Sign language linguistics, Part II: Syntax and semantics

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Sign language is a language

Just like any spoken language...

- ▶ Sign language activates the language centers of the brain.
- ▶ Sign language has grammatical rules:

  (1) a.   ME LIKE ICECREAM.
               'I like icecream.'
      b.   * LIKE ME ICECREAM.

- ▶ Sign language has phonology:

  (2)   Minimal pairs:
       a.   FATHER vs. MOTHER
       b.   MARRY vs. PROOF

Sign language is unique

- But, sign language uses the eyes and hands instead of the ears and mouth.
- The **visual-spatial channel** of sign language results in some unique properties:

  1. **Synchronicity**
  2. **Use of space**
  3. **Iconicity**

The big question

- Can these properties give us insight into the structure behind *all* languages (spoken as well as signed)?

- Today: what can they tell us about **syntax** and **semantics**?

Section 2

Properties of sign language

Synchronicity

Synchronicity:
The ability for multiple signals to be produced at the same time.

- In the acoustic channel, it is hard to hear more than one thing at a time, and we only have one vocal tract.
- Spoken speech is essentially **linear**.

On the other hand, for sign language...

- The visual field can perceive many things at once.
- Multiple visible articulators:
    - two different hands
    - facial expressions.

Use of Space

- The articulators of sign language are completely visible.
  - (Hands instead of vocal folds/vocal tract)
- A signer can manipulate space for grammatical or expressive purposes.
- Using space allows gradient but easily distinguishable distinctions between the locations of signs.
- Connections to gestural uses of space (e.g. pointing).

Iconicity

Iconicity:
Similarity between the form of a sign and its meaning.

- ► Sign language $\neq$ pantomime.
- ► In sign languages, as in spoken languages, words are often completely arbitrary.

(3) ASL WHERE = LSF NOT = ISL WHO = JSL WHAT

- ► Nevertheless, sign languages have pervasive iconicity.
- ► Signs often *look like* their denotation.

(4) a. English: *meow*, *cock-a-doodle-doo*, ...
    b. ASL: BIRD, TREE, SWEEP, LOOK-AT, ...

Several case studies

- We will look at two instances in which the unique properties of sign language allow us to explore our syntactic and semantic theories.

  1. Synchronous syntax (especially: non-manuals)
  2. Spatial indexing of NPs
  3. The 'Event Visibility Hypothesis'

Section 3

Synchronous Syntax

Simultaneous compounds

- Remember our discussion from last time:

- Compound-formation never makes use of two-hands.

  (Wilbur 1990)

  (5) a. FATHER+MOTHER
         'parents'
      b. * FATHER-right-hand +
         MOTHER-left-hand

- But... exceptions with non-manual morphemes?

  (6) SEX-non-manual +
      TRAVEL-right-hand
      'honeymoon'

- Conclusion: Non-manuals easier to dissociate than H1 and H2?

Non-manuals in Syntax

- But remember that non-manuals occur in syntax, too:

- Grammatical uses

  (7)   a.   JOHN LIKE ICECREAM.
             'John likes icecream.'
        b. $\overline{\text{JOHN LIKE ICECREAM.}}$^{br}
             'Does John like icecream?

- Adverbial uses
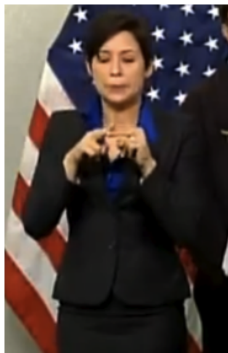 - Our focus now.

Adverbial non-manuals

- Some adjectival/adverbial non-manuals
    - th = 'carelessly/sloppily'
    - mm = 'average/regular'
    - oo = 'small'
    - puffed.blow = 'to a great degree'

(8) a. BOY WRITE LETTER.
         'The boy is writing a letter.'
     b. BOY $\overline{\text{WRITE LETTER}}^{\text{mm}}$.
         'The boy writes letters regularly.'
     c. BOY $\overline{\text{WRITE LETTER}}^{\text{th}}$.
         'The boy writes letters carelessly.'

Adverbial non-manuals

INCREASE‾^{oo}
'increase little by little'

SPILL‾th
'spill sloppily'

Timing: Generalizations

- There is a lot of work on the timing of non-manuals.

- **A first approximation:**
  A non-manual sign is held for the duration of the constituent that it modifies.

Synchronous syntax

- In our phrase structure grammar so far, we have rules like:
  - A → B C   'A can be decomposed into a B followed by a C'
  - A → C B   'A can be decomposed into a C followed by a B'
- How do we create a syntax for a language in which two syntactic objects occur **simultaneously**?
- Any suggestions?

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    - VP → VRs

Synchronous syntax

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  - $A \rightarrow B\ C$ 'A can be decomposed into a B followed by a C'
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- How do we create a syntax for a language in which two syntactic objects occur **simultaneously**?
- Any suggestions?
  - $VP \rightarrow \overline{VP}$s
- Here's a better idea:
  - $VP \rightarrow \overline{VP}^{nms}$

- Though, trees will be a bit harder to draw...

Trees with Synchrony

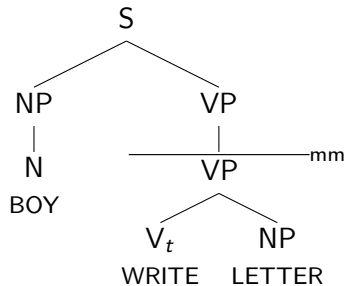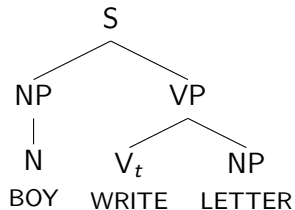- Though, trees will be a bit harder to draw...

```
           S
        ／     ＼
      NP         VP
      |        ／   ＼
      N      V_t      NP
     BOY   WRITE    LETTER
```
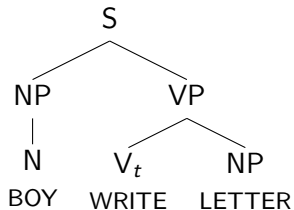
Trees with Synchrony

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Synchronous syntax

Summary:

- Non-sequential syntax ... initially seemed tricky, but ultimately reasonably easy to build into our phrase structure grammar.

- One thing of note: a non-manual sign marks an entire constituent.
  - It may be possible for sign languages to disambiguate sentences in novel ways.

Section 4

NPs in space

The use of space

▶ In ASL, NPs may be associated with locations in space ('loci').

(9) MY ZOO LION-a TIGER-b BEAR-c HAVE. UNICORN NOT
HAVE. WHY? NOT REAL.

The use of space

- This use of space will turn out to have syntactic and semantic effects.

- Based on our preceding discussion, here's a possible rule:

$$NP \rightarrow [NP]_i$$

The use of space: payoff

- In English, the following sentence is ambiguous.

  (10)   Mary drank coffee and tea or wine.

- Here are the relevant syntactic rules:
  - NP → NP and NP
  - NP → NP or NP

- What are the two different tree structures?

The use of space: payoff

- It turns out that the use of space in ASL can eliminate this ambiguity:

    (11)   MARY DRINK [COFFEE$_a$ AND TEA$_b$]$_c$ OR WINE$_d$,
           EITHER$_{c/d(alternating)}$.

The use of space: payoff

- It turns out that the use of space in ASL can eliminate this ambiguity:

  (12) MARY DRINK [COFFEE$_a$ AND TEA$_b$]$_c$ OR WINE$_d$,
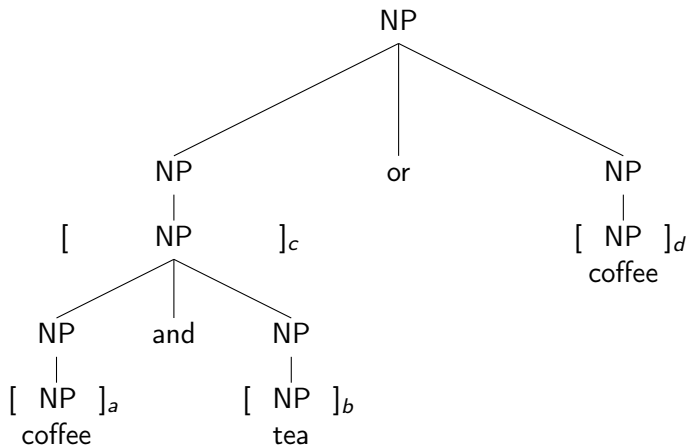   EITHER$_{c/d(alternating)}$.

- Why is this?

The use of space: payoff

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  (13)   MARY DRINK [COFFEE$_a$ AND TEA$_b$]$_c$ OR WINE$_d$, EITHER$_{c/d(alternating)}$.

- Why is this?
- In order for locus c to be associated with the the entire string [COFFEE$_a$ AND TEA$_b$], that string must be a constituent.

A tree

Section 5

Spatial indexing of pronouns

The meaning of a pronoun

- Pronouns:

  (14) Harold is happy. He won the lottery.
        = 'Harold is happy. Harold won the lottery.'

  (15) John told Bill that he would win.

        a. 'John told Bill that John would win.'
        b. 'John told Bill that Bill would win.'

- What is the meaning of a pronoun?
  - It's like a hole; it depends on something else for its meaning.

The meaning of a pronoun

The classic idea: <u>pronouns denote variables</u>.

- ▶ Variables in math:
  - ▶ $f(x) = x^2$
  - ▶ Takes an input (a number) and gives an output (a number)
- ▶ Variables in language:
  - ▶ "the woman that he saw" = the woman that x saw
  - ▶ Takes an input (a person) and gives an output (a person)

The meaning of a pronoun

Pronominal ambiguity arises from the choice of variable:

(16)   John told Bill that $\boxed{\text{he}}$ would win.
      = John$_x$ told Bill$_y$ that $\boxed{x}$ would win.
      = John$_x$ told Bill$_y$ that $\boxed{y}$ would win.

Okay, enough about English...

Indexing individuals in space

- With the **use of space**, ASL is able to eliminate pronominal ambiguity!

- As we have seen, DPs can be placed at locations ('loci') in the signing space.

- Pronouns point back to the locus of their antecedent.

(17)   IX-a JOHN TELL IX-b BILL {IX-a/IX-b} WILL WIN.
'John$_i$ told Bill$_j$ that he$_{\{i/j\}}$ would win.'

- How can we analyze this using our theory of pronouns?

Indexing individuals in space

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- What if we say:
  Loci are a direct phonological reflection of variable names.

Indexing individuals in space

- ▶ How can we analyze this using our theory of pronouns?

- ▶ What if we say:
  Loci are a direct phonological reflection of variable names.

- ▶ Or, more precisely:

(20) **Constraint on spatial co-indexation:**
     If two loci are spatially indexed at two different loci, then
     they must be assigned two different variables.

Indexing individuals in space

- Does this account for the data?

  (21) IX-a JOHN TELL IX-b BILL IX-a WILL WIN.

- *Bill* and the pronoun are indexed at two different loci, so the same variable *can't* be assigned to both.
- *John* and the pronoun are indexed at the same locus, so they *may* be assigned the same variable.

Section 6

The Event Visibility Hypothesis

Two types of verbs

- Telic events : have a point of culmination
  - 'John ate an apple **in** 30 seconds'
  - eat an apple, paint a picture, die, blink
- Atelic events : happen over time with no culmination
  - 'John slept **for** 30 seconds'
  - sleep, swim, walk, wait

Telicity

- A predicate P is **divisible** iff every temporal sub-event of P is also an event of which P holds.

- Atelic verbs are divisible.
  - Example: If there is an event in which Max slept from 10pm to 6am, then the period from 2am-3am is also an event in which Max slept.

- Telic verbs are not divisible.
  - Example: If there is an event in which Max painted a picture from 10pm to 6am, then the period from 2am-3am is *not* an event where Max painted a picture.

Event Visibility Hypothesis

Event Visibility Hypothesis (EVH):
In the predicate system, the semantics of the event structure is
visible in the phonological form of the predicate sign.

(Wilbur 2012)

Two components of this hypothesis (there are more):

- A phonological path movement corresponds with the runtime of a durative event.
- Each phonological end-point corresponds with the culmination of a telic event.

(22) **Atelic:** WALK, MULL-OVER, WAIT, SWIM

(23) **Punctual/telic:** SNEEZE, BLINK, DIE, HIT, SIT-DOWN

Coercion
(An interlude)

Coercion is the process in which a verb of one class is forced into a different class.

Example: *cough* is punctual ('John coughed'), but can be coerced into a durative event by ...

- Requirements of semantic operators (e.g. progressive *be*)

  (24) John was coughing.

- Requirements of the environment (e.g. *for*-adverbials)

  (25) John coughed for five minutes.

Coercion

- Note: How does the meaning of the verb change?

    (26) John was coughing for five minutes.
            $\rightarrow$ iterated event

    (27) John was leaving the party for an hour.
            $\rightarrow$ single extended event

- Interpretation based on plausibility

    - (E.g. Imagine a super slow-mo video of John coughing.)

Coercion via phonology

- Given the EVH, a third situation that causes coercion arises from the phonology itself:

  (28) SIT *(no contact)*
        'almost sit'

  (29) DIE *(slowly)*
        'die slowly'

- **Analysis:** Pursuant to the EVH, semantic constraints are imposed by the phonological form. When these semantic constraints are in conflict with the lexical semantics of the verb, the meaning is coerced into a different event type.

Plural events

- "Each primary movement corresponds to the runtime of the event."
- ASL syntax allows several different forms of reduplication of verbs:
- One form, VERB++, is the 'iterative' form.
  - Full repetition of movement; full repetition of any phonological end-points.
  - *Meaning:* The event happened again and again.

(30) THAT BOY GIVE++ THAT GIRL MANY BOOK.
      (See videos)

- Meaning: The boy gave the girl books repeatedly.

- How does this relate to our two iconically-grounded constraints?
    - Multiple movements, so multiple events.
    - Multiple end-points, so multiple completions of the event.

(31)   THAT BOY GIVE++ THAT GIRL MANY BOOK.
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- ▶ How does this relate to our two iconically-grounded constraints?
    - ▶ Multiple movements, so multiple events.
    - ▶ Multiple end-points, so multiple completions of the event.

- ▶ (Note the relation to divisibility.)

Other kinds of plural events

- Many other forms of reduplication are also possible:

- VERB-circ   'durative'
    - *Phonetics:* A repeating, circling motion.
    - *Meaning:* A long continuous event.
- VERB-alt
    - *Phonetics:* Two hands alternate the motion.
    - *Meaning:* Multiple individuals are involved in the event.

- Your homework has you work through the connection between these forms and the iconic constraints.

Section 7

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    - Linear ordering in phrase structure rules

    - Structural ambiguity

    - Pronominal ambiguity via variables

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