Competing linguistic theories can offer radically different outlooks on the nature of linguistic systems. These views have implications for theories of language acquisition. Today’s aim: Testing some of the different predictions made by these models.

**Context**

- Acquisition as grammatical generalization
- Driving factor: grammatical transparency
  - Basic/transparent units acquired first
  - Abstract properties acquired progressively
  - Idiosyncrasies must be memorized
  - Frequency: a potential influence, but does not drive the developmental sequence
  - Potential (over-)generalizations of the most transparent aspects of the system during the developmental period

**Grammatical (generative) approach**

**Constructivist (exemplarist) approach**

- Acquisition from stacking of events in memory
  - “Storage is processing” (Bybee 2001)
  - Every used form (in perception or production) leaves a trace in the lexicon
  - No generalizations beyond semantic and/or phonological similarity (analogical)
  - Repetition/frequency = determining
  - Early word productions reflect salient/frequent properties of the memorized forms
  - Low-level production issues may hinder initial pronunciations
Pitting the approaches

The two approaches differ significantly with regard to the roles of frequency versus grammatical transparency.

We compare these approaches based on acquisition data from Northern East Cree.

Key fact: some grammatically opaque/transparent properties of NE Cree do not correlate with low/high frequency figures.

THM: Grammatically transparent properties are the first to systematically manifest themselves in our production data, in spite of input frequency.

127 videos made over 30 month period (2004-07)
In 2004:
- Cohort A ≈ 2 y.o.
- Cohort B ≈ 4 y.o.

Current case study:
- Child code-named Ani
- Acoustic measurements and data analysis at ages 2;02, 2;08, 3;04, 3;06 and 4;01

NE Cree metrical system

NE Cree displays an abstract stress system whose analysis poses its own challenges (e.g. Dyck et al. 2006; Wood 2006; Swain 2009)

General properties:
- Basic foot: iamb (weak-STRONG)
- Rightmost ‘stressable’ syllable receives stress
- Stress falls on either of the last 3 syllables in long words, depending on syllable weight
- Final extrametricality (suppressed in case it yields sub-minimal or unstressable words; e.g. one-σ words)
- Some idiosyncratic stress patterns

Ani’s metrical development

- Properties of (adult) NE Cree
- Developmental data
- Interim discussion
NE Cree’s pitch accent system

- One pitch accent per word
- Two patterns

<table>
<thead>
<tr>
<th>Non-final</th>
<th>Final</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default pattern for words in isolation and in context</td>
<td>Morphologically conditioned</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Word</th>
<th>Example</th>
<th>Morphological Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>chî.mân ['tʃiːmɑ̃]</td>
<td>boat</td>
<td>chî.'mâːn-H [tʃiː'mɑːnʰ]</td>
</tr>
<tr>
<td>nhu.kum ['nuhkʊm]</td>
<td>my grandmother</td>
<td>ūh.'kum-H [uːhkomʰ]</td>
</tr>
</tbody>
</table>

Ani: Word-final stress

- Word-final stress mastered early on
- Percentage of accuracy in words with final stress

<table>
<thead>
<tr>
<th>Age</th>
<th>Attempts</th>
<th>Errors</th>
<th>Target-like stress</th>
</tr>
</thead>
<tbody>
<tr>
<td>2;02.02</td>
<td>14</td>
<td>1</td>
<td>92.9%</td>
</tr>
<tr>
<td>2;08.28</td>
<td>47</td>
<td>0</td>
<td>100%</td>
</tr>
<tr>
<td>3;04.09</td>
<td>14</td>
<td>0</td>
<td>100%</td>
</tr>
<tr>
<td>3;06.23</td>
<td>16</td>
<td>0</td>
<td>100%</td>
</tr>
<tr>
<td>4;01.30</td>
<td>32</td>
<td>0</td>
<td>100%</td>
</tr>
</tbody>
</table>

Ani: Penultimate Stress

- Accuracy rate = much lower
- Error pattern: almost-systematic stress displacement to the final syllable

<table>
<thead>
<tr>
<th>Age</th>
<th>Attempts</th>
<th>Errors</th>
<th>Target-like stress</th>
<th>Stress shift to final σ</th>
</tr>
</thead>
<tbody>
<tr>
<td>2;02.02</td>
<td>24</td>
<td>9</td>
<td>62.5%</td>
<td>9/9</td>
</tr>
<tr>
<td>2;08.28</td>
<td>35</td>
<td>14</td>
<td>60%</td>
<td>14/14</td>
</tr>
<tr>
<td>3;04.09</td>
<td>41</td>
<td>19</td>
<td>53.7%</td>
<td>17/17</td>
</tr>
<tr>
<td>3;06.23</td>
<td>33</td>
<td>11</td>
<td>66.7%</td>
<td>10/10</td>
</tr>
<tr>
<td>4;01.30</td>
<td>39</td>
<td>6</td>
<td>84.6%</td>
<td>6/6</td>
</tr>
</tbody>
</table>

Ani: Antepenultimate Stress

- Accuracy rate: initially very low
- Same error pattern: almost-systematic stress displacement to the final syllable

<table>
<thead>
<tr>
<th>Age</th>
<th>Attempts</th>
<th>Errors</th>
<th>Target-like stress</th>
<th>Stress shift to final σ</th>
</tr>
</thead>
<tbody>
<tr>
<td>2;02.02</td>
<td>7</td>
<td>6</td>
<td>14.3%</td>
<td>6/6</td>
</tr>
<tr>
<td>2;08.28</td>
<td>12</td>
<td>6</td>
<td>50%</td>
<td>7/7</td>
</tr>
<tr>
<td>3;04.09</td>
<td>16</td>
<td>12</td>
<td>25%</td>
<td>12/12</td>
</tr>
<tr>
<td>3;06.23</td>
<td>32</td>
<td>5</td>
<td>84.4%</td>
<td>4/5</td>
</tr>
<tr>
<td>4;01.30</td>
<td>12</td>
<td>3</td>
<td>75%</td>
<td>3/3</td>
</tr>
</tbody>
</table>
Interim discussion

- Over-application of final stress suggests early acquisition of the most basic properties of the target stress system
- Foot form = Iamb; End rule = Right
- Gradual acquisition of extrametricality
  - This opaque parameter is acquired on a word-by-word basis
  - No antepenultimate-to-penult stress shift suggests no over-generalization of the (opaque) parameter
- Obscuring factors: syllable weight, morphology

Ani’s morpho-syntactic development

- Properties of (adult) NE Cree
- Developmental data
- Interim discussion

Animate Intransitive (AI) verbs

- Cree verbs are traditionally classified along lines of transitivity and animacy, intransitive subjects, transitive objects
- AI verbs are the most frequently occurring verb type in the 10 sessions (and in target language, 41% for NE Cree)
- We consider two of the three verbal inflectional “orders”, Independent, Conjunct, and Imperative

Independent versus Conjunct

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Independent</th>
<th>Conjunct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attested in main clause contexts</td>
<td>Required in:</td>
<td></td>
</tr>
<tr>
<td>‘Elsewhere’ (default) inflection</td>
<td>Subordinate clauses</td>
<td></td>
</tr>
<tr>
<td>Brittain 2001)</td>
<td>Wh-clauses</td>
<td></td>
</tr>
<tr>
<td>Focus constructions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Morph’y</td>
<td>Less fusional (more transparent)</td>
<td>More fusional</td>
</tr>
<tr>
<td></td>
<td>Initial change (IC)</td>
<td></td>
</tr>
</tbody>
</table>
Input frequency: Independent versus Conjunct

(Woods) Cree, inflection types in main clauses (Starks 1994)
[Recall: Conjunct is required in subordinate clauses]

<table>
<thead>
<tr>
<th></th>
<th>Conversation</th>
<th>Narrative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>#</td>
<td>%</td>
</tr>
<tr>
<td>Independent</td>
<td>89</td>
<td>45</td>
</tr>
<tr>
<td>Conjunct</td>
<td>95</td>
<td>48</td>
</tr>
<tr>
<td>Imperative</td>
<td>14</td>
<td>7</td>
</tr>
</tbody>
</table>

Overall, Conjunct is the most frequent order used in adult Cree

Given general observations about child-directed speech, the frequencies seem roughly equivalent [...study in progress...]

Usage-based approaches predict the early emergence of the Conjunct over the Independent order

Or, minimally, parallel development

This prediction is not supported by the data

Favouring the Independent:
- Grammatically transparent
- Innovative inflection of ‘child’ verbs
- Child verbs: rarely/inconsistently inflected in the input, if inflected at all
- From age 3;04, Ani inflects child verbs

Overall drop in performance (at 3;04):
- Coincides with the onset of productive inflection, suggesting a move from use of stored amalgams to creative use of rules

Predominance of Independent forms
- At around 3;04:
  - Emergence of productive inflection
  - Dip in overall performance
Verbal productions: numbers

- Between 2;01 and 3;01
  - 67% of Ani’s attempted verbs are Independent
  - 7% are Conjunct
- Between 3;04 and 3;08
  - 55% of Ani’s attempted verbs are Independent
  - 26% are Conjunct
- These numbers run counter to expectations if input frequency is a significant force in the acquisition of these forms

≈ 3;04: A drop in performance

- As Ani begins to inflect child forms, she starts making errors on forms previously produced close to target
- Focus: 1st person (Independent) forms, which require prefix and suffix
- Gradual emergence of the prefix; performance drop at 3;04
- Suffix: performance decreases at 3;04

Interim discussion

- Prior to 3;04, Ani began to generalize her use of the language’s default inflectional system
- Default order easier to interpret, acquired faster (despite input frequency)
- At around 3;04: emergence of a productive grammatical system
- Grammatical innovation (inflected child forms)
- Dip in performance on produced inflections
- Both prefixes and suffixes are affected
We cannot build a receptive lexicon for polysynthetic languages without grammar. Single roots can yield thousands (potentially millions!) of forms (Hankamer 1989; Sadock 1980). This claim holds true of Cree. Most (NE) Cree words (80%) are verbs. Verbs encode varied and complex semantic (and, we assume, structural) relationships. Form-meaning associations within the verb complex logically require some degree of decomposition into smaller units.

Discussion

Our working hypothesis:
- Memorization of amalgams (unanalyzed chunks) involved in building an initial lexicon
- Pre-3;04: implicit grammatical analysis during the amalgam-storing stage
- Identification of basic (transparent) properties of the target grammar
- 3;04 onward: onset of productive use of grammatical rules
- Over-application ‘errors’

Initial productions are stress-driven
- Segmentation driven by prosodic salience (Mithun 1989, Slobin 1985)
- Ani’s initial word forms: (W)S foot (Swain 2009)
  - Prefix deletion: falls outside the foot
  - Suffix production: part of the foot
- Emergence of morphology enables larger-domain analysis
- Gradual revisions of the lexicon incorporate units matching morphological analysis

Memorization remains a significant component of the story
- Early generalizations arise from phonologically-conditioned, memorized amalgams

Exemplar storage cannot be equated to grammatical processing (contra Bybee’s claim)