Dependent indefinites: the view from sign language

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Abstract

In many languages, an indefinite determiner or numeral may be inflected to indicate that the value of the indefinite DP depends on another DP in the sentence or in context. 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?
2. Are dependent indefinites themselves quantificational?

In this paper, 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 American Sign Language gives insight into these questions, but that the answers have theoretical and empirical ramifications beyond sign language. An analysis is presented within the framework of Dynamic Plural Logic (van den Berg 1996, *i.a.*).

Overview. 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 American Sign Language, inflecting the numeral ONE with an 'arc' movement creates such a **dependent indefinite**: (1a) 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 ([6]), Hungarian, Romanian, Albanian, Telugu on the 'participant key' reading ([1]), and ASL (this work).

(1) 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 ([3]), or is the relation indirect ([1][5][6])?
2. Are dependent indefinites themselves quantificational (as in [1][5]) or does distribution come from a (possibly covert) distributive operator elsewhere in the sentence ([3][6])?

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.

(2) 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}.'

(3) 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 licensor; 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 (4) 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: (4) only allows an 'internal' reading, where the 'sameness' is distributed over the boys.

(4) ALL-a BOY READ SAME-arc-a BOOK.
'All the boys read the same book *as each other*.'

Again, movement in space allows disambiguation in cases of multiple licensors; while the English sentence '*Every boy gave every girl the same book*' is ambiguous ([4]), the same sentence in ASL may be disambiguated with space, like in (3). 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 licensor); 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 [6], the variation condition must be able to escape from the distributive scope of a distributive operator; otherwise, (1b) would be predicted to be as ungrammatical as (1c). In the present proposal, licensing by 'each' is achieved by quantifier raising of the dependent indefinite, letting it scope outside the distributive operator. Following [6], the framework of **Dynamic Plural Logic** ([8][7][2]) 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 (5)–(12) are adapted from [7] and [2].

(5) $G(i) \quad := \quad \{g(i) | g \in G \text{ and } g(i) \neq \star\}$

(6) $G|_{i=d} \quad := \quad \{g | g \in G \text{ and } g(i) = d\}$

(7) $g[j]h \quad \Leftrightarrow \quad$ for any index i, if $i \neq j$, then $g(i) = h(i)$

(8) $G[j]H \quad \Leftrightarrow \quad$ 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 $g[j]h$

(9) $[j] \quad := \quad \lambda GH.G[j]H$

(10) $\varphi \wedge \psi \quad := \quad \lambda GH.\exists K[\varphi(G)(K) \text{ and } \psi(K)(H)]$

(11) For P any n-place dynamic predicate with classical denotation P',
$P(i_1, ..., i_n) \quad := \quad \lambda GH.G = H \text{ and } \forall g \in G[\langle g(i_1), ..., g(i_n)\rangle \in \mathcal{I}(P')]$

(12) $\delta_i(\varphi) \quad := \quad \lambda GH.G(i) = H(i)$ and $\forall d \in G(i) : \varphi(G|_{i=d})(H|_{i=d})$

Definitions (13)–(15) provide cardinality operations.

(13) $\textbf{inside}(j) = n \quad := \quad \lambda GH.G = H$ and $|H(j)| = n$

(14) $\textbf{inside}(j/i) = n \quad := \quad \lambda GH.G = H$ and $\forall H' \in \{H|_{i=d}(j) : d \neq \star\}[|H'(j)| = n]$

(15) $\textbf{outside}(j/i) = n \quad := \quad \lambda GH.G = H$ and $|\{H|_{i=d}(j) : d \neq \star\}| = n$

Definitions (16) and (17) give new denotations for plain indefinites and dependent indefinites.

(16) $[\![\text{three}_j]\!] = \lambda NP.[j] \ \wedge \ N(j) \ \wedge \ P(j) \ \wedge \ \textbf{inside}(j) = 3$

(17) $[\![\text{two-two}_{i,j}]\!] = \lambda NP.[j] \ \wedge \ N(j) \ \wedge \ P(j) \ \wedge \ \textbf{outside}(j/i) > 1 \ \wedge \ \textbf{inside}(j/i) = 2$

Licensing by a distributive operator is achieved by allowing quantifier raising of the dependent indefinite. (18) shows the result of QR for a sentence with a distributive licensor. Note that the variation condition, '$\textbf{outside}(j/i) > 1$,' is evaluated after the distributive scope of δ_x has closed.

(18) a. Three students each$_x$ saw two-two$_{x,y}$ zebras.

b. $[y] \ \wedge \ \text{ZEBRAS}(y) \ \wedge \ [x] \ \wedge \ \text{STUDENTS}(x) \ \wedge \ \delta_x(\text{SAW}(y)(x)) \ \wedge$
$\textbf{inside}(x) = 3 \ \wedge \ \textbf{outside}(y/x) > 1 \ \wedge \ \textbf{inside}(y/x) = 2$

Discussion. The proposal above is modeled largely after [6], 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 (1a)) 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 (19): 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.

(19) 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 licensor, 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. [6] achieves this by enriching the semantics to include 'postsuppositions' (see [6] 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.

References

[1] Balusu, R. (2005). Distributive reduplication in Telugu. In Davis, C., Deal, A. R., and Zabbal, Y., editors, *Proceedings of the 36th Annual Meeting of the North East Linguistic Society (NELS 36)*, pages 39–53, Amherst, MA. University of Massachusetts GLSA Publications.

[2] Brasoveanu, A. (2013). Modified numerals as post-suppositions. *Journal of Semantics*, 30(2):155–209.

[3] Brasoveanu, A. and Farkas, D. (2011). How indefinites choose their scope. *Linguistics and philosophy*, 34(1):1–55.

[4] Bumford, D. and Barker, C. (2013). Association with distributivity and the problem of multiple antecedents for singular *different*. *Linguistics and Philosophy*, 36:355–369.

[5] Cable, S. (2014). Distributive numerals and distance distributivity in Tlingit (and beyond). *Language*, 90(3):562–606.

[6] Henderson, R. (2014). Dependent indefinites and their post-suppositions. *Semantics and Pragmatics*, 7(6):1–58.

[7] Nouwen, R. (2003). *Plural pronominal anaphora in context: Dynamic aspects of quantification*. PhD thesis, Utrecht University, Utrecht, Netherlands.

[8] van den Berg, M. (1996). *Some aspects of the internal structure of discourse: the dynamics of nominal anaphora*. PhD thesis, ILLC, Universiteit van Amsterdam.