

Syntactic Development

- Holophrastic speech
 - Single word utterances or phrases learned as wholes
- Telegraphic speech
 - 2- and 3-word utterances
 - grammatical morphemes omitted
 - Theories for telegraphic speech:
 - Children haven't learned the function morphemes,
 - Children have production constraints,
 - Production constraints could be based on phonological limitations

Are syntactic categories innate?

- Pinker and others view these as innate:
 - Children know that nouns refer to objects and verbs to actions
 - First, child learns some word meanings and learns the meanings of events associated with simple multi-word utterances.
 - Then, the child links the semantic roles (agent and patient for example) to the syntactic roles (subject noun and object noun)
 - It is hypothesized that the child has "linking rules" that relate the semantic info to the syntactic categories
- Pinker called this **semantic bootstrapping**
 - the child is using the meanings to infer the syntactic structure of the sentence

Various criticisms:

- One important criticism is that hypothesizing specific innate information for syntactic categories is too powerful
 - doesn't fit with the actual slow and error-prone progress that children make.
- Alternate theory: a constructivist-semantic or meaning-first view
- Some researchers have described early multi-word utterance productions without assuming knowledge of syntactic categories
 - Early utterances are *asyntactic*

Semantic basis for syntax

- Early syntactic categories fit with early semantic roles – so objects are nouns and actions are verbs
 - This won't be true later, but children do learn about balls and boats before they learn about truth and time
- Verb learning is harder to explain (return to this in a few slides)
 - Unlikely that children are learning the "verb" concept just from semantic information

Distributional Analysis for acquiring the syntactic categories

- Infer categories by sentence position
 - Subject nouns in utterance initial position in English
- Grammatical morphemes co-occur with content words:
 - "the" with nouns and "is" or "ing" with verbs
 - Count vs mass nouns marked with articles or plural -s
 - Words that can take suffix -s and -ed are verbs, but words that take -s are nouns
- There are also prosodic differences for nouns and verbs in English
 - Nouns stressed on first syllable, verbs have stress on second syllable, example word "compound"

- Researchers argue that children's errors can be accounted for by statistical probabilities based on what they hear, not any innate information
- Connectionist modeling of distributional information (MOSAIC)

Conclusions:

1. Probably do not need innate mechanisms to successfully find the syntactic categories in a language, and
2. Distributional information is more powerful for learning syntax than semantic information.

Braine's Pivot-Open Grammar

- "Open" words
 - open class of words (opposite of closed class)
- "Pivot" words
 - words are members of closed class of words
- Braine proposed rules for use of "open" and "pivot" words to explain early word combinations
- Pivot words don't occur alone
 - ex. "my" "the"
- Open words can occur alone
 - ex. "car"
- Possible combinations:
 - open-open "car go" or "go car"
 - pivot-open "my car"
 - open-pivot "car up"

Semantic-Syntactic Rules

- Bloom argued that Pivot-Open Grammar failed to deal with semantic aspects that were probably primary at this age/stage of development.
- Rich Interpretation
 - "mommy sock" used in 2 separate contexts:
 1. one was the mother's sock
 2. other was mother putting the sock on the child
- Early 2-word utterances express child's knowledge of meaning relationships and word order
- Difficult to describe an early grammar that is separate from semantics

Prevalent Semantic Relations

- Brown identified 11 two-term semantic relationships seen in children's language
 - 75% of children's 2-word utterances fit these patterns
 - word order can vary, but often doesn't
- See Table 4.5, p. 141
- Children may use a combination of general and specific rules:
 - At times, they generalize to the category – (so begin to understand "boy," "mommy," etc. as agent)
 - But for other words (e.g., "more" or "other"), children don't show general categories. Use in specific ways and don't use words that can fill the same role

How do children acquire verbs?

- **Semantic verb class hypothesis**
 - Pinker
 - Children determine that verbs that convey information in a certain direction (e.g., fall, climb, for example) can only be intransitive not transitive
 - Semantic bootstrapping
- **Verb island hypothesis**
 - Tomasello
 - Children's early verb use called "verb islands"
 - Children do not generalize much, instead just use the verbs and utterances in ways that match input
 - Not novel use for the most part
 - Children are not forming abstract categories before age 3.

Specific – to – General

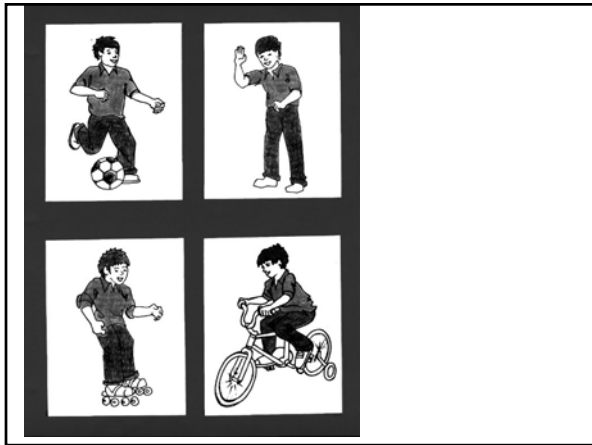
- **Conclusion:** Start with specific instances and then generalize.
 - Seems to be a true pattern for development.
 - Many specific instances of hearing a verb help the child to learn it
 - Early on they imitate those specific instances
 - As they get older they can make generalizations and develop more general patterns and uses.
- **KEY:** Need to be able to abstract information from specific instances
 - Agnes kicked Vlad
 - Agnes kissed Vlad

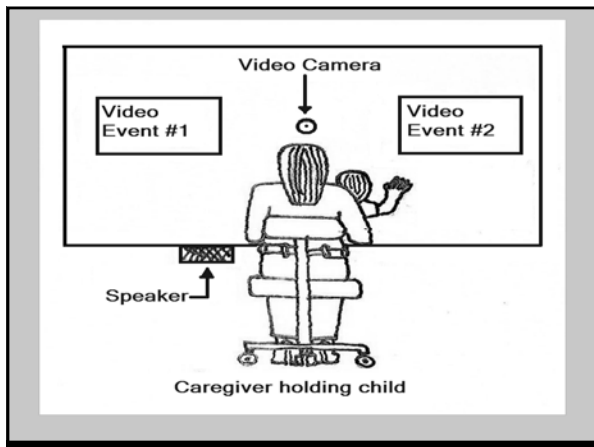
Late-syntax vs Early-syntax

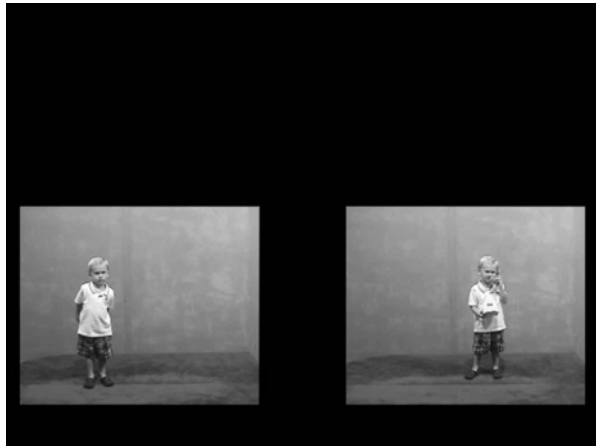
- **Late syntax:**
 - Children use lexical or verb-specific knowledge for a long time before abstracting information to form syntactic categories
- **Early syntax:**
 - Abstraction occurs relatively early
 - So innate information would support this but still could arise from powerful brain structures
- Sometimes the late syntax theories are better supported by assessing production
 - Because children show conservative productions, long time in development
- Yet, early syntax theories are supported by comprehension studies
 - See that children have knowledge of these patterns and abstractions even when they don't produce them

Research Examples

- Gerken & McIntosh 1993
 - "Find the bird for me" vs "Find bird for me," "Find was bird for me" and "Find gub bird for me"
- Beverly & Swanson 2005
 - "Who is pushing?" vs "Who pushing?", "Who in pushing?" and "Who id pushing?"
- Zangl & Fernald 2007
 - "Look at the shoe," vs "Look at shoe," and "Look at loo shoe"
- Kerns & Beverly
 - "Who is pushing?" vs "Who is pushes?" and "Who is pushi?"







MLU

- MLU is a moderately reliable predictor of complexity for English speaking children
 - When MLU <4.0
 - > 4.0, then MLU less accurate measure
- 18 mos. to 5 yrs. MLU increases approx. 1.2 morphemes per year

Brown's 14 Morphemes

Brown isolated 14 morphemes based on common characteristics:

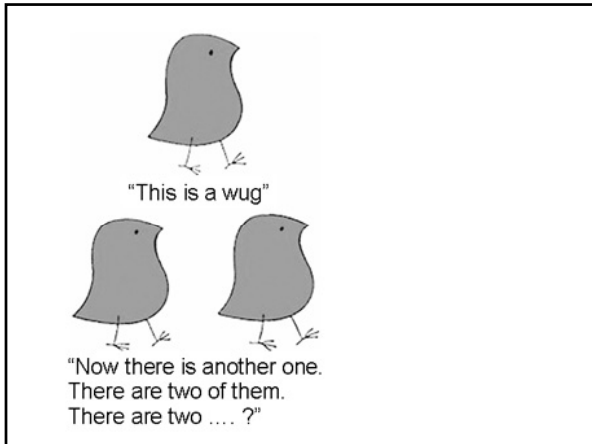
- most are phonetically minimal forms
- their development is gradual
- able to identify obligatory contexts
- morphemes are "function words" or closed-class words, different from open-class words
- note how the phonological form varies for some

- **-ing**
 - present progressive verb tense
 - earliest English morpheme
 - Brown's Stage II
 - phonologically more stable and less minimal
 - no irregular forms
 - not used with state verbs (e.g., know, want)
- **in/on**
- **plural -s**
 - concept develops before morpheme
- **Possessive -s**
 - concept possession marked by word order and stress before morpheme is used
 - ultimately child sorts out the three phonological forms
- **copula "be" vs. auxiliary forms of "be"**
- **contractible vs. uncontractible forms of "be"**
 - based on whether it is able to be contracted
 - 6 contexts for uncontractible:
 - Is that hot?
 - That isn't hot.
 - It is.
 - That was hot.
 - That IS hot.
 - This is hot.

- **Articles**
 - definite "the" and indefinite "a"
 - early on, these may sound the same
- **3rd person singular**
 - regular form -s
 - English verbs in present tense are only marked for 3rd person, others are bare stems
 - irregular form "does" "has"

"Rule-based" grammatical knowledge

- Berko-Gleason and the "wug" task.



Past Tense Learning

- Review the U-shaped learning curve
- "Dual Route Model" (Pinker)
 - Develop past-tense formation system with two routes.
 - One that uses a rule to create the regular -ed past tense
 - Other route accesses a listing of the irregular forms
 - Evidence from dissociation among persons with aphasia and neuroimaging
- Connectionist model that simulates past tense learning without separate routes.
 - Differences in brain activation are related to the phonological aspects of the regular form versus the lexical-semantic information underlying the irregular forms.
 - Computational Modeling
