Linguistics: Semantics

Introduction

The study of sign language *semantics* aims to describe how meaning is communicated through sign languages. Clearly, many individual signs carry their own meaning; the study of what individual words and signs mean and how the mind classifies them is called *lexical semantics*. One major categorization of words is into "open class" (content) words and "closed class" (function) words. Open class words include most nouns (e.g. *HOUSE, SHOES*), verbs (*DANCE, READ*), and adjectives (*RED, FRIENDLY*) which can, and are, constantly being created anew in a language (e.g. *EMAIL*) and comprise most of the content of an utterance. Because the meaning of open class words is tied closely with the cognitive science of *concepts*, the study of the classification and acquisition of content words is frequently the focus of studies in psychology. In contrast, closed class words (e.g. *NOT, FINISH, NO-ONE, IX*, *IF, SELF*) provide the structure for the sentence and are typically added as new items to the language at a much slower pace. These have been the focus of much of natural language semantics research in linguistics for both spoken and sign languages and have contributed greatly to our understanding of *compositional semantics*--the study of how the meanings of individual words combine to provide the meaning of a sentence.

Locations in space

One important topic of inquiry in the compositional semantics of sign languages is the representation and contribution of space to sentence meaning. Unique to the visual/spatial language modality, sign languages are able to associate areas of space, known as *loci*, with things and people that signers want to continue to talk about ("discourse referents"), so that each time a signer returns to the same area in signing space, they can refer back to the same referent. This is accomplished by either directly pointing to the area of space uniquely associated with such referent or by having this area incorporated into another sign.

(1) MARY $_{a}$IX SMART $_{b}$PETER LOSER. $_{a}$IX READ+ PRACTICE+ $_{b}$IX WATCH TV ALL-DAY.
'Mary is smart, Peter is a loser. She reads and practices, he watches TV all day.'

The areas of space glossed in (1) as ***a*** and ***b*** are uniquely associated with Mary and Peter, respectively. There are three main types of analyses of these loci in sign languages. The first, based primarily on work by Scott Liddell, takes space to be essentially gestural, and so not amenable to analogy to existing linguistic phenomena. The other two analyses draw a comparison to existing phenomena in spoken languages, either as semantic indices, or as semantic features, each of which we briefly describe in more detail below.

Semantic Indices. Some researchers--e.g., Diane Lillo-Martin and Edward Klima--have argued that *loci* are pronounced phonological or morphological realizations of semantic indices that have previously been proposed for spoken languages, but which in spoken languages are never pronounced. They suggest that loci simply signal what spoken languages cannot: overt manifestation of the system of keeping track of discourse referents (i.e. the "assignment function") often associated with anaphoric expressions like pronouns.

Implementing this view in (1), *IX* (articulated using a closed-fist handshape with the index finger extended, i.e. pointing) is an anaphoric expression (like a pronoun): in location *a, IX* is necessarily interpreted as Mary, while in location *b, IX* is interpreted as Peter. One argument in favor of this view is that the assignment of loci is arbitrary: any particular (non-present) discourse referent could be assigned to any location in signing space. A second similarity between indices and loci is the ability to refer to different entities while maintaining the same phonological characteristics of the lexical item.

Recent work has shown that the loci-as-indices view successfully predicts the existence of various phenomena associated with Binding Conditions, originally articulated for spoken languages: anaphors (such as *himself/herself*) must be bound within their binding domain; pronouns (such as *he/she*) must not; and referential expressions (such as *Mary/her cat*) are free. These conditions predict that in (2) below, a reflexive sign *SELF* will be able to refer only to the subject of the clause in which it occurs and not outside of it. Further, only *SELF*, and not *IX,* may refer to Jim while only *IX,* and not *SELF*, may refer to Bob. Finally, neither *BOB* nor *JIM* can occur in this position, even though the reference to them is possible. These predictions are borne out. Notice in (2) the correspondence of the loci *a* and *b* in the possible ASL sentences and the indices *i* and *j* in the English glosses.

(2) $_{a}$BOB TELL-1 $_{b}$JIM LOVE {*$_{a}$SELF / $^{OK}{}_{b}$SELF / $^{OK}{}_{a}$IX/ *$_{b}$IX / *$_{a}$BOB /*$_{b}$JIM}
'Bob$_i$ told me that Jim$_j$ loves {himself$_{j,*i}$/ him$_{i,*j}$/ *Jim$_j$/ *Bob$_i$}'

In addition, Philippe Schlenker's research has shown that signers' interpretations of person and temporal anaphora in complex sentences pattern consistently with "dynamic" approaches that can model co-indexation across sentence-boundaries, arguing that this powerful framework is needed for sign languages, and so natural languages more generally.

Morpho-Syntactic Features. Despite these findings, correspondence between loci and semantic indices, or at least to what is commonly assumed to reflect their behaviors, is far from neat. Some researchers have argued instead that loci realize the morpho-syntactic features (such as gender in English, as in *he/she*), rather than semantic indices. This view is has been advanced by Judy Kegl, Carol Neidle and their colleagues. One argument in favor of this view is that loci are optional, unlike semantic indices; thus, the loci-as-indices approach necessitates a theory of why/how some indices are overtly realized while others are not--an additional complication. Further, a large class of verbs has been argued to exhibit 'morphological agreement' with its arguments by incorporating their loci as morphemes. There is also unusual morpho-syntactic behavior of $_{1}$*IX*, typically glossed as the 1st person pronoun, noticed Richard Meier. Finally, as Jeremy Kuhn demonstrates, loci may remain uninterpreted in contexts indices should--namely ellipsis and focus sensitive operators.

Noun phrases

Returning to the meaning of *IX* in our example (1), a second question that arises is the contribution of *IX* separate from the locus. Until now, we have assumed that *IX* is a pronoun; however, it need not be so. After all, pointing is not unique to sign languages. Many spoken languages employ a similar device: concurrently with speech, language users point to particular areas of space in order to differentiate among the potential referents. Therefore, the inquiry into the semantics of the pointing, in conjunction with the inquiry into the semantics of noun phrases, promises to advance our understanding of sign languages.

(3) a. #I know {him/that man} (uttering in a crowd of people, no use of hands)
b. OKI know {him/that man} (uttering in a crowd of people, pointing at a man in a blue suit)

In ASL, *IX* occurs in a number of contexts: before and after noun phrases, as well as instead of them. The latter has already been demonstrated in (1)-(2); the former is shown in (3).

(3) [IX WOMAN $IX_{\text{variable pathlength}}$]$_{DP}$ BORROW VIDEOTAPE
'The woman (more or less far away) borrowed the videotape.' (MacLaughlin 1997)

Dawn MacLaughlin argues that the prenominal *IX* is a definite article, akin to the English *the* (as the translation indicates); the postnominal *IX* is adverbial in nature, on par with *here/there*. However, matters are clearly complicated here. The English article signals both uniqueness and familiarity, as can be seen in the English translations in (4). It turns out, however, that ASL *IX* can occur in neither understood 'uniqueness' cases (as in (4a), where, by common knowledge, a church has only one priest), nor in the environments signaling familiarity (as in (4b)).

(4) a. TODAY SUNDAY. DO-DO. GO CHURCH, SEE (*IX) PRIEST.
'Today is Sunday. What to do? I'll go to church, see *(the) priest.'
b. HAVE THREE PEOPLE HERE COORD-L TEACHER PRIEST COOK.
t
(*IX) PRIEST HUMBLE [...]
'There are three people here: a teacher, a priest, and a cook. *(The) priest is humble [...]'

Such behavior casts serious doubt on the validity of the approach to *IX* in terms of English *the*. This is corroborated by independent evidence: (a) on a number of typological diagnostics ASL behaves as a language without a definite article, and (b) while necessarily absent in the environments discussed above, *IX* can occur in both definite as well as specific indefinite contexts. The question then is what *IX* denotes and how to derive its distribution from its semantics. Elena Koulidobrova and Diane Lillo-Martin treat *IX* as demonstrative, akin to *that* in (3b). Cross-linguistically, such expressions are notorious for having both definite and specific indefinite readings; how to derive these effects has puzzled semanticists for decades. One option for Sign Languages is the idea that the vertical signing plane encodes specificity. For instance, Gemma Barberà shows that in LSC, specific noun phrases are signed in the lower part of this plane, while the upper part of the plane is reserved for non-specific noun phrases (as in (5)). In ASL, the same spatial distinction (the lower vs. upper part of the vertical plane) has been argued to mark definiteness or, more recently, the size of sets that serve as the domain for quantifiers like *ONE, ALL, NONE, FEW*, etc. (in work by Kathryn Davidson and Deanna Gagne), as in (6).

(5) a. BOOK $_3IX_{low}$, $_1$IX NEED ONE_{low}
'I need one (specific) of those books'
b. BOOK $_3IX_{high}$, $_1$IX NEED ONE_{high}
'I need one (non-specific) of those books'

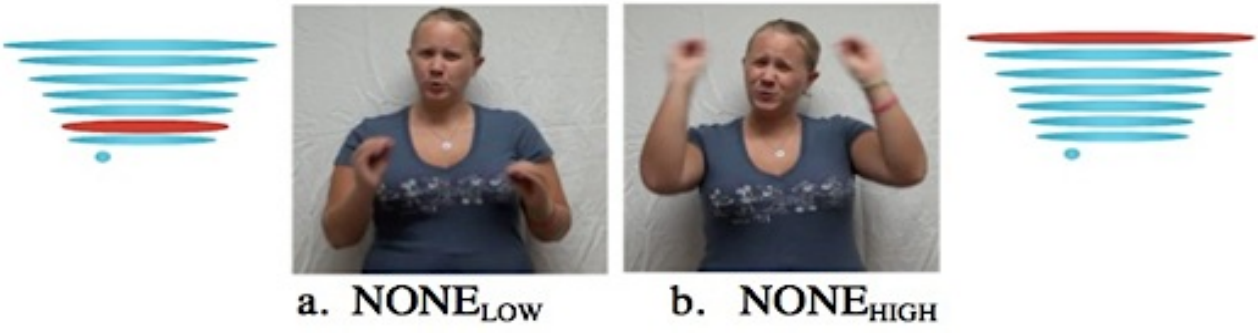
Figure B. 'One$_{spec}$'

Figure D. 'One$_{non.spec}$'

Figure 1 (Barberà 2012)

(6) *Context: Signer is asked if anyone in her family is deaf beside herself. She replies:*

a. 'None, only me.' b.'None at all (no extended family members), only me'



a. NONE$_{LOW}$ b. NONE$_{HIGH}$

Figure 2 (Davidson and Gagne 2013)

Finally, nouns can be modified by adjectives, and researchers have found interesting effects of the sign language modality in this domain as well. In a study of JSL, Kazumi Matsuoka and Jon Gajewski discuss the use of adjective modifiers that have been borrowed and conventionalized from mouth gestures in the surrounding hearing culture and are sensitive to the positive (*RICH/GOOD*) or negative (*POOR/BAD*) polarity of the adjective.

Role Shift

One widely discussed issue in Sign Language Linguistics is how to adequately capture the fact that signers appear able to move in and out of the point of view of another. This has become known as Role Shift (RS):

(7) $_{a}$GOVERNOR $_{1}$SELF PAY TAX HIGH
a-RS
'The governor's like, "I pay high taxes."' (Lillo-Martin 1995)

Note that in (7), the phrase attributed to the governor is in quotations, suggesting its similarity to quotation ("direct speech") in languages like English. However, a number of researchers have argued against such a view for all of the RS cases. One crucial argument comes from 'mixed indexicals,' or instances where some signs in an utterance are interpreted from the point of view of the actual speaker, and some from the point of view of the reported speaker. For example, Josep Quer reasons that if RS necessarily involves direct quotations, then in (8), although the context of utterance is Barcelona, *HERE* would only be expected to refer to Madrid. Yet, as the translation below indicates, *HERE* corresponds to Barcelona.

(8) $_{a}$IX $_{m}$MADRID MOMENT JOAN$_{i}$ THINK $_{l}$IX$_{i}$ STUDY FINISH HERE$_{b}$
(t) (i-RS)
= 'When he was in Madrid, Joan thought that he would finish his study here (Barcelona)'
≠ 'When he was in Madrid, Joan thought, "I will finish my study here (Madrid)"'
(Quer 2011)

Although various proposals have been made to accommodate this type of data from various languages, none unify the data. Yet, a key seems to be the *attitude* verb that introduces the role shift--overt *SAY, BELIEVE*, etc., as well as covert "point of view" operators '*POV*' in Diane Lillo-Martin's account of ASL, '→' in Sandro Zucchi's account of LIS, and '*PVOp*' in Josep Quer's account of LSC).

Iconicity

Space in sign languages is used not only to communicate information about "who did what to whom" (the *argument structure* exhibited by pronouns and verb agreement) but also to convey information about both the referents and the action themselves. In some cases, this is done iconically, i.e. the form is motivated by meaning and may be transparent even to a non-signer. For example, talking about a person's height results in assignment of loci to higher or lower parts of the vertical plain. Philippe Schlenker and his colleagues have shown that these have analogous presuppositional behavior to features like gender in spoken languages.

When it comes to actions, some verbs are more iconic than others: handling verbs like *HAMMER* look just like the action, while others like *ARRIVE* are quite abstract and not at all transparent in their meaning. One proposal that suggests aspects of iconicity even in abstract verbs appeals to a semantic notion of telicity. This proposal, put forth by Ronnie Wilbur, is known as the *Event Visibility Hypothesis*. On this view, telic predicates like *walk home* or *read the newspaper*, which describe a complete event, are produced with a specified final location in the sign; atelic predicates, which describe incomplete events like *read novels* or *walk around*, are not. In other words, a specified final location in the pronunciation seems to correspond to a final point in the semantics of the event. This correlation has been found to hold across a variety of sign languages (e.g. HZJ, ÖGS). What is especially interesting about this idea is that it combines a modality specific property of sign languages (the use of space) with a very abstract linguistic property (telicity) into a formalized hypothesis that can be tested in other languages.

Logical Operators

Another area of compositional semantics that has received attention recently is the study of *logical operators*, which turn a simple sentence into a complex one. We discuss four here: negation, conjunction, disjunction, and implication. Negation is the most well-studied across

sign languages. Ulrike Zeshan's typological study of negation across the world's sign languages shows that sign languages fall into two classes with respect to negation: manual dominant negation languages (e.g. LIS, LIU,TİD) which require a manual expression of negation and often have nonmanuals on the negative item only, and nonmanual dominant languages (e.g. ASL, DGS, LSC) which can convey negation with nonmanuals only; these allow more extensive spreading of the nonmanuals.

(9) Manual dominant: LIS (Cecchetto et al 2009)

a. *PAOLO CONTRACT SIGN
neg hs

b. PAOLO CONTRACT SIGN NOTHING
neg hs
'Paolo didn't sign the contract'

(10) Nonmanual dominant: ASL

a. $_{a}$IX LIKE ICE-CREAM
hs

b. $_{a}$IX NOT LIKE ICE-CREAM
hs
'She doesn't like ice-cream.'

This variation is similar to what we find in spoken languages: two negative terms in the same sentence may be interpreted as a single negation ("negative concord") or as two separate logical operators ("double negation"). Yet, the ability of nonmanuals to convey negation at all is an effect of modality that deserves further inquiry at the semantic, syntactic, and pragmatic levels.

Coordinators combine multiple clauses (or smaller pieces) together. In ASL, common coordinating strategies include placing the items to be coordinated on successive fingers on the non-dominant hand ("list buoys" or "Coord-L") or in successive loci in the default singing space (COORD-shift). Kathryn Davidson shows that both of these strategies can convey both conjunction ("and") or disjunction ("or"), depending on (a) linguistic and non-linguistic context, (b) nonmanuals, or (c) accompanying discourse particles like "both" or "either". Although ASL also has lexical signs *AND* and *OR*, the frequency of strategies for conveying these logical connectives that don't use words like *AND* and *OR*, and especially the use of nonmanuals to signal this semantic distinction may be another possible effect of modality.

A final category of logical operators are subordinating structures like conditionals. While less research is focused on the semantics of these constructions compared to negation or even coordinators, at least in ASL they show similarities with both. They can be conveyed either using nonmanual markers ("brow raising") only or in a combination with manual signs (IF+"brow raising").

Logical operators show us how, on the one hand, sign languages are precisely like spoken languages in expressing logical notions like negation, disjunction, conjunction, and implication. On the other hand, sign languages are special in allowing this to be done in a modality-specific way--namely, via nonmanual marking. Not all sign languages allow each of these to be expressed non-manually, but all of these *can* be conveyed nonmanually in at least *some* sign language, which makes them an interesting source of comparison to their more frequently lexicalized counterparts in spoken languages.

Conclusions

While sign languages clearly exhibit the same complexity and rules that are found in spoken languages, some aspects of their structure are influenced by the fact that they occur in the visual mode. This is obviously true for the phonetic and phonological levels, since sign languages are produced with the hand and body and perceived by the eyes, but is less obviously true at more abstract levels. Given that semantics is one of the most abstract levels

of linguistic structure, it is important that even there, there are some effects of modality that manifest in stronger tendencies toward some structures than others, but which nevertheless all fit into the complex patterns of natural languages across the world.

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See Also: *Linguistics: Spatial Grammar; Linguistics: Pragmatics; Linguistics: Syntax.*

Further Readings

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