Language Acquisition: Part II

Syntactic development

Theories of syntactic development
Mean Length of Utterance (MLU) - related to syntactic development

Measured in terms of morphemes - “walked” would be an MLU of 2. “No milk” would also be 2

Consistent pattern of growth of MLU with age
Individual differences in rate.
Figure 5.3  The relation of MLU to age for Adam, Eve, and Sarah

### Box 5.1 Examples of one child's two-word utterances

#### Possessives
- daddy coffee  
- daddy shell  
- mommy shell  
- Andrew shoe  
- daddy hat  
- Eliot juice  
- mommy mouth  
- daddy door  

#### Property-indicating patterns
- big balloon  
- big hot  
- big shell  
- big juice  
- big pants  
- big lion  
- big water  
- big light  
- big step  
- big jump  
- big boy  
- big bird  
- big tobacco  
- big banana  
- little hat  
- little duck  

#### Recurrence, number, disappearance
- more glass  
- more boy  
- more raisins  
- more shovel  
- more “O”  
- other door  
- other pin  
- other ball  
- other hand  

(continued)
<table>
<thead>
<tr>
<th>Locatives</th>
<th>“ON”</th>
<th>“IN”</th>
<th>“IN/TO”</th>
<th>“OUT”</th>
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<tbody>
<tr>
<td>sand ball</td>
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<tr>
<td>hand hair</td>
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<tr>
<td>ball house</td>
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<tr>
<td>man car</td>
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<td>fly light</td>
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<td>sand toe</td>
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<td>sand water</td>
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<td>sand eye</td>
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<tr>
<td>daddy . . . hot ball</td>
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<tr>
<td>ball daddy</td>
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<tr>
<td>stick car</td>
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<td>rock outside</td>
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<td></td>
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<tr>
<td>in there . . . old apple</td>
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<tr>
<td>in there . . . old appple</td>
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<td>milk in there</td>
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<td>down there car</td>
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<thead>
<tr>
<th>Actors/Actions</th>
<th>daddy work</th>
<th>boy walk</th>
<th>Andrew sleep</th>
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<tbody>
<tr>
<td>mommy sit</td>
<td>daddy sleep</td>
<td>man walk</td>
<td>daddy work</td>
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<tr>
<td>daddy sit</td>
<td>daddy walk</td>
<td>Elliot sleep</td>
<td>stone daddy</td>
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<tr>
<th>Other combinations</th>
<th>eat fork</th>
<th>bite top</th>
<th>back eat</th>
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<tbody>
<tr>
<td>have it egg</td>
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<td>have it milk</td>
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<tr>
<td>have it fork</td>
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<tr>
<td>dirty face</td>
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<td></td>
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<td>dirty mouth</td>
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<td></td>
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<tr>
<td>dirty feet</td>
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<tr>
<td>clean socks</td>
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<td></td>
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<tr>
<td>split bread</td>
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<tr>
<td>split raisin</td>
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<td>boom-boom tower</td>
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<tr>
<td>boom-boom car</td>
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<tr>
<td>boom-boom coffee</td>
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<tr>
<td>boom-boom plane</td>
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<tr>
<td>boom-boom chair</td>
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<tr>
<td>eat dessert</td>
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Telegraphic utterances

Omission of closed class (function words) and inflections - Perceptual salience of open class? Stressed

In some other languages with richer inflectional systems - more evidence of early use of inflections. Semantic salience of words and inflections could also be relevant
Comprehension of word order

Hirsh-Pasek and Golinkkoff (1993) - 19 mo. old infants’ comprehension of sentence like “Big Bird is tickling Cookie Monster” (preferential looking paradigm)

Two videos playing simultaneously - one correct, one showing Cookie Monster tickling Big Bird

Infants looked longer at correct video

Very early understanding of word order
Structure of early utterances:

- pivot grammar
- semantic bootstrapping
- frozen utterances
Pivot grammar (Braine, 1963; Brown & Fraser, 1964):

Allgone shoe  My mommy  Push it
Allgone milk  My daddy  Close it

Pivot word + Open word  or  Open word + Pivot word

Problems -

a. Ignores semantic relations - “mommy sock” in two contexts
b. No clear relation to adult grammar
Semantic Bootstrapping (Pinker)

Innate knowledge of syntactic categories (N,V) and linking rules (agent -> subject)

Learning of meanings of some content words

Hears sentence:

“The girl pushed the boy.” (or “Tren-ba lok-po ven.”)

Maps girl or tren-ba (agent) to Subject, boy or lok-po (patient) to Object
Problem:

In English, expect child to have more difficulty mastering verbs where agent - subject mapping doesn’t hold

Predicted:
Easy: push, kiss, trip
Hard: want, got (I want it, Mommy got bag)

Bowerman (1990), Lieven, Pine & Baldwin (1997) - no difference
No initial structure - Frozen utterances

Pine & Lieven (1993), Lieven et al. (1997)

Children 12 mos to 3 yrs. First 400 multi-word utterances recorded by parents.

Large proportion of initial multiword utterances (mean = 60%) occurred in stereotyped form:

Either words hadn’t occurred individually before combination or one word had occurred but not in that position in the utterance
Tomasello (1992; 2000)

Examined his daughter’s use of verbs, age 15-24 mos. From diary data

Findings:
1. Of 162 verbs, half used in only one construction type (e.g., Mommy break, Daddy break, but not break cup)
2. Verbs with similar meanings varied substantially in no. of construction types used
3. Uneven use of morphological marking - some verbs used with past tense, some with present progressive (ing), few with both
4. Current use of verb predicted by past. Introduced one small change in particular verb.
Verb Island Hypothesis:

Children learn verb-specific constructions. Verb + slot for noun. Which slot depends on which verb.

More general claim:

Learning is based on acquisition of particular examples. Later, child will abstract from many examples what the patterns are. Then, any new verb that seems to fit pattern will inherit remaining characteristics.
Acquisition of the Negative

Three stages:

1. Negative added to sentence - outside (1 - 2 yrs)

No go movies
No sit down
No mommy do it

2. Negative inside sentence - use negative and contractions like single words ("don’t" not composed of. do + not) (2 - 3.5)

I no like it.
Don’t go
I no want book.
Negatives (cont.)

3. Different auxiliaries used - approach adult forms (3.5-4.0)

You can’t have this.
I don’t have money.
I’m not sad now.

Slow acquisition (takes 2 yrs to see full development)
Questions

Similar pattern
1. Wh- word at beginning
   What that?  Where Daddy go?

2. Start including auxiliary, but don’t invert
   Where you are going?
   What she is playing?

3. Adult form
   How can he be a doctor?
   Why did they talk?

Again long period of acquisition
Later Syntactic Development (Carol Chomsky, 1969)

1. Passives - complete understanding and correct usage may be delayed until 7-8 yrs of age
John was pushed by Mary. (action verbs come in earlier)
Mary was remembered by Jim. (“experiencer” verbs difficult)

2. “eager/easy”

John was eager to please
John was easy to please

Who is doing the pleasing? Who is pleased?

3. John promised Bill to wash the car.
   John told Bill to wash the car.

Who will wash the car?
Theories of the acquisition of grammar

1. Behaviorist approach

2. Information processing approach
   connectionist

3. Nativist approach
Behaviorist approach

1. Stimulus-response, reinforcement

2. Imitation

Problems?
1. No punishment or reward for grammar

2. Lack of imitation

3. Complexity of structure requires hierarchical model of syntax - not chain of associations

4. Productivity, creativity - ability to create sentences never heard
Information processing approach

1. Symbolic/formal approach

Children induce rules -

You are going to the store.
Are you going to the store?

Mike didn’t want the candy
Didn’t Mike want the candy?

Sarah bought the book.
Did Sarah buy the book?
Hypothesize that question is formed by moving auxiliary to front.

Then what to do when no auxiliary?

Another hypothesis needed.

Problems:
1. How do children know what to pay attention to? Slobin’s operating principles
   A. Pay attention to ends of words
   B. Phonological forms can be systematically modified
   C. Pay attention to order of words and morphemes.
   Etc.
Problems?

1. Kind of induction seems quite difficult for 2-4 yr olds

Even adults can’t state rules

2. “unconscious” rule induction doesn’t really solve the problem
Connectionist Approach

Network representing input-output and interconnections

Initially random weights, weights adjusted by experience

Past-tense learning (McClelland & Rumelhart):

Input present (go), output past (went)
Walk-walked
Tease- teased
Pick -picked
Sing - sung

Format rule: past tense = present + /d/
memorize exceptions
Input Phonology

Hidden Units

Output Phonology

\[
\begin{array}{c}
t \\
ae \\
g \\
\end{array}
\quad
\begin{array}{c}
\text{Hidden Units} \\
\text{Hidden Units} \\
\text{Hidden Units} \\
\end{array}
\quad
\begin{array}{c}
\text{Output Phonology} \\
\text{Output Phonology} \\
\text{Output Phonology} \\
\end{array}
\]
System can learn input-output connections for large set of regular and irregular verbs

Can generalize fairly well to new verbs
Sensitive to sub-regularities:

Sing-sang
Ring-rang
Fring - ?
How to extend to word order, grammatical structure?

Recurrent networks - Elman auto-associative network

One node become associated with next (like chaining), but chaining in terms word class (det - N) (N-V), etc not particular words

Problems -

1. Both work when given extensive training in particular domain
2. Need feedback from environment to adjust weights (internally generated?)
3. Grammatical doesn’t generalize to new structures
**Nativist approach**

Innate system - Universal Grammar
Parameters are set by exposure to one’s own language

E.g. Whether word order or inflections are important for signalling grammatical roles

Susan disliked Mary
Mary-pa Susan-bo disliked

2. Draws on specialized cognitive system different from that involved in non-language processes

3. Critical period may be postulated

Evidence in favor?
1. **Pidgin/Creole** (Bickerton, 1983)
Pidgin spoken when two language communities come in contact
Lack of grammatical structure productivity

Children of pidgin speakers develop Creole - which is a fully grammatical language

Pidgin - no fixed word order, no embedded clauses, sometimes missing verb
Creole - has all these features as in standard languages

2. **Home-sign** (Goldin-Meadow, 1982)
Two deaf children in a home with hearing parents create complete sign language, though not taught one
3. Williams syndrome children - genetic disorder
Language abilities seem to be much better than their non-language abilities. Thus, language can’t depend on general cognitive capabilities - has to be specialized system. Converse - children with poor acquisition of language (SLI children) with good non-language abilities

4. Lack of negative -

Positive evidence of what is correct grammatically not enough to induce grammatical rules

Negative evidence needed, but not provided.

Therefore system has to be innately set so that rules don’t have to be induced.
Problems with nativist approach

A. Why does language learning take so long, if just waiting for input to set parameters? (up to 10 yrs??)

B. Brain specialization could be due to nature of input - auditory/sequential gives left hemisphere specialization

C. Dissociations not as clear as sometimes claimed - Williams syndrome spatial abilities better than might expect. Only mild problem with spatial prepositions, picture/word matching good. Grammatical abilities impaired.

D. Difficulty in specifying what principles and parameters are - assume default and then show languages with default easier to learn.

Not very successful approach so far