

Abstract: Cross-categorial singular and plural reference in sign language

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This dissertation addresses a range of semantic topics—anaphora, plurality, dependency, telicity, and pluractionality—and investigates them from the point of view of sign language, focusing on data from American Sign Language (ASL) and French Sign Language (LSF). The importance of sign language to these debates arises from its visuospatial modality, in which the hands and face generate a signal that is perceived with the visual system. From a semantic perspective, this modality offers several unique expressive possibilities, including the ability to use space in a meaningful way, and the pervasive availability of iconic, picture-like representations. In this dissertation, I argue that the use of space in sign language provides a new window into the machinery underlying the compositional system; I leverage the properties of the visuospatial modality to gain new insights into theories of natural language semantics.

Two themes run throughout the work. First I investigate the compositional treatment of plurality and dependency in natural language, focusing in particular on recent dynamic frameworks that manipulate plurals (Chapters 3, 4, 7). Second, I investigate the incorporation of iconic meaning into the combinatorial grammar, focusing on points of interface between the two (Chapters 6, 7).

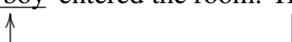
Part I: Nouns

Across a variety of diverse phenomena, sign languages have been argued to display the property of **visibility**: through the use of space, linguistic objects that have been postulated based on indirect evidence in spoken language are made phonologically overt, or ‘visible,’ in sign language. Part I of the dissertation leverages this property to engage with a variety of compositional questions regarding the treatment of nominal discourse referents. Chapter 2 begins by focusing on the most famous case of visibility in sign language: the use of space to disambiguate pronominal antecedents. The chapter reviews debates about variables, the role of iconicity, and cross-sentential anaphora. Of particular relevance to later chapters, the chapter introduces the framework of dynamic semantics, in which discourse referents can be introduced into a discourse context.

The last 20 years have seen enrichments to the theory of dynamic semantics, allowing the semantic system to represent and manipulate functional relationships between plural discourse referents. In Chapters 3 and 4, I argue that what is conceptually unified within these theories is *visibly* unified in ASL: functional dependency is overtly represented as the spatial association of two plurals. I conclude that ASL provides new evidence in favor of this second wave of dynamic semantics, and argue that the ASL data informs recent debates about dependency across languages and modalities.

Chapter 3: Functional reference in ASL

One of the largest theoretical shifts in semantic theory has been the shift from traditional, static semantics to theories of dynamic semantics. The fundamental motivation for this shift is the observation that natural language sentences are not truth-conditionally self-contained; rather, a sentence may introduce individuals into the context that are used in the interpretation of later sentences. In (1), for example, the pronoun in the second sentence is most easily interpreted as referring to *whichever boy entered*. Intuitively, the existential quantifier ‘a boy’ must receive a meaning that can take scope over both sentences.

- (1) A boy entered the room. He started to sing.
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Examples like these motivated semanticists in the early eighties to propose of a richer conception of meaning, one now called **dynamic semantics** [10, 8]. On these theories, in addition to truth conditions, the

compositional system keeps track of a list of referents (i.e., possible antecedents) that is passed through the discourse; pronouns select, or ‘point to,’ individuals from this list.

As it turns out, research on sign language has contributed to this picture. In ASL, Lillo-Martin and Klima [14] observe that discourse referents are localized in space, and pronouns *literally* point back to their antecedents (see Figure 1a). Assigning different discourse referents to different locations thus allows pronouns in ASL to be disambiguated. The flexibility of this strategy has allowed old debates to be revisited with new evidence. For example, Schlenker [17] compares the use of space in ASL to test dynamic semantics against E-type theories of cross-sentential pronouns. Kuhn [13] tests whether locations in space are better treated as formal variables or morphosyntactic features. These debates are reviewed in Chapter 2.

The last 20 years has seen a second wave of dynamic semantics; in its new incarnation, the framework of dynamic semantics is enriched to allow the semantic system to represent and manipulate functional relationships between plural discourse referents [19, 16, 3]. This enrichment is motivated by the observation that certain constructions introduce **functional discourse referents**. The sentences in (2) provide examples. In each case, the sentence establishes a functional relation mapping each boy to the book he read. In (2b), for example, the sentence is true if this function is a constant function.

- (2) a. The boys read one book each. **English**
 b. All the boys read the same book.
 c. Every boy read a different book.

In Chapter 3 of the dissertation, I show that what is conceptually unified within these theories is again *visibly* unified in sign language. Given that singular individuals may be associated with points in space, it perhaps comes as no surprise that plural individuals—i.e., sets of individuals—are associated with areas of space—i.e., sets of points. In Chapter 3, I go one step further, and show that the functional association of two plurals is represented by the spatial association of two areas of space. The spatial representation of higher order objects is summarized in Figure 1.

Example (3) illustrates this with ASL translations of the English sentences in (2). In each case, the noun-modifier (ONE, SAME, or DIFFERENT) moves in an arc-movement over the same area of space that was established by the plural BOY (indicated by lowercase letter a). This inflection has a semantic effect: (3a) entails that a plurality of books are distributed over the boys, one each; (3b) and (3c) only allow an ‘internal’ reading where the boys are compared to each other.

- (3) a. ALL-a BOY READ ONE-arc-a BOOK. **ASL**
 ‘All the boys read one book *each*.’
 b. ALL-a BOY READ SAME-arc-a BOOK.
 ‘All the boys read the same book *as each other*.’
 c. ALL-a BOY READ DIFFERENT-arc-a BOOK.
 ‘All the boys read different books *from each other*.’

These results thus provide *new evidence* for theories in the second wave of dynamic semantics. Furthermore, as in the case of singular reference, they also provide *new tools* to distinguish between these theories. In this

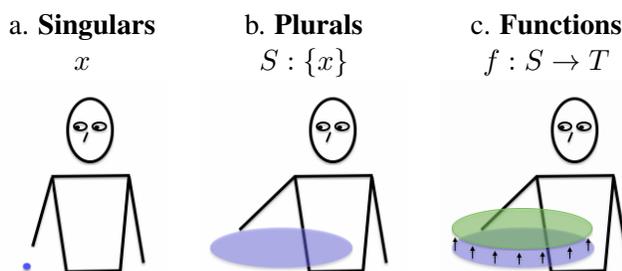


Figure 1: Localization of discourse referents in ASL

spirit, Chapter 4 focuses on the case of ‘dependent indefinites’ (as in (3a)), a compositionally challenging cross-linguistic phenomenon that has seen a range of different treatments in recent literature [4, 9, 6, *i.a.*].

Chapter 4: Dependent indefinites – the view from sign language

In many languages, an indefinite determiner or numeral may be inflected to indicate that the value of the indefinite DP varies with respect to another DP in the sentence or in context. In the terms introduced above, this morphological marking indicates the introduction of a functional discourse referent. In American Sign Language, inflecting the numeral ONE with an ‘arc’ movement creates such a **dependent indefinite**: (4a) means that the books vary with respect to the boys.

In many unrelated languages, dependent indefinites show the same licensing patterns: they are licensed under a plural or a distributive operator, but are ungrammatical when all other arguments are singular. This generalization holds of dependent indefinites in Kaqchikel [9], Hungarian, Romanian, Albanian, Telugu on the ‘participant key’ reading [2], and ASL (this work).

- (4) a. BOYS THEY-arc-a READ ONE-arc-a BOOK. ASL
‘The boys read one book each.’
b. EACH-EACH-a PROFESSOR NOMINATE ONE-arc-a STUDENT.
‘Each professor nominated one student.’
c. * JOHN-a READ ONE-arc-a BOOK.

Most semantic analyses of dependent indefinites formalize a similar insight: dependent indefinites contribute a variation condition: the value of the variable introduced by the indefinite must vary with respect to the value of another variable in the sentence or in context. The specific implementation of this insight varies in significant ways, notably on the following two fundamental architectural questions:

1. Are dependent indefinites anaphoric to their licensor [4], or is the relation indirect [2, 6, 9]?
2. Are dependent indefinites themselves quantificational [as in 2, 6] or does distribution come from a (possibly covert) distributive operator elsewhere in the sentence [4, 9]?

Here I argue the following: (1) dependent indefinites have an anaphoric component; (2) they are themselves quantificational. I argue that new data involving spatial agreement in ASL gives insight into these questions. I discuss new empirical and theoretical ramifications of these choices.

Spatial agreement in ASL. In their licensing patterns and interpretation, dependent indefinites in ASL fit into a broader cross-linguistic pattern of dependent indefinites. With the use of space, however, ASL is unique in that it is able to overtly represent the dependency relation between a dependent indefinite and its licensor. In ASL, plural DPs may be indexed over areas of space in the horizontal plane in front of the signer (indicated in glosses by lowercase letters a and b). Dependent indefinites are obligatorily signed over the same area of space as their licensor. Empirically, this means that sign language is able to disambiguate readings where spoken language cannot. In particular, dependent indefinites in spoken language (e.g. in Hungarian) are ambiguous when there are multiple potential licensors; in ASL, they are not.

- (5) A fiúk két-két könyvet adtak a lányoknak. Hungarian
The boys two-two book give.3Pl the girls
‘The boys gave the girls two books {per boy OR per girl}.’

- (6) ALL-a BOY GAVE ALL-b GIRL ONE-arc-b BOOK. ASL
 ‘All the boys gave all the girls one book *per girl*.’

This shows that the semantic representation of dependent indefinites in ASL must be rich enough to represent the connection between the dependent indefinite and its licenser; that is, dependent indefinites in ASL must contain an anaphoric component.

SAME and DIFFERENT. The same spatial inflection that is displayed by dependent indefinites is also displayed by the adjectives SAME and DIFFERENT in ASL. In (7) the adjective SAME moves in an arc-movement over the same area of space that was established by the plural ALL BOY. As above, this inflection has a semantic effect: (7) only allows an ‘internal’ reading, where ‘sameness’ is distributed over the boys.

- (7) ALL-a BOY READ SAME-arc-a BOOK. ASL
 ‘All the boys read the same book *as each other*.’

Again, movement in space allows disambiguation in cases of multiple licensers; while the English sentence ‘*Every boy gave every girl the same book*’ is ambiguous [5], the same sentence in ASL may be disambiguated with space, like in (6). Analogous results hold for DIFFERENT.

Although the semantics of *same* and *different* is complex in itself, what is clear is that these adjectives must compare elements of a set to each other—that is to say, they are quantificational. Inspired by the morphological similarities in ASL, we treat dependent indefinites likewise.

Proposal. Dependent indefinites introduce a plurality into a discourse. The plural associated with the dependent indefinite can be divided into subsets with respect to the atomic parts of an antecedent (the licenser); the dependent indefinite presupposes that there are at least two such subsets (the variation condition) and entails that each subset contains a certain number of individuals.

As observed by Henderson [9], the variation condition must be able to escape from the distributive scope of a distributive operator; otherwise, (4b) would be predicted to be as ungrammatical as (4c). In the present proposal, licensing by ‘each’ is achieved by quantifier raising of the dependent indefinite, letting it scope outside the distributive operator. Following [9], the framework of **Dynamic Plural Logic** [19, 16, 3] allows the semantics to be able to make reference to the necessary functional dependency even after the distributive scope has closed.

Let g and h be variables over assignment functions that map indexes (variables i, j) to individuals. Undefined indexes are given value ‘ \star ’. Let G and H be variables over sets of assignment functions (‘information states’). Sentences are propositions (variables φ, ψ), that map an input/output pair of information states to a truth value. Definitions (8)–(15) are adapted from [16] and [3].

- (8) $G(i) := \{g(i) | g \in G \text{ and } g(i) \neq \star\}$
 (9) $G|_{i=d} := \{g | g \in G \text{ and } g(i) = d\}$
 (10) $g[j]h \Leftrightarrow$ for any index i , if $i \neq j$, then $g(i) = h(i)$
 (11) $G[j]H \Leftrightarrow$ for all $g \in G$, there is a $h \in H$ such that $g[j]h$, and
 for all $h \in H$, there is a $g \in G$ such that $g[j]h$
 (12) $[j] := \lambda GH. G[j]H$
 (13) $\varphi \wedge \psi := \lambda GH. \exists K [\varphi(G)(K) \text{ and } \psi(K)(H)]$

- (14) For P any n -place dynamic predicate with classical denotation P' ,
 $P(i_1, \dots, i_n) := \lambda GH.G = H \text{ and } \forall g \in G[\langle g(i_1), \dots, g(i_n) \rangle \in \mathcal{I}(P')]$
- (15) $\delta_i(\varphi) := \lambda GH.G(i) = H(i) \text{ and } \forall d \in G(i) : \varphi(G|_{i=d})(H|_{i=d})$

Definitions (16)–(18) provide cardinality operations.

- (16) **inside**(j) = n := $\lambda GH.G = H \text{ and } |H(j)| = n$
- (17) **inside**(j/i) = n := $\lambda GH.G = H \text{ and } \forall H' \in \{H|_{i=d}(j) : d \neq \star\} [|H'(j)| = n]$
- (18) **outside**(j/i) = n := $\lambda GH.G = H \text{ and } |\{H|_{i=d}(j) : d \neq \star\}| = n$

Definitions (19) and (20) give new denotations for plain indefinites and dependent indefinites.

- (19) $\llbracket \text{three}_j \rrbracket = \lambda NP.[j] \wedge N(j) \wedge P(j) \wedge \mathbf{inside}(j) = 3$
- (20) $\llbracket \text{two-two}_{i,j} \rrbracket = \lambda NP.[j] \wedge N(j) \wedge P(j) \wedge \mathbf{outside}(j/i) > 1 \wedge \mathbf{inside}(j/i) = 2$

Licensing by a distributive operator is achieved by allowing quantifier raising of the dependent indefinite. (21) shows the result of QR for a sentence with a distributive licenser. Note that the variation condition, ‘**outside**(j/i) > 1,’ is evaluated after the distributive scope of δ_x has closed.

- (21) a. Three students each _{x} saw two-two _{x,y} zebras.
 b. $[y] \wedge \text{ZEBRAS}(y) \wedge [x] \wedge \text{STUDENTS}(x) \wedge \delta_x(\text{SAW}(y)(x)) \wedge$
 $\mathbf{inside}(x) = 3 \wedge \mathbf{outside}(y/x) > 1 \wedge \mathbf{inside}(y/x) = 2$

Discussion. The proposal above is modeled largely after Henderson [9], but it differs with respect to exactly the two architectural questions discussed above. These revisions have both empirical and theoretical ramifications.

First, on an account in which dependent indefinites bear the same at-issue meaning as plain indefinites (i.e., they are non-quantificational), licensing by a plural (as in (4a)) requires the presence of a covert distributivity operator. However, this fails to generate cases where the dependent indefinite is conjoined with a plain indefinite that is interpreted cumulatively, as in (22): a covert distributivity operator scoping over the VP would generate a reading with twice as many appetizers as students. On the other hand, if dependent indefinites are themselves quantificational, no covert distributivity is necessary.

- (22) A diákok két előételt és **egy-egy** főételt rendeltek. **Hungarian**
 The students two appetizers and one-one main dish ordered.
 ‘The students ordered two appetizers in total, and one main dish per student’

Second, we have seen that the variation condition must be able to escape from the distributive scope of a distributive operator. On an account in which distributive force comes only from the distributive licenser, the result is a kind of split-scope: the at-issue content must scope below the distributive operator, and the variation condition must scope above it. [9] achieves this by enriching the semantics to include ‘postsuppositions’ (see [9] for details). On an analysis where dependent indefinites are themselves distributive, both semantic components can scope high. There is thus no need for the postsuppositional enrichment; the effect can be derived by standard quantifier raising of the dependent indefinite, as we have done here.

Part II: Verbs

In second part of the dissertation, I turn to questions regarding iconicity. Like spoken languages, sign languages can communicate information through a discrete combinatorial system that combines words and morphemes into meaningful sentences. Additionally, though, sign languages are famous for displaying a ‘pictorial’ quality; they can communicate information graphically, through an iconic mapping that preserves information about the form of a sign. Thus, in the second part of the dissertation, I investigate the relation between iconicity and the combinatorial grammar, focusing on points of interface between the two, where iconic representations result in categorical effects that feed into the combinatorial system.

Chapter 6: Telicity and iconic scales in ASL

Chapter 6 addresses the representation of telicity in sign languages. In a series of papers [20, 15, *i.a.*], Wilbur shows that a number of sign languages display a non-arbitrary form-to-meaning correspondence in the verbal lexicon: telic verbs end with sharp deceleration (‘end-marking’); atelic verbs do not. Figure 1 provides an example. In ASL, Wilbur also shows that the phonetic form of a verb may be manipulated with semantic effect. In Chapter 6, I provide an analysis of these facts in terms of structural iconicity, where the interpretation of a sign preserves abstract structure of the form of the sign. I follow Kennedy and McNally [12] in assuming that the meanings of change-of-state verbs are derived from scales; I argue that verbs in ASL iconically represent these scales, and that end-marking on telic verbs is the iconic representation of the maximum of a closed scale.

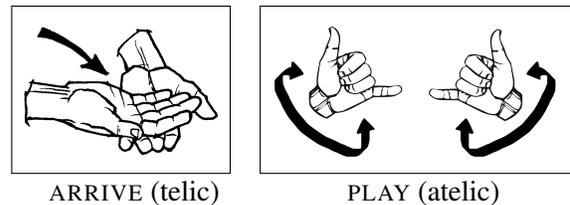


Figure 2: Images of ARRIVE and PLAY in ASL

Gradient manipulations. In ASL, Wilbur shows that the phonetic form of a verb may be manipulated with semantic effect. For example, the verb SIT-DOWN in ASL ends with contact between the signer’s two hands; if the sign is produced without this contact at the end, the verb is interpreted roughly as ‘almost sat down.’ If the verb DIE is signed slowly, it is interpreted roughly as ‘slowly die.’ Wilbur proposes that these phonetic features are discretely codified in the grammar as a finite set of combinatorial morphemes. Here, I argue that these effects arise not from discrete morphemes, but from an iconic mapping that preserves abstract geometric structure from the form of a sign to its meaning. As evidence, I present examples with gradient interpretive effects that cannot be generated by a discrete combinatorial system alone.

First, Figure 3 presents an example where the reduplicated sign GIVE accelerates from a length of 0.27 seconds down to a length of 0.07 seconds. The resulting interpretation is that the event occurred at a speed that increased over time. Critically, the interpretation of acceleration is only possible with arbitrarily many levels of speed represented.



Figure 3: Reduplicated GIVE in ASL

Second, pronunciation of a sign can be interrupted by pauses; the resulting inference of this ‘bit-by-bit’ inflection is that the event occurred gradually reaching successive states towards completion of the event. These intermediate markers are sensitive to fine-grained temporal and spatial modifications. For example,

if the verb DIE is signed with an increased number of pauses as the motion of the sign nears its end point, this is interpreted as meaning that the subject's health declined more and more slowly until the moment of death. In order to capture this meaning, the interpretive system must be able to preserve information from at least two different dimensions: the time elapsed and the distance that the hand has traveled.

Verbal scales. Kennedy and Levin [11] observe that many adjectives come associated with scales, allowing gradability with degree modifiers like English *very*. [11] shows that adjectives display different semantic properties depending on whether their associated scale contains a maximal and/or minimal element. Kennedy and McNally [12] argue that a similar decomposition holds for verbs, based on the observation that verbs are sensitive to the same categories as adjectives, as exemplified by pairs like *wide/widen* and *dry/dry*. Of note, verbs based on closed scales have a telic and an atelic reading, as in (23). In contrast, verbs based on open scales are always atelic, as seen in (24).

- (23) a. The towel dried for an hour. **English**
b. The towel dried in an hour.
- (24) a. The gap between the boats widened for a few minutes.
b. ?? The gap between the boats widened in a few minutes.

For [12], pragmatic principles determine the meaning of a change-of-state verb; critically, verbs based on closed scales admit the (telic) meaning in which a degree increases to a maximum.

Iconic scales. Aristodemo and Geraci [1] argue that adjectival scales are iconically represented in Italian Sign Language: when the phonological form of an adjective includes a path motion, a comparative form can be built by signing the adjective at two different positions along the path.

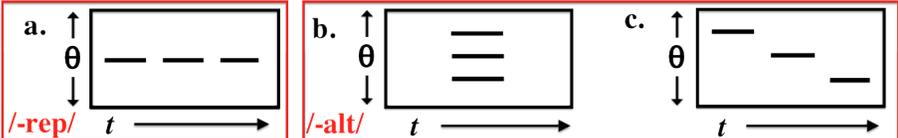
I propose that the same scales that are iconically represented in adjectives are also iconically represented in change-of-state verbs in ASL. Specifically, for each point in the production of a verb, we say that (a) the time that has elapsed after the onset of the sign is proportional to the time that has elapsed after the start of event, and that (b) the distance that has been traversed from the beginning of the phonetic motion (compared to a default motion) is proportional to the change along a scale from the initiation of the event (compared to a canonical event). When a verbal form travels the maximal distance that a phonological motion can travel (perhaps due to contact with another bodypart), an iconic condition entails that the scalar change reaches a maximal degree.

Importantly, the iconic condition on endpoints is only defined if a scalar maximum exists—that is, if the meaning of the verb is based on a closed scale. As above, verbs based on closed scales are exactly those verbs which receive telic meanings. End-marking tracks telicity.

Discussion. The resulting analysis has several important implications for the way that iconicity interacts in the grammar. First, we observe that ‘pictorial’ information can be categorized according to logical properties; thus, the output of an iconic mapping can feed grammatical distinctions like diagnostics for telicity. Second, we show that the iconic component of meaning cannot always be analyzed as a separate signal that is interpreted conjunctively. Specifically, in iconically incomplete forms like ‘SIT-DOWN-incomplete’ (where there is no contact between the hands), the resulting meaning is that the individual was in the process of sitting down, but did not necessarily finish the action. Just like the English ‘*almost sat down*’ and ‘*was sitting down,*’ the iconic mapping must be analyzed as an **intensional function** that operates on a logical argument. The final picture is a system in which iconicity is interleaved throughout the computation of a logical form.

Chapter 7: Iconic pluractionality in LSF

In Chapter 7 (co-authored with Valentina Aristodemo), we address cases of verbal pluractionality in French Sign Language (LSF), in which repetition of a verb in one of several ways communicates that there are a plurality of events. We focus on the semantics of two pluractional markers that appear pervasively in LSF: one-handed repetition (*/-rep/*) entails that sub-events with the same participants are distributed over time; two-handed alternating repetition (*/-alt/*) entails that sub-events are distributed across participants. Thus, (25) is compatible with only (27a); (26) is compatible with only (27b,c).

- (25) MY FRIEND CL:plural FORGET-*rep* BRING CAMERA. LSF
 ‘Again and again, my friends forgot to bring a camera.’
- (26) PEOPLE BRING CAMERA FORGET-*alt*.
 ‘Each of the people forgot to bring a camera.’
- (27) 

The LSF pattern fits into a broader typology of spoken languages where pluractional morphology (often reduplication) specifies distribution over plural arguments or time [7]. Cross-categorically, verbal inflection with */-alt/* in LSF shows licensing patterns that are formally identical to those of dependent indefinites in ASL and other languages, as discussed in Chapters 3 and 4.

Analog iconicity. Concurrently, the pattern of pluractionality in sign language displays iconic effects, similar to those discussed for singular verbs in Chapter 6. Focusing on cases of gradient interpretation, we show that LSF verbal forms include an iconic mapping that preserves information about the rate at which an event occurs. This iconic mapping preserves relative durations, but not absolute durations (e.g. slow repetition can denote an event that occurs over the course of days, but it need not take days to complete the sign). In practice, this means that gradient interpretive effects only arise in comparative paradigms. For example, in isolation, the forms in (28b) and (28c) are evaluated as true in the same situations: multiple giving events over a short period. But, when compared directly, they are judged to differ in *relative* speed: the givings are faster in (c) than (b).

- (28) a. GIVE-*rep*-slow b. GIVE-*rep*-medium c. GIVE-*rep*-fast

Additionally, we can see gradient effects in forms in which there is a *change of speed* (i.e. acceleration), as these forms show internal comparison. These iconic inferences are at-issue entailments, evidenced by their interpretation under negation and in the antecedents of conditionals.

Synthesis and compositionality. Following Schlenker [18], we propose that iconicity interfaces with the combinatorial grammar at a deep level, with an iconic predicate included in the logical definitions themselves. For a phonetic form Φ , we let \mathbf{Icon}^Φ be a mapping that preserves geometric properties of Φ . In (29), \mathbf{Icon}^Φ yields distributivity, since multiple motions map to plural events.

- (29) a. $\llbracket \text{-alt} \rrbracket = \lambda V. \lambda e [e \in \mathbf{Icon}^\Phi(V) \wedge \exists e', e'' \leq e [\theta(e') \neq \theta(e'')]]$
 b. $\llbracket \text{-rep} \rrbracket = \lambda V. \lambda e [e \in \mathbf{Icon}^\Phi(V) \wedge \forall e', e'' \leq e [\theta(e') = \theta(e'')]]$

This meaning then interacts with the grammar as any other logical operator.

The condition of thematic variation in (29a) means that /-alt/ is licensed by plurals (as in (26)) and by ALL, and is ungrammatical when all arguments are singular. Interestingly, /-alt/ is also licensed by EACH (as in (30)), despite the fact that EACH distributes to atomic individuals, evidenced by incompatibility with collective predicates like GATHER.

(30) BOY EACH-EACH FORGET-alt BRING CAMERA.

LSF

In order for the variation condition to be satisfied, it must somehow scope above the distributive scope of EACH. Notably, this state of affairs is formally identical to the puzzle of dependent indefinites under distributive quantifiers discussed in Chapter 4. As in the nominal domain, there are a number of possible mechanisms for scope-taking, including standard mechanisms of scope-taking and analyses employing postsuppositions. In either case, the scopal effect can be emulated by evaluating a conjunct as though it attaches to a given tree at a higher node, as in Figure 4.

New evidence this kind of solution comes from an interaction with iconicity. We show that the iconic meaning of the pluractional marker in ASL and LSF can be interpreted locally or interpreted globally: for example, an accelerating inflection can indicate the rate at which each individual performed an event, or it can indicate the overall rate at which events were performed by members of a plural licenser.

Critically, we show that the level at which the iconic condition is evaluated is exactly the structural position at which the grammatical condition is evaluated. In particular, in the case of distributive operators, where the analysis in (4) requires the pluractional morpheme to scope high, we show that a slow movement of /-alt/ under EACH must denote an event which happens slowly *from a global perspective*. We thus argue that both logical and iconic components are integrated into a single syntactic unit. Local or global interpretation is captured via linguistic scope-taking.

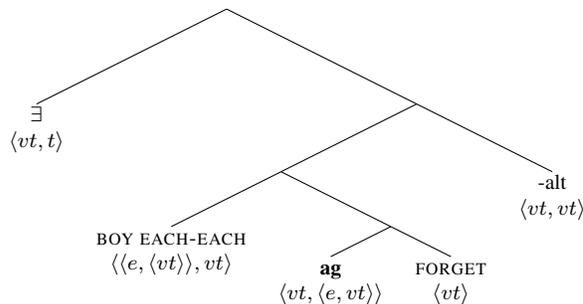


Figure 4: Licensing of /-alt/ by EACH

General conclusions

Taking advantage of the unique properties of the visuospatial modality, I provided new evidence from two sign languages to address a variety of recent debates about the compositional system of natural language. Concerning patterns of dependency, we saw that use of spatial agreement united a range of dependent nominal modifiers; we were led to an analysis where dependent forms are anaphoric and inherently distributive. New data from iconicity in the verbal domain provided new support for theories on which dependent forms are licensed by distributive operators by taking scope above them. Turning to iconicity, I argued that the interpretive system must be able to concurrently manipulate logical and iconic forms. Among the ‘points of interface,’ we saw that (a) pictorial representations may feed categorical grammatical distinctions, (b) iconic forms may themselves be intensional functions, (c) iconically-generated pluralities may take scope with respect to other operators. The resulting system interleaves iconicity deeply throughout the grammar.

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