movements could be produced in a single space, but more often were produced in multiple spatial locations."

¹⁴ Schlenker and Lamberton 2017 checked in their last judgment task that these sentences do not trigger any inference to the effect that *if* there are trophies, they should be arranged in a particular way. This was to ascertain that there is no 'projection' outside of the conditional of the inference pertaining to the arrangement of the relevant objects. This test matters because if the iconic conditions behaved like co-speech gestures as analyzed in Schlenker 2015, to appear d, one would expect an inference to the effect that *if there are trophies, they are arranged in a linear/triangular fashion*.

=> if there are at least 3 trophies forming a triangle, \$20 will be added. Explicit uncertainty if there is a large number of trophies in a row (4/4 judgments)

e. ^{6.7} TROPHY- $\text{rep} \geq 4_{\text{horizontal}}$

=> if there at least three or four or five trophies in a horizontal line, \$20 will be added. Vague condition about numbers: explicit uncertainty for the 'exactly 3' (2/4 judgments) and 'exactly 4' (1/4 judgments) conditions

f. ^{6.5} TROPHY- $\text{rep} \geq 4_{\text{triangle}}$

=> if there are at least three or four or five trophies forming a triangle, \$20 will be added. Vague condition about numbers: explicit uncertainty for the 'exactly 3' (2/2 judgments) and 'exactly 4' (1/4 judgment) conditions. Explicit uncertainty if there is a large number of trophies in a row (3/4 judgments).

(ASL, [32.0096](#), 4 judgments; Schlenker and Lamberton 2017)

Schlenker and Lamberton 2017 argue that punctuated and unpunctuated repetitions can be given a relatively unified semantics in which the shape of the iterations provides information about the arrangement and to some extent the size of the denoted plurality of objects.

7.2 *Replicating the basic facts with gestures*

Schlenker and Lamberton 2017 further suggest that similar data can be found with pro-speech gestures (see Feldstein 2015 for an earlier attempt to study plurals in gesturers). In (46), the horizontal version involves repetition of the gesture for a cross in a row in front of the signer, with the shape ... , while the triangular version with the shape .: .

(46) *Context*: The addressee is taking part in a treasure hunt in churches. The speaker provides an indication about the location of the treasure.



Gesture for *CROSS*:

a. If you enter a room and you see [CROSS CROSS CROSS]_{horizontal}, you have reached the prize.

=> if there are three crosses (arranged in a row?), the addressee has reached the prize

b. If you enter a room and you see [CROSS CROSS CROSS]_{triangle}, you have reached the prize.

=> if there are three crosses arranged in a triangle, the addressee has reached the prize

c. If you enter a room and you see CROSS- $\text{rep} 3_{\text{horizontal}}$, you have reached the prize.

=> if there are several crosses (arranged in a row ?), the addressee has reached the prize

d. If you enter a room and you see CROSS- $\text{rep} 3_{\text{triangle}}$, you have reached the prize.

=> if there are crosses arranged in a triangle, the addressee has reached the prize

e. If you enter a room and you see CROSS- $\text{rep} 6_{\text{horizontal}}$, you have reached the prize.

=> if there are lots of crosses (arranged in a row?), the addressee has reached the prize

f. If you enter a room and you see CROSS- $\text{rep} 6_{\text{triangle}}$, you have reached the prize.

=> if there are lots of crosses arranged in a triangle, the addressee has reached the prize

In all cases, the gestural contribution is interpreted within the conditional, and it does not lead to 'projection' phenomena characteristic of presuppositions and supplements. In particular, we do not derive an inference that *if* there are crosses in the room, they should be arranged in a particular way, or should be present in a certain number (this is the type of inference predicted by Schlenker 2016b, 2016f for co-speech gestures co-occurring with noun such as *crosses*, and it is noteworthy that it does not seem to arise with the pro-speech gestures under consideration here). Thus the iconic properties of

the pro-speech gesture appear to be at-issue. In addition, we arguably replicate key properties of punctuated and unpunctuated repetitions in ASL.

- First, punctuated repetitions give rise to a precise reading, amounting to *at least three* in (46)a-b. By contrast, the threshold established by unpunctuated repetitions is not precise.
- Second, when unpunctuated repetitions involve more iterations, the threshold correspondingly goes up (but remains imprecise).
- Third, in all cases there is a clear iconic component when the iterations are arranged as a triangle (when they are arranged as a row, things are a bit less clear; as Schlenker and Lamberton discuss, in sign language and in gestures this might sometimes be considered as a neutral form, although the facts remain to be fully investigated).

Schlenker and Lamberton 2017 also suggest that some gestures can be used with a mass meaning, with iconic effects reminiscent of some ASL iconic mass terms. An example is given in (47), where *FLAT-HAND* stands for a flat hand in the horizontal plane, making a small circular/trembling motion, and used to refer to areas of a disgusting substance. A continuous repetition is quite appropriate; and if a discontinuous repetition is used instead, it is understood that there were several disjoint parts of the relevant substance. (In (47), a disgusted facial expression :- (co-occurs with the gesture; and it might help if in (47)c the disgusted expression is iterated three times, once with each gesture).

- (47) There was a leak coming from the upstairs neighbor's bathroom, so when I got back home, I saw
- a. :- (**[FLAT-HAND-cont]**
an area of a disgusting substance
- b. :- (**[FLAT-HAND -rep]**
several areas of a disgusting substance
- c. :- (**[FLAT-HAND FLAT-HAND FLAT-HAND]**
three areas of a disgusting substance

7.3 Interaction with anaphora: the edge effect

Schlenker and Lamberton 2017 argue that iconic plurals interact in interesting ways with anaphora. Specifically, the *edges* of an iconic plural representation can sometimes introduce a discourse referent for further anaphoric uptake, but this is more difficult for non-edges. A simplified paradigm is given in (48). In (48)a, the unpunctuated repetitions of *TROPHY* appear in horizontal shape (= ...), and the possessive indexes the middle of the row. The result is degraded, and the dominant (although not the sole) reading is that all trophies have a funny inscription. In (48)b, unpunctuated repetitions of *TROPHY* appear in a triangular shape (= ∴), and the top tip of the triangle is indexed by the possessive. The sentence is acceptable and the possessive denotes the top trophy. In the complete paradigm, one can see that when the left-most or the right-most iteration of *TROPHY* is indexed, the sentence is acceptable and the possessive refers to the left-most or right-most trophy, as the case may be.

- (48) YESTERDAY IX-1 VISIT POSS-2 APT. IX-1 SEE TROPHY-rep- . POSS_ CARVE WORDS FUNNY.

'Yesterday, I visited your apartment. I saw several trophies, arranged in a _____. The inscription of was funny.'

POSS_ targets the intermediate *TROPHY*

a. ^{5.2} TROPHY-rep-3_{horizontal}

_____ = row; = all trophies / the intermediate trophy

=> all the trophies are funny (3/4 judgments) or the intermediate trophy is funny (4/4 judgments)

b. ^{6.2} TROPHY-rep-3_{triangle}

_____ = triangle; = the top trophy

=> the top trophy was funny

(ASL, [32.0084c](#), d; 4 judgments; Schlenker and Lamberton 2017)

No such contrasts are found with simple examples involving punctuated repetitions: in (49), the intermediate iteration is indexed by the possessive, the sentence acceptable, and the possessive refers to the middle trophy.

- (49) HERE HAVE [TROPHY TROPHY TROPHY]_{horizontal}.
⁷ POSS-middle SHAPE STRANGE.
 => the intermediate trophy has a weird shape
 'Here there are at least three trophies in a row. The intermediate one has a weird shape.'
 (ASL, 33, 0596,c 3 judgments)

Schlenker and Lamberton 2017 argue that a weak version of this Edge effect can be replicated with gestural plurals. In (50), a pointing gesture is used to index part of a repetition-based gesture. With punctuated repetitions, each iteration introduces a discourse referent, which can be picked up by a pointing gesture. For unpunctuated repetitions, there seems to be a slight contrast between pointing towards an edge and pointing towards the middle of a row: a singular reading (= *I took a particular cross*) is easier to obtain in the former than in the latter case, at least for some speakers (one speaker obtained for the 'pointing in the middle' case a different inference, to the effect that *I took the cross that was closest to me*).

- (50) *Context*: The speaker is taking part in a treasure hunt, and he has been told to look for a cross.

At last, I entered a room and I saw

- a. [CROSS CROSS CROSS]_{horizontal}. So you know I what I did? I took IX-left / IX-middle / IX-right
 => there were three crosses
 b. [CROSS CROSS CROSS]_{triangle}. So you know I what I did? I took IX-left / IX-middle / IX-right
 => there were three crosses
 c. CROSS-rep_{horizontal}. So you know I what I did? I took ?IX-left / ??IX-middle / ? IX-right
 d. CROSS-rep_{triangle}. So you know I what I did? I took ?IX-left / ?IX-middle / ? IX-right

While the facts need to be investigated in greater detail, we tentatively conclude that the Edge effect might exist not just in ASL, but in gestures as well.

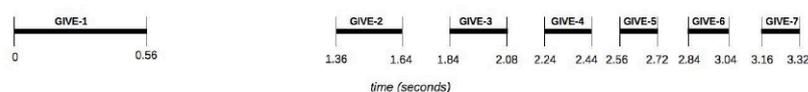
8 Pluractionality

Kuhn 2015b and Kuhn and Aristodemo 2017 argue that repetition-based pluractionals in LSF can have an iconic component, and that it may contribute at-issue information. As an example, the difference in realization between the 'accelerating' and the 'decelerating' versions of LSF *GIVE* transcribed in (51)a and (51)b are represented by way of the diagrams in (52)a and (52)b respectively, which display the time-course of the sign iterations. The translations immediately show that the rate of repetitions of the signs are interpreted: accelerating repetitions refer to accelerating repetitions of the event, and similarity for decelerating repetitions. Kuhn 2015b and Kuhn and Aristodemo 2017 make specific proposals about the form of the iconic rule of interpretation at work here.

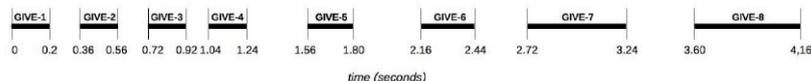
- (51) a. MIRKO CHILD BOOK GIVE-rep-acceleration.
 'Mirko gave the child a book at an accelerating pace.' (Kuhn and Aristodemo 2017)
 b. MIRKO CHILD BOOK GIVE-rep-deceleration.
 'Mirko gave the child a book at decelerating pace.' (Kuhn and Aristodemo 2017)

(52) Time-course diagrams of accelerating and decelerating *GIVE*-*rep* (Kuhn and Aristodemo 2017)

a. Acceleration



b. Deceleration



We believe that repetitions of gestural verbs give rise to the same type of iconic inferences as sign language plurals. First, our impression is that with clearly separated unpunctuated repetitions, as in (53)a, we can obtain a reading on which there were exactly as many slapping actions as there are slapping gestures. Second, focusing now on unpunctuated repetitions (as in Kuhn and Aristodemo's discussion), these appear to provide vague quantitative information about the number of denoted actions, with larger numbers of iterations associated with more numerous actions, or possibly of actions performed with greater intensity, as illustrated in (53)b,c. In particular, accelerating or decelerating repetitions yield inferences that are close to those reported by Aristodemo and Kuhn, as shown in (53)d,e (although here too we cannot exclude less literal interpretations having to do with the degree of intensity or control over an action).

(53) My opponent, I am going to

a. SLAP, SLAP, SLAP.

=>? slap three times

b. SLAP-*rep*3.

=> slap several times

c. SLAP-*rep*6.

=> slap many times / for a longer period

d. SLAP-*rep*-accelerating.

=> slap in an accelerating fashion

e. SLAP-*rep*-decelerating.

=> slap in a decelerating fashion

While more work will be needed on this topic (particularly on the distinction between punctuated and unpunctuated repetitions, both in sign language and in gestures), there appear to be strong initial similarities between iconic pluractionals in sign language and in gestures.

9 Telicity¹⁵

Semanticists traditionally classify event descriptions as *telic* if they hold of events that have a natural endpoint determined by that description, and they call them *atelic* otherwise. *John spotted Mary* and *John understood* have such a natural endpoint – the point at which John spotted Mary and came to an understanding, respectively; *John knew Mary* and *John reflected* lack such a natural endpoint and are thus atelic. Standardly (e.g. Rothstein 2004), a temporal modifier of the form *in α time* can modify telic VPs, whereas *for α time* modifies atelic VPs (e.g. *John reflected for a second* vs. *John understood in a second*). In influential piece, Wilbur 2003 argued that *the distinction between telic and atelic predicates is often realized overtly in ASL*. In Wilbur and Malaia's (2008) words, the observation was that

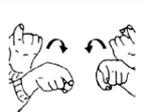
ASL lexical verbs could be analyzed as telic or atelic based on their form: telic verbs appeared to have a sharper ending movement to a stop, presumably reflecting the semantic end-state of the affected argument (...). These end-states were observed to be overtly marked in ASL by several mechanisms: (1) change of handshape aperture (open/closed or closed/open); (2) change of handshape orientation; and (3) abrupt stop at a location in space or contact with a body part. (...) The observation that semantic verb classes are characterized by certain movement profiles was formulated as the Event Visibility Hypothesis (EVH) for sign languages: "In the predicate system, the semantics of the event structure is visible in the phonological form of the predicate sign"

¹⁵ This section borrows from a summary in Schlenker 2016b.

(Wilbur, 2008: 229).

Wilbur 2008 posited that in ASL and other sign languages, telicity is overtly marked by the presence of an affix dubbed *EndState*, and which "means that an event has a final state". Its phonological form is "a rapid deceleration of the movement to a complete stop", which can come in several varieties, as illustrated in (54).

(54) Examples of movement sin signs denoting telic events (from Wilbur 2008, figure 3)

			
a. change of aperture handshape change SEND	b. orientation change HAPPEN	c. setting change proximal / distal POSTPONE	d. change of location with contact HIT

Schlenker (to appear c) proposes instead that Wilbur's finding should be recast within a theory of iconic meaning. The point is that sign language telic verbs can be modulated in such a way that the entire development of the sign rather than just its endpoints provide information about the precise development of the denoted action.

Be that as it may, Strickland et al. 2015 revisit Wilbur's Hypothesis of Event Visibility. They show that non-signers that have not been exposed to sign language still 'know' Wilbur's generalization about the overt marking of telic endpoints in sign language: when asked to choose among a telic or atelic meaning (e.g. 'decide' vs. 'think') for a sign language verb they have never seen, they are overwhelmingly accurate in choosing the telic meaning in case endpoints are marked. Furthermore, this result holds even when *neither* meaning offered to them is the actual meaning of the sign, which rules out the possibility that subjects use other iconic properties to zero in on the correct meaning.

We believe that related facts can be found with pro-speech gestures. We consider first the distinction between *EAT* produced once with a sharp boundary, and *EAT-cont* produced with trembled continuous repetitions and without sharp boundary. It seems to us that the repeated form corresponds to an atelic predicate and is compatible with a *for*-modifier as in (55)b, but is less acceptable with an *in*-modifier as in (56). *EAT* with a sharp boundary seems to be acceptable with the *in*-modifier, but less so with a *for*-modifier.¹⁶

(55) John cooked rice for lunch, and he will

a. ?? *EAT*-sharp_  <https://drive.google.com/file/d/0B7Mz-VKVeYNKU/FbOeGsxUUR1Z0U/view?usp=sharing>

b. *EAT*-cont_  <https://drive.google.com/file/d/0B7Mz-VKVeYNKU/5aGZiVWc/view?usp=sharing>
for two minutes.
b => John will eat rice for two minutes

(56) John cooked rice for lunch, and he will

a. *EAT*-sharp

¹⁶ Interpretation matters. One informant tells us that he accepts *EAT-cont* with an *in*-modifier, as in (56)b, but on an inchoative reading where *EAT-cont* is coerced to mean *start eating (repeatedly)*; similarly, he accepts (58)a with the meaning: it will take five minutes to get the helicopter's blades running. This inchoative coercion, which can be found with other atelic verbs, is compatible with the view that *EAT-cont* without the coercion is atelic.

b. ? EAT-cont

in two minutes.

a => John will eat his rice in two minutes

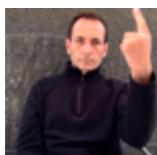
A related contrast seems to us to hold between a repeated gesture without sharp boundaries, *CIRCLE-ROTATING*, which suggests that a helicopter is flying around, and a gesture with sharp boundaries, *TAKE-OFF-ROTATING*, which suggests that a helicopter is taking off. As illustrated in (57)-(58), *CIRCLE-ROTATING* seems to pattern like an atelic verb. *TAKE-OFF-ROTATING* seems to pattern like a telic verb (the facts might be less clear because the sharp movement might be interpreted in terms of speed rather than as the completion of an event).

(57) Tomorrow, the company's helicopter will



a. CIRCLE-ROTATING

<https://drive.google.com/file/d/0B7Mz-VKVeYnKRTdtSmV1Nuc4ZGe/view?usp=sharing>



b. ?? TAKE-OFF-ROTATING

<https://drive.google.com/file/d/0B7Mz-VKVeYnKa1FwMC1TUmbY3M/view?usp=sharing>

for five minutes.

a => the company's helicopter will fly around for five minutes

(58) Tomorrow, the company's helicopter will

a. ??CIRCLE-ROTATING

b. TAKE-OFF-ROTATING

in five minutes.

b => the company's helicopter will take off and reach altitude in five minutes

A related paradigm involves a downward, rotating movement of the full hand, palms down, to represent a parachute descent. One gesture, *CIRCLE-DOWN*, involves a downward circling motion without sharp endpoints, whereas the other, *CIRCLE-REACH-GROUND*, involves a downward circling motion followed by an abrupt stop at a location given by the non-dominant hand, representing the ground. Here *CIRCLE-DOWN* behaves like an atelic verb while *CIRCLE-REACH-GROUND*, behaves like a telic one.

(59) When skydiving tomorrow, you will

a. CIRCLE-DOWN

b. ?? CIRCLE-REACH-GROUND

for five minutes.

a => the addressee will be skydiving for five minutes

(60) When skydiving tomorrow, you will

a. ??CIRCLE-DOWN

b. CIRCLE-REACH-GROUND

in five minutes.

b => the addressee will take five minutes to reach the ground

On the assumption that the telic vs. atelic distinction is logical in nature (as standardly assumed, e.g. Rothstein 2004), it is of course unsurprising that different gestural verbs should pattern differently depending on their intuitive meaning. But what is interesting is potential validity of Wilbur's generalization for the realization of the telic/atelic distinction in at least some gestural verbs. Importantly, more fine-grained paradigms should of course be investigated in the future, in order to

come up with more minimal pairs of gestural verbs that differ *only* with respect to the realization of their boundaries.

10 Role Shift

As summarized in Quer, to appear, Role Shift across sign languages is morpho-syntactically characterized by non-manual markers such as the following: (i) 'temporary interruption of eye contact with the actual interlocutor and direction change of eye gaze towards the reported interlocutor'; (ii) 'slight shift of the upper body in the direction of the locus associated with the author of the reported utterance'; (iii) 'change in head position'; (iv) 'facial expression associated to the reported agent.' Role Shift comes in two varieties (e.g. Schlenker, to appear a, b): Attitude Role Shift serves to report thoughts or words, with a quotational component; Action Role Shift describes an action in a particularly vivid way, with an iconic component. Some analysts (Quer 2005, Schlenker to appear a, b) take Role Shift to be an overt manifestation of 'context shift', a grammatical operation that shifts of the context of evaluation of some or all indexicals, (e.g. Schlenker 2011a). Schlenker to appear b argues that Role Shift is context shift *augmented* with special iconic constraints). Others take Role Shift to incorporate a gestural, demonstrative component - with the idea that it signals that the words or actions were in relevant respects 'like' the words used by the signer (Davidson 2015). In fact, Lillo-Martin 2012 noted that "what role shift conveys is very similar to what is conveyed with the colloquial English use of like, as in, "He's like, I can't believe you did that!""", and in some cases this construction may involve pro-speech gestures, as in Davidson's example in (61) (Davidson 2015; see also Quinto-Pozos and Parrill 2015 for a comparison between signers' and speakers' strategies to encode viewpoint in narratives).

(61) Bob was like [gobbling gesture].

Without taking a stance on the theoretical debate, we can ask whether some pro-speech gestures can be realized under Role Shift. Attitude and Action Role Shift are arguably both exemplified in the following example.

Notation: RS_i indicates that the speaker shifts her body to adopt the position of a fictional character found in gestural locus i (here we will have $i = a$ or $i = b$). The gesture that follows RS_i is realized from this shifted position.

(62) I was next to IX-hand-a [little Robin] and IX-hand-b [little Francis], and I was a holding a really yummy chocolate bar. I asked: Who wants it?

(i) And so of course

a. IX-hand-a [little Robin] goes: RS_a IX-1. And right away IX-hand-b [little Francis] (goes)¹⁷: RS_b IX-1.

b. ? IX-hand-b [little Robin] ... IX-hand-a [little Francis]

(ii) Next thing I know, IX-hand-a [little Robin] turns towards IX-hand-b [little Francis] and

a. RS_a SLAP-b. And so IX-hand-b [little Francis] RS_b PUNCH-a.

b. (#) RS_b SLAP-a ... RS_a PUNCH-b.

(62)(i)a displays an example reminiscent of Attitude Role Shift, here involving of direct quotation. The first person pointing gestures are interpreted as quoted material: one understands that Robin and Francis each replied with a first person gesture (if the gesture is repeated, we understand that they used repeated gestures in their answers); and facial expressions that accompany this gesture will equally be attributed to the relevant child. If one shifts from gestural locus b, associated with Francis, to represent Robin's gestural utterance, the result will be less acceptable, as shown in (62)(i)b.

By contrast, in (62)(ii)a we are dealing with a construction reminiscent of Action Role Shift: the gesture is not quoted, but rather is used to refer to an action. Thus no speech report is involved

¹⁷ Two informants tell us that the first *goes* is near-mandatory, but that the second one can to some extent be replaced with a pause.

here, but rather an action report.¹⁸ If the boxed Action Role Shift in (62)(ii)a is realized from Francis's perspective rather than Robin's, as in (62)(ii)b, a different and/or odd meaning is obtained, to the effect that little Robin turned towards little Francis and the latter slapped the former (rather than the other way around as in (62)(ii)a).

It is worth adding that these gestural examples do not by themselves decide theoretical debates about sign language Role Shift. These hinge on far more subtle constructions than are discussed here. In fact, without a more thorough investigation of the data, it will be hard to argue that we genuinely have a gestural counterpart of Role Shift, rather than a different construction which is vaguely reminiscent of it. Detailed formal work will be needed to come to some clarity on this issue.

11 Focus

In sign language, focus (be it in its contrastive or exhaustive functions) can be realized by a combination of manual and non-manual modulations; in several cases, word order is also affected, but this will not be relevant for the present discussion. In production experiments, Crasborn and van der Kooij 2013 (studying NGT [Dutch Sign Language]) and Kimmelman 2014 (studying NGT and RSL [Russian Sign Language]) emphasized the role of prosody, showing (Kimmelman 2014 p. 130) that RSL focus primarily involves manual prosody, with modulations of size, speed and duration, as well as repetitions. NGT also uses these strategies (with different frequencies), but in addition it makes use of non-manual prosody, involving eyebrow raising, backward head tilt, and head nod. In elicited data from ASL and LSF, Schlenker et al. 2016 found that focus had contrastive and exhaustive functions in both languages; in their data, focus was marked in both languages by raised eyebrows and forward leans/head nods, and it could also be marked by increased sign amplitude, speed acceleration, and longer hold times. Raised eyebrows are also of interest because they were found as a co-speech gesture marking focus in spoken language (Dohen 2005 and Dohen and Loevenbruck 2009).

The natural question, then, is whether focus can be marked without vocal means on pro-speech gestures, and if so whether sign language means can prove to be effective. In the following, it will be essential to make use of silent pro-speech gesture, for otherwise it will be hard to avoid using vocal means to mark focus. We will consider the effect of Eyebrow raising (notated as \wedge) on focus marking, and we will use Eyebrow lowering/furrowing (notated as \sim) as a control. Our informants mention that the examples are most natural if the focused element includes not just raised eyebrows but also a manual modulation with greater gesture amplitude and speed velocities. Importantly, however, the manual modulation on its own does not suffice to clearly mark focus. Needless to say, these phonetic questions should be investigated in future research.

Let us now consider the example in (63).

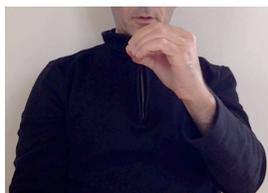
Notation: We encode as $+$ the (co- or pro-speech) gesture for a cross, as o the gesture for a circle, and as $[]$ the gesture for a square. As co-speech gestures, they are transcribed before the expressions they co-occur with, which are boldfaced; gestures are illustrated with pictures on their first occurrence. $\wedge+$ and $\wedge o$ mark eyebrow raising on $+$ and o ; $\sim+$ and $\sim o$ mark eyebrow lowering/furrowing on $+$ and o .

(63) *Context:* The addressee is taking part in a game.



In order to win, you'll have to put two objects together among three: $+$  **[a]**

¹⁸ If the gesture is modulated, for instance by targeting a lower or higher position, or by repeating it, this too will be interpreted; this fact could but need not be due to Role Shift per se, since the same observations would hold of unshifted gestural verbs modulated in similar ways.



cross], a o_+ [a medallion], and $[\]_+$ [a square]. But it won't work to put

a. $+ \text{ next to } o$

b. $\wedge+ \text{ next to } o$

=> inference that $[\]o$ should work

b'. ? $\sim+ \text{ next to } o$

c. $+ \text{ next to } \wedge o$

=> inference that $+[\]$ should work

c'. ? $+ \text{ next to } \sim o$

We believe that Eyebrow raising can modify the implications of pro-speech gestures. (63)a just denies that the sequence $+o$ (or possibly $o+$) should be found. (63)b denies this as well, but also implicates that a sequence obtained by replacing $+$ with an alternative *can* be used, hence on the assumption that there are just three object tokens, $[\]o$ (or possibly $o[\]$). By contrast, (63)c implicates that $+[\]$ (or possibly $[\]+$) could be used. Eyebrow furrowing/lowering, as in (63)b', c' yields weaker or no focus effects.

In (63), negation associates with complete pro-speech gestures. But the example can for some informants be modified minimally so that focus co-occurs with part of a complex gesture, as in (64), where the gestures for a cross and for a medallion are produced in sequence. Eyebrow raising on a part of the complex gesture yields the same effects as in (63), but now it is crucial that a subcomponent of a gesture is targeted. Eyebrow furrowing/lowering yields weaker or no focus effects.

(64) Same beginning as (63).

But it won't work to try

a. $+ o$

b. $\wedge+ o$

=> inference that $[\]o$ should work

b'. ? $\sim+ o$

c. $+ \wedge o$

=> inference that $+[\]$ should work

c'. ? $+ \sim o$

One important task in the future will be to construct rigorously controlled minimal pairs in which the very same phonological string precedes our various gestural sequences, so as to ensure that any focus-related effects are entirely due to the gestures, and not to the preceding intonation.

12 Conclusion

While these initial observations should be complemented with far more detailed empirical and formal work, we believe that they license the following conclusions.

(i) There are non-trivial rules governing the use of pro-speech gestures, in particular when it comes to the syntax/semantics interface. Gestural grammar could thus offer a rich field of new data for formal linguistics.

(ii) Gestural rules share non-trivial properties with rules that are instantiated in sign language. More detailed empirical and theoretical work will be needed to assess the extent of the similarities, including in areas we did not discuss here, such as Binding Theory.

(iii) It should go without saying that the existence of a gestural rules reminiscent of sign language grammar in no way implies that sign languages are mere gestural systems. Pro-speech gestures on their own are isolated iconic elements, which we studied by embedding them in full-fledged spoken language sentences. By contrast, sign languages notoriously have sophisticated formal properties and rich expressive possibilities, just like spoken languages but independently from them (in fact, along some dimensions, the simultaneous presence of rich logical *and* iconic means in sign languages might give them an expressive advantage).

(iv) Since home signs and emerging sign languages are historically connected to pro-speech gestures, our results might bear on home sign and sign language development and typology.

(v) Finally, it is likely that most of the pro-speech gestures discussed in this piece are very uncommon in standard use. If so, and if speakers still have relatively clear intuitions about their grammar and meaning, an acquisition-theoretic question emerges: how can the relevant rules be acquired on the basis of highly limited (possibly 'zero-shot') experience?

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