Language
“UG [universal grammar] may be regarded as a characterization of the genetically determined language faculty. One may think of this faculty as a 'language acquisition device,' an innate component of the human mind that yields a particular language through interaction with present experience, a device that converts experience into a system of knowledge attained: knowledge of one or another language.”

-Noam Chomsky
Spoken language

Articulators: Mouth/tongue
Signal: Linear, acoustic waveform
Perception: Auditory (ears)

Sign language

Articulators: Hands/face
Signal: Multi-dimensional image
Perception: Visual system (eyes)
Section 1

Getting started
Some myths about sign language

- **Myth 1:** Sign language is mime.

- Sign languages can talk about non-tangible things: ideas, philosophy, mathematics, ...

- Words are arbitrary:
Some myths about sign language

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  American Sign Language: ‘where’
Some myths about sign language

- **Myth 1:** Sign language is mime.
- Sign languages can talk about non-tangible things: ideas, philosophy, mathematics, ...
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  - American Sign Language: ‘where’
  - French Sign Language: ‘not’
Some myths about sign language

- **Myth 1:** Sign language is mime.

- Sign languages can talk about non-tangible things: ideas, philosophy, mathematics, ...

- Words are arbitrary:

  - American Sign Language: ‘where’
  - French Sign Language: ‘not’
  - Israeli Sign Language: ‘who’
Some myths about sign language

▶ Myth 2: There is one sign language.

Dr. Peter Hauser (right) presenting in ASL at TISLR 11, simultaneously being translated into English, British Sign Language (left), and various other sign languages (across the bottom of the stage).
Some myths about sign language

From airbnb.com:
Some myths about sign language

- **Myth 3:** ASL is signed English.
- Sign languages have their own grammar.
- In fact...
  - ASL and BSL (British SL) are different languages!
  - ASL is descended from LSF (French SL).
  - So: it would be easier for an American signer to understand a French signer than a British signer!
In short...

- Sign languages are natural human languages!
- I will show...
- We see the same grammatical patterns that we see in spoken language.
- Looking at two different modalities gives us a richer perspective on the deep properties of language.
Section 2

Sign language ‘phonology’
## Classes of sounds (English)

<table>
<thead>
<tr>
<th></th>
<th>voiceless</th>
<th>voiced</th>
<th>nasal</th>
</tr>
</thead>
<tbody>
<tr>
<td>lips</td>
<td>p</td>
<td>b</td>
<td>m</td>
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<tr>
<td>tongue tip</td>
<td>t</td>
<td>d</td>
<td>n</td>
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<td>tongue back</td>
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<td>g</td>
<td>η</td>
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Parameters of sign language

- Signs can also be put in ‘natural classes’
  - Handshape
  - Location
  - Movement
  - Orientation

FATHER ~ MOTHER ~ FINE
Phonological processes

- In language production, segments change from one form to another in specific environments.
- Phonological processes target specific natural classes, along the dimensions we described.
Assimilation in English

- **Assimilation** is the process where one sound becomes *similar to* an adjacent sound.

- **Example:** nasal place assimilation in English
  - *interminable* /n/ → [n]
  - *intangible*
  - *intolerant*
  - *impossible* /n/ → [m]
  - *implausible*
  - *impolite*
  - *inconceivable* /n/ → [ŋ]
  - *incongruous*
  - *incomplete*
Assimilation in English

- \( \text{in} + \text{k\$amplit} \rightarrow \text{i}\text{\$k\$amplit} \)

- More schematized:

\[
\begin{align*}
n & \quad + & k & \quad = & \quad \eta & \quad + & k \\
[+\text{nasal}] & & [-\text{voice}] & & [+\text{nasal}] & & [-\text{voice}] \\
[+\text{tip}] & & [+\text{back}] & & [+\text{back}] & & [+\text{back}] \\
\end{align*}
\]
Assimilation in English

▶ \( \text{in} + \text{k}\text{amplit} \rightarrow \text{i}\text{ŋk}\text{amplit} \)

▶ More schematized:

\[
\begin{array}{cccc}
\text{n} & + & \text{k} & = & \text{ŋ} & \text{k} \\
[+\text{nasal}] & & [−\text{voice}] & & [+\text{nasal}] & [−\text{voice}] \\
[+\text{tip}] & & [+\text{back}] & & [+\text{back}] & [+\text{back}]
\end{array}
\]
Assimilation in English

- $\text{in} + \text{k\ampli}t \rightarrow \text{i\&k\ampli}t$

- More schematized:

  \[ \begin{align*}
  n & + k &= \eta & k \\
  [+\text{nasal}] & [-\text{voice}] & [+\text{nasal}] & [-\text{voice}] \\
  [+\text{tip}] & [+\text{back}] & [+\text{back}] & [+\text{back}] \\
  \end{align*} \]

- **Generalization:** the /n/ of ‘in-’ changes its place to match the following consonant.
Handshape
Assimilation in sign language

- Handshape assimilation in sign language:
  - RED + CHOP = TOMATO
Assimilation in sign language

- Handshape assimilation in sign language:

- RED + CHOP = TOMATO

\[ \text{\begin{array}{c}
\text{\includegraphics{handshape1.png}} \\
+ \\
\text{\includegraphics{handshape2.png}} \\
= \\
\text{\includegraphics{handshape3.png}} + \\
\text{\includegraphics{handshape4.png}}
\end{array}} \]
Assimilation in sign language

- Handshape assimilation in sign language:
  - RED + CHOP = TOMATO
  
  ![Assimilation of the entire handshape.](image)

- Assimilation of the entire handshape.
Handshape assimilation

- Partial assimilation:

\[
\text{THINK} + \text{SELF} = \text{‘think for yourself’}
\]

\[
[+\text{index}] + [-\text{index}] = [+\text{index}] + [+\text{thumb}]
\]

\[
[-\text{thumb}] + [+\text{thumb}] = [+\text{thumb}] + [+\text{thumb}]
\]

A new handshape is produced!

(Just like \([n] + [k] \) produced \([N]\).)
Handshape assimilation

- Partial assimilation:

$$\text{THINK} + \text{SELF} = \text{‘think for yourself’}$$

\[
\begin{array}{c}
[+\text{index}] \\
[-\text{thumb}] \\
\end{array}
\begin{array}{c}
[-\text{index}] \\
[+\text{thumb}] \\
\end{array}
\begin{array}{c}
[+\text{index}] \\
[-\text{index}] \\
\end{array}
\begin{array}{c}
[+\text{thumb}] \\
[+\text{thumb}] \\
\end{array}
\]
Handshape assimilation

» Partial assimilation:

\[
\text{THINK} + \text{SELF} = \text{‘think for yourself’}
\]

\[
\begin{align*}
\text{[+index]} & \quad \text{[–index]} & \quad \text{[+index]} & \quad \text{[–index]} \\
\text{[–thumb]} & \quad \text{[+thumb]} & \quad \text{[+thumb]} & \quad \text{[+thumb]}
\end{align*}
\]

» A new handshape is produced!

» (Just like \([n]\) + \([k]\) produced \([\eta]\).)
Partial assimilation:

\[
\text{TIME} + \text{SAME} = \text{‘simultaneous’}
\]

\[
\begin{align*}
[+\text{index}] & \quad [-\text{thumb}] & \quad [+\text{thumb}] & \quad [-\text{index}] \\
[-\text{pinky}] & \quad [+\text{pinky}] & \quad [-\text{pinky}] & \quad [+\text{pinky}]
\end{align*}
\]
Handshape assimilation

- **Partial assimilation:**

\[
\text{TIME} \quad + \quad \text{SAME} \quad = \quad \text{‘simultaneous’}
\]

\[
[+\text{index}] \quad + \quad [-\text{index}] \quad = \quad [+\text{index}]
\]

\[
[-\text{thumb}] \quad + \quad [+\text{thumb}] \quad = \quad [+\text{thumb}]
\]

\[
[-\text{pinky}] \quad + \quad [+\text{pinky}] \quad = \quad [+\text{pinky}]
\]
To summarize:

In both spoken and sign language...

- Sets of units arranged along various dimensions.
  - E.g. place, manner, ...

- Articulatory pressure: “make things the same” applies across one dimension or another.
Section 3

Visible telicity
Let’s play a game!
Match the sign with its meaning!

a. decide
b. ponder
I have a confession to make...
I have a confession to make...

play

arrive
Something in common?

play

vs.

ponder

arrive

decide

Telicity, an abstract semantic property relating to the temporal properties of an event.
Something in common?

play arrive vs. ponder decide

Yes!
Something in common?

play vs. ponder

arrive vs. decide

Yes!

Telicity, an abstract semantic property relating to the temporal properties of an event.
“In all things which have a plurality of parts, and which are not a total aggregate but a whole of some sort distinct from the parts, there is some telos [cause].”

“It is clear that there is some difference between ends: some ends are energeia [energy], while others are products which are additional to the energeia.”

-Aristotle
Two types of verbs

- Telic events: have a point of culmination
  - ‘John ate an apple **in** 30 seconds.’
  - ‘John painted a picture **in** five minutes.’
  - ‘John came to a decision **in** 30 minutes.’
  - ‘John arrived at the party **in** a split second.’

- Atelic events: happen over time
  - ‘John slept **for** 30 seconds’
  - ‘John waited **for** 30 seconds’
  - ‘John pondered the question **for** 30 seconds’
  - ‘John played with his friends **for** 30 minutes’
Visible telicity in sign language!

- **Ronnie Wilbur:**
  Many sign languages systematically distinguish telicity in the phonological movement of a verb.
  - Telic verbs stop sharply.
  - Atelic verbs have a continuous movement

- **Strickland *et al*. 2015*: 
  Even naive non-signers are sensitive to this connection (like y’all were).
  
  Surprising, robust connection between visual system and abstract conceptual space.

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