Grammar and word order

Grammar
- Includes morphology and syntax
  - Morphology
    - Analysis of structure at the word level
    - How are morphemes organized and structured into words?
  - Syntax
    - Analysis of structure at the clause and sentence level
    - How are words organized and structured into clauses and sentences?

Bound morphemes
- Are attached to words they modify
- Affixes
  - Suffix: at the end of a word
    - -ed in walked
    - -ing in going
  - Prefix: at the beginning of a word
    - un- in undo
    - para- in paramilitary
  - Infix: in the middle of a word
    - -ly in slowly

Unbound morphemes
- Are free standing in a sentence
- Whole words
  - dog; go; dogs; the; that
  - I found a dog vs. I found the dog vs. I found the dogs

Languages differ
- Swedish
  - Indefinite article unbound – en hus “a house”
  - Definite article bound – huset “the house”

“Dog bites man” vs. “Man bites dog”

Questions vs statements
- The girl who is on the swing is happy
- Is the girl who is on the swing __ happy?

A child needs to learn both word structure and clause structure
- And learn which is what
- Does a language encode a meaningful contrast in morphology or syntax?

Infant Speech Production

<table>
<thead>
<tr>
<th>Stage</th>
<th>Typical Age</th>
<th>Description</th>
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<tbody>
<tr>
<td>Cooing</td>
<td>2-3 months</td>
<td>Interactional but non-linguistic vocalizations</td>
</tr>
<tr>
<td>Marginal Babbling</td>
<td>4-6 months</td>
<td>Transition between cooing and babbling</td>
</tr>
<tr>
<td>Canonical Babbling</td>
<td>7-12 months</td>
<td>Repeated syllable strings</td>
</tr>
<tr>
<td>Words</td>
<td>12+ months</td>
<td>Babbling and words initially co-exist</td>
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<tr>
<td>Two-word stage</td>
<td>18-24 months</td>
<td>“mini-sentences” with simple semantic relationship</td>
</tr>
<tr>
<td>Telegraphic stage/early multiword stage</td>
<td>24-30 months</td>
<td>(1.5-2 years) “telegraphic” sentence structures of lexical (open-class) rather than functional morphemes</td>
</tr>
<tr>
<td>Later multiword stage</td>
<td>30+ months</td>
<td>Grammatical or functional structures (e.g., articles, agreement, et cetera) emerge</td>
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</tbody>
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When Syntax Starts...

- Novel combinations (where we can be sure that the result is not being treated as a single word) appear sporadically as early as 14 months.
  - At 18 months:
    - 11% of parents say that their child is often combining words
    - 46% say that s/he is sometimes combining words.
  - By 25 months:
    - almost all children are sometimes combining words
    - but about 20% are still not doing it so “often.”
About 18 Months: The 2-word Stage

- Usually combinations of individual naming actions that might just as well have occurred alone.
  - Mommy hat (e.g., "mommy’s hat")
  - Hat mommy (e.g., "mommy is putting on a hat")
  - Shirt wet
  - Doggy bark
  - Ken water (for ‘Ken is drinking water’)
  - Hit doggy
- Some combinations with certain pronouns or prepositions begin to occur as well (e.g., *my turn, in there*, etc.)
- The more purely grammatical morphemes (e.g., *-s, is, a, the*) are typically absent.

About 24 Months: Telegraphic Stage

- More than two words are often combined, but speech still usually lacks most grammatical elements.
- In the early multi-word stage, children who are asked to repeat sentences may simply leave out function words including pronouns.
  - "I can see a cow" repeated as "See cow" (Eve at 25M)
  - "The doggy will bite" repeated as "Doggy bite" (Adam at 28M)
- "Where does Daddy go?" repeated as "Daddy go?" (Daniel at 23M)
- Spontaneous utterances also lack most grammatical elements
  - Kathryn no like celery (Kathryn at 22M)
  - Baby doll ride truck (Allison at 22M)
  - Pig say oink (Claire at 25M)
  - Want lady get chocolate (Daniel at 23M)

Syntax – It’s not All or Nothing

- About the age of 2, children first begin to use grammatical elements
  - finite auxiliaries (is, was)
  - verbal tense and agreement affixes (-ed, -s)
  - nominative pronouns (I, she)
  - complementizers (that, where)
  - determiners (the, a)
- Telegraphic patterns alternate with adult or adult-like forms, sometimes in adjacent utterances:
  - She’s gone. Her gone school. (Dominic at 24M)
  - He’s kicking a ball. Her climbing up the ladder there. (Jam at 24M)
  - I teasing Mummy. I’m teasing Mummy. (Olivia at 24M)
  - I having this. I’m having ‘nana. (Olivia at 27M)
  - I’m having this little one. Me’ll have that. (Bathy at 30M)
  - Mummy haven’t finished yet, has she? (Olivia at 36M)

Syntax

Who did what to whom?

Children know the correct forms before they reliably use them

Tom Bever
Child: Mommy goed to the store.

Tom: Mommy goed to the store?
Child: NO! (annoyed) Daddy, I say it that way, not you.

Dan Slobin
Child: You readed some of it too...she readed all the rest.

Dan: She read the whole thing to you, huh?
Child: Nu-uh, you read some.

Dan: Oh, that’s right, yeah. I readed the beginning of it.
Child: Readed? (annoyed surprise) Read!

Dan: Oh yeah, read.
Child: Will you stop that, Papa?

Two strategies

- Case marking: morphological cue
  - *Der Hund hat den Mann gebissen* ("the dog bit the man")
  - *Der Mann hat den Hund gebissen* ("the man bit the dog")
- Word order: syntactic cue
  - Configurational vs non-configurational languages
17 month old infants looked longer at the image that one doesn’t match! But do they recognize a difference in meaning?

**Do infants detect word order differences?**
- Head-turn preference procedure
  - Habituate to: “cats-would-jump-benches”
  - Test with: “cats-jump-wood-benches”
  - 2 month old infants showed differential response – detected difference!

**Non-configurational Languages**
- Warlpiri
- Free word order
- Null anaphora
- Discontinuous syntactic expressions

**Configurational Languages**
- SVO (English)
  - The man bit the dog
- SOV (Hindi)
  - The man the dog bit
- VSO (Biblical Hebrew)
  - Bit the man the dog
- VOS (Malagasy)
  - Bit the dog the man
- OVS (Hixkaryana)
  - The dog bit the man
- OSV (Urubu)
  - The dog the man bit

**Do infants detect word order differences?**
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**But do they recognize a difference in meaning?**

**Preferential Looking Technique**
- Listen to an auditory stimulus
- See images of two events: one matches, one doesn’t
- Does the infant look longer at the image that matches?
- If yes, the infant understood the sentence

**Preferential Looking Technique**
- Big Bird’s tickling cookie monster. Find Big Bird tickling Cookie Monster.
- Image 1: Big Bird is tickling Cookie Monster
- Image 2: Cookie Monster is tickling Big Bird
- Infants knew the names of the characters
- Actions and characters identical – word order is cue to roles of each character

**More complex syntax**
- At age 2 (24-27 months)
- Tested verbs toddlers are unlikely to know
  - Transitive verb:
    - Big Bird is tickling Cookie Monster
  - Intransitive verb:
    - Big Bird is flexing with Cookie Monster
- Image 1:
  - Big Bird pushes Cookie Monster up and down, making him flex
- Image 2:
  - Big Bird and Cookie Monster flexing up and down next to each other
- Toddlers looked longer at matching image
- Recognition of grammar > production of grammar
Acquiring word order

- Parameter setting
  - “flipping a switch”
- Head initial language: VO (English)
- Head final language: OV (Hindi)
- Relatively little data needed to determine which option is found in target language
- Set of options provided by UG
- Pattern induction
  - Learn patterns based on specific examples
  - “data-driven” learning

Evidence?

- Basic word order learned very rapidly for production and comprehension
- When full sentences are produced, constituents are ordered accurately
- Supports parameter setting models
- But – evidence comes from tests using familiar verbs!

Alternative interpretation

- Understanding of word order is not truly general
- Modeled on basis of individual verbs, gradually expands as more verbs are learned
- Give (“She gave me a toy”)
  - SVIO (general)
  - [donor]–[give]–[recipient]–[gift] (specific)

Evidence for verb specific comprehension of word order?

- Toddlers can enact a transitive sentence with a verb tickle but not hug
- Verb specific formulas predict good performance on tests of production and comprehension with familiar verbs
- Parameter setting models also make this prediction
- Good performance with familiar verbs does not distinguish these two accounts

Unfamiliar verbs...

- If children use and comprehend word order correctly with novel verbs, then they may have a general understanding of order, rather than a specific one
- Inspired by wug test (Berko, 1958)
- How do children do with novel verbs?

Akhtar and Tomasello, 1997

- What do children do when told:
  - Make Big Bird dack Cookie Monster (agent verb patient)
- Children taught novel verbs
  - Without linguistic cues:
    - “This is called dasking”
  - With linguistic cues:
    - “Big Bird’s taming Cookie Monster”
    - “Make Big Bird dack Cookie Monster”
- Children younger than 3
  - With no linguistic cues: chance performance
  - With linguistic cues: accurate performance
  - Suggests verb-specific word order knowledge
Parameters vs Patterns
- Present English speaking children with novel verbs in non-English orders
  - There are no languages in which some verbs follow one word order and other verbs follow another (also consistent with parameter account)
- Parameter setting –
  - Very young children will use a single word order with all transitive verbs
- Pattern induction –
  - Very young children may acquire order on a verb-by-verb basis

Methods
- Participants
  - 12 children aged 2;1 – 3;1
  - 12 children aged 3;2 – 3;11
  - 12 children aged 4;0 – 4;9
  - Equal numbers of boys and girls
- All participants taught 3 novel verbs
  - One verb in sentence-medial position (SVO) – Elmo dacking the car
  - One verb in sentence-final position (SOV) – Elmo the car gapping
  - One verb in sentence-initial position (VSO) – Tamming Elmo the car

Novel Verbs
- Gapping –
  - A puppet springs a toy off a platform connected to a metal coil
- Tamming –
  - A puppet puts a toy on a prop which when hit caused the toy to be catapulted
- Dacking –
  - A puppet knocks a toy down a curved chute

Predictions
- After training with puppets/toys, children given opportunity to perform the action
- Asked “What’s going to happen now?” or “What happened?”
- Parameter setting –
  - Even youngest children will not use SOV or VSO orders – either ignore verbs or correct to SVO
- Pattern Induction –
  - May show verb-dependent order, at least at youngest ages

Data Coding
- Examine frequency of sentences containing novel verbs (spontaneous or elicited) and both an agent and a patient
- Class sentences as either matching or mismatching order modeled for child
  - If tamming is modeled in SVO, does child use it in SVO sentence?
- Older children used more novel verbs than younger children, so use proportions to control for this difference

Results
- SVOS
  - All children matched order correctly
- SOV
  - Two younger groups equally likely to use SOV as correct to SVO
  - Older children corrected to SVO
- VSO
  - Two younger groups equally likely to use VSO as correct to SVO
  - Older children corrected to SVO

Control for compliance: if a child used a non-SVO order – just cooperating? Expose them to a familiar verb in wrong order – do they use it wrong or not?
Summary

- Younger children were willing to use ungrammatical structures with novel verbs
  - “Tigger the fork dacking”
  - These are not imitative!

- Control condition:
  - All children corrected to SVO with familiar verbs
  - Only 3 children occasionally matched experimenter’s ungrammatical use of unfamiliar verb
  - Possibly some cooperation, but not enough to explain results

Individuals vs averages

- On average – children equally likely to correct to SVO as use non-SVO order

- True for every child? Or averaging artifact (i.e., some children have parameter set, some don’t)

  - Some of both –
    - Some children matched only, and didn’t correct
    - Some children corrected only, didn’t match
    - Some children did both

Parameters or patterns?

- Even the youngest children produced SVO orders for verbs they had only heard in non-SVO sentences
  - Not consistent with strong version of pattern induction hypothesis
  - 2 year olds; 3 year olds sometimes used non-SVO orders
  - 4 year olds almost never did (corrected weird orders to make them like English
  - Acquisition of word order is a gradual process

Parameters or patterns?

- Parameters –
  - Maybe learning word order is not just like flipping a switch, as process is gradual
    - Maybe discrete changes not perfectly reflected in child’s use of language?

- Patterns –
  - Knowledge not framed around individual verbs, since some novel verbs are corrected to order they were never learned in
    - Maybe children know more about verbs generally than they were expected to?
    - Maybe animacy cue? (inanimate items occur post-verbally)