PRESCHOOL DEVELOPMENT OF LANGUAGE FORM

COMD570: Language Development

Morphological & Syntactic Development

Brown's stages of development

- Brown (1973): seminal in-depth longitudinal study of preschool language development
  - Underlies our discussion of morpho-syntactic language development
- Study began in 1962
  - Three English-speaking pre-school children (Adam, Eve, Sarah)
    - Eve's starting age: 18 months
    - Adam and Sarah's starting age: 27 months
- Children were selected because:
  - Just beginning to speak multi-word utterances
  - Highly intelligible speech
  - Highly talkative (easy to get data!)

Brown 1973

Brown's stages of development

- Principal data: transcriptions of spontaneous speech of each child and mother (occasionally w/father) at home
  - Two hours per month
- Weekly lab discussions about children's development during Year 1
  - Ended up being an intensive analysis by Brown by himself
- End of Year 1: Eve left study, continued data collection from Adam and Sarah for four more years
  - Most in-depth analyses based on the first year of data collection

Brown 1973

Mean Length of Utterance (MLU)

- MLU helps us conceptualize and operationalize language development in a fairly rigorous manner
- Moderate predictor of language complexity
- MLU increases ~1.2 morphemes per year up until ~42 months

Brown 1973

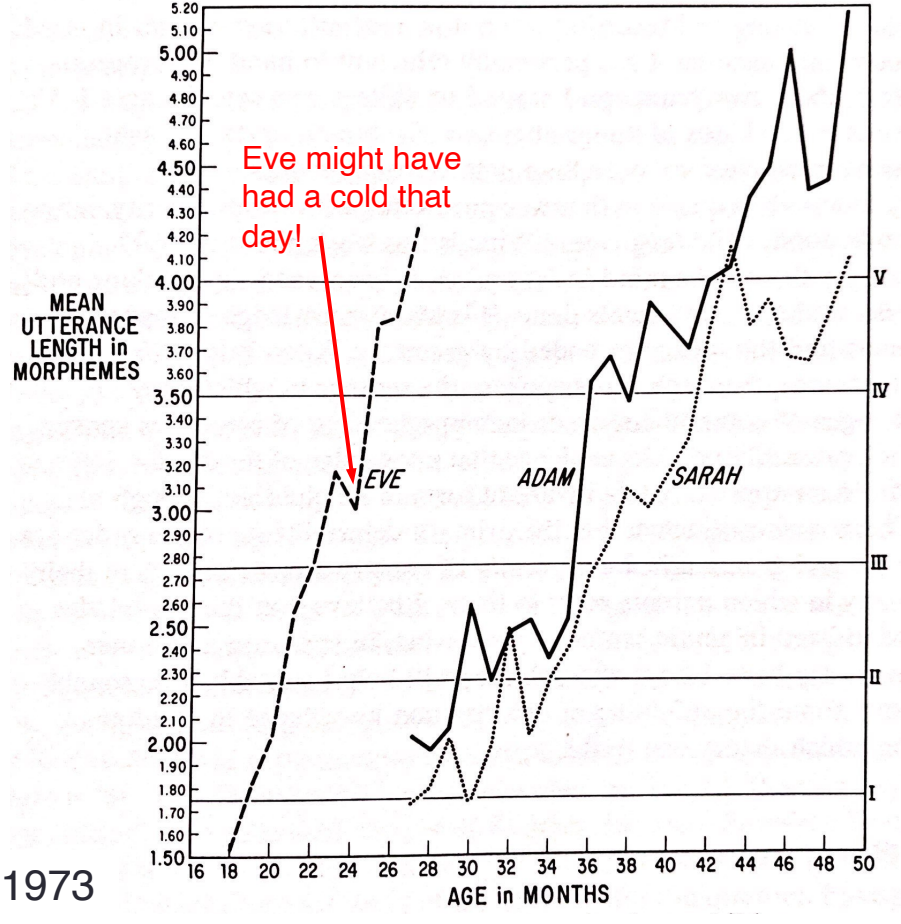
MLU and age are correlated

MLU	Age (months)
1.31	18
1.62	21
1.92	24
2.54	27
2.85	30
3.16	33
3.47	36
3.78	42
4.09	45
4.40	48
4.71	51
5.02	54
5.34	57

Brown 1973

MLU and age are correlated

- MLU consistently rises with age
- Lots of individual variability in relationship of MLU to age
- MLU thought to equate grammatical development across children better than age
- Brown's stages are defined by MLU and presence of specific morphemes
  - Not age! Just rough estimates of expected age



Brown 1973

Stage I: MLU = 1.0-2.0, 18-24 months

- Children use **free morphemes** only (no inflectional affixes)
  - Gives a “telegraphic” flavor (vaguely similar to agrammatic aphasia)
- Typically one and two-word phrases
  - Result in average MLU between 1 and 2
- Two-word phrases are creative
  - Not just repetition of what they’ve heard.
  - E.g. “all gone lettuce”
  - Reflect development of syntactic combination rules
- When about 50% of utterances contain two words (MLU = 1.5), first three-word utterances emerge

2-word phrases

2-word phrases	Examples
Agent + Action	Daddy eat
Action + Object	Eat cookie
Agent + Object	Mommy cookie
Attribute + Entity	Big doggie
Possessor + Possession	Mommy cookie
Negative + Entity	No milk
Demonstrative + Entity	This cup
Entity + Locative	Doggie outside

3-word phrases

3-word phrases	Examples
Agent + Action + Object	Daddy eat cookie
Agent + Action + Location	Mommy sleep bed
Action + Attribute + Entity	Eat big cookie
Action + Possessor + Possession	Eat Mommy cookie

3-word phrases depend on semantics of 2-word phrases

- A child will not produce a three-word phrase until mastery of the same semantic relations at the two-word stage
- E.g., a child will not produce:
  - Agent + Action + Object — *Mommy eat cookie*
- Unless the child also can produce:
  - Agent + Action — *Mommy eat*
  - Agent + Object — *Mommy cookie*
  - Action + Object — *Eat cookie*

Stage II: MLU = 2.0-2.5, 24-30 months

- Presence of inflectional morphology marks the beginning of Stage II
- Inflectional morphology emerges as MLU reaches 2.0
- Inflectional morphology not mastered until MLU > 4.0 (age 3.5 to 4 years)

Stage II
Progressive: -ing
Regular Plural: -s
Prepositions: in, on
Pronouns: that, this, I, you, me, it
Possessive: my

Overgeneralization errors

- Overgeneralization errors:
  - Applying a rule of regular inflectional morphology incorrectly to an irregular form
  - E.g. **foots*
  - Overgeneralization occurs during stage II when inflectional morphology starts being used

- https://www.youtube.com/watch?v=PU9yUaZroq0

Progressive aspect -ing

- Progressive verb aspect: activity currently in progress; consists of auxiliary BE (e.g. is, am, are) + verb + -ing
  - *Mommy is eating*

- Present progressive *–ing* is one of the first verb inflections to be mastered, but children in Stage II usually drop the auxiliary form of the verb “to be”
  - E.g. *Mommy eating*, not *Mommy is eating*

Regular plural -s

- Regular plural -s emerges much earlier than irregular plural forms
  - E.g. *boy-s*, *girl-s*, etc., but not *men* or *women*
  - Usually by the age of 3

- Phonological development doesn't seem to be particularly troubling, follows morphological development
  - Voiced followed by /z/
  - Voiceless followed by /s/
  - Sibilants followed by /əz/

Stage III: MLU = 2.5-3.5, 31-34 months

- Stage III marked by more complex and abstract morphemes (both free and bound morphemes)

Stage III
Irregular past tense: broke, flew
Uncontractible copula: He is; Mommy and Daddy are sad
Possessive: -s
Prepositions: under, with, of, for, to
Negative marker with auxiliary: did not, won't
Pronouns: he, she, him, her
Possessive: your

Irregular past tense

- Small number of words (~200), but those words are high frequency (in English)
- Some appear in single-word utterances by age 2 (e.g., fell, broke)
- Probably learned individually
  - Overgeneralization of a learned rule (sing/sang → bring/brang) (although such rules are not productive in adult language)
- Most mastered by age 4, some not mastered until school age

Possessive -s

- Emerges initially as an inflection on single animate nouns (e.g., Mommy's, sissy's, doggie's)

- Usually first mark possession of alienable objects
  - Alienable: separate from the person
  - I.e., children say "mommy's spoon" (alienable), not "mommy's arm"

- Phonological aspects are mastered later

Copula

- Copula = “be” form + non-verbal predicate
  - Followed by a noun, adjective, adverb, prepositional phrase
  - Examples: “I am tired”; “The car is new”; “I am a professor”; “They are here”

- Not fully mastered until age 4
  - Many forms that reflect person and number (am, is, are, was, were, will be, been)
  - Each form seems to develop semi-independently and based on word-specific basis

Copula

- Uncontractible (*not* contracted) copula emerges in stage III, then overextended
  - "He is fast" → "They is fast"
  - Requires subject-verb agreement within a complex structure

- Contracted forms *seem* to emerge early (he's, they're)
  - But, likely the child uses them as single words, not as complex words comprised of separate grammatical elements
  - *Real* contracted forms don't emerge until stage V (much later!)

Stage IV: MLU = 3.5-4, 35-40 months

- Stage IV marked by additional morphemes and morphological rules
  - First appearance of regular past tense rule

Stage IV
Regular past tense: -ed
Modal auxiliaries/verbs: can, will
Articles: a, the
Prepositions: around, behind
Prepositional phrases: in the car; on the boat
Pronouns: they, we, them, us
Possessive pronouns: hers, his

Past tense -ed

- Used with relatively low frequency words
- Regular past-tense rules tend to “stick” and be over-generalized to irregular verbs once they emerge
  - Comed, Maked, Eated, Falled, Runned
- Overgeneralization phase may last months and may overlap with correct usage
- Phonological rules:
  - Voiced followed by /d/
  - Voiceless followed by /t/
  - If ending in /t/ or /d/, followed by /əd/ (e.g., salted)

Articles: a, the

- Usually appear before age 2, but aren't used correctly until later
  - "a": new information, nonspecific reference
  - "the": old information, shared experience, specific reference
- Example of pragmatic influences on syntactic development
- Also very difficult for 2nd language learners

Stage V: MLU > 4, 41-46 months

- Stage V marked by additional morphemes and morphological rules that reflect more complex syntactic computations
  - Progressive auxiliary verb used (both contracted and not contracted)
  - 3rd person singular subject-verb agreement

Stage V
Uncontractible auxiliary: BE+ing Mommy and Daddy are eating
Contractible auxiliary: Mommy's eating
Contractible copula: e.g., I'm sad
3rd Person singular present tense: he walks, he climbs
Modals: could, would
Prepositions: beside, between
Wh- questions
Possessives: its, our(s), their(s)
Reflexive pronouns: myself, herself, himself, yourself, ourselves

Regular third person singular -s

- Usually mastered around 3.5-4 years of age
- Inconsistent
- Can be influenced by preceding adult questions:
  - A: “Where **does** she **sleep**?”
  - C: “She **sleep** here.”

Verb Example	First Person Singular	Everything else
Run	he/she runs	I/you/we/they run
Dance	he/she dances	I/you/we/they dance
Walk	he/she walks	I/you/we/they walk

Auxiliary verbs

- Auxiliaries = “helping” verbs (be, can, do, will)
- First appear in their contracted form (e.g., can’t, won’t, don’t)
  - Most likely reflect monolithic utterances for important pragmatic purposes

- When uncontracted auxiliaries emerge, lots of errors :
  - Number/person of the subject (“I is going”, “You am running”)
  - Overextended/double past tense markers (“I didn’t eated it”)
- Modal auxiliaries = would, could, should, must, might
  - Emerge later (~4 years)
  - More complex semantic properties

Brown's stages of language development

Stage II: MLU = 2.0-2.5 (24-30 months)		**Stage III: MLU = 2.5-3.5** (31-34 months)	
Progressive	***ing***	Irregular past tense	
Regular Plurals	***/s/, /z/, /xz/***	Uncontractible copula	
Prepositions	***in***	Possessive	***/s/, /z/, /xz/***
	on	Prepositions	***under***
Pronouns	***that***		***with***
	this		***of***
	I		***for***
	you		***to***
	me	Negative marker with auxillary	***won't***
	it		***did not***
Possessive	***my***	Pronouns	***he***
			she
			him
			her
		Possessive	***your***

Brown's stages of language development

Stage IV: MLU = 3.5-4.0 (35-40 months)	**Stage V: MLU >4.0** (41-46 months)
Regular past tense ***/t/,/d/,/xd/***	Uncontractible auxiliary
Modal verbs ***can*** ***will***	Contractible auxiliary
Articles ***a*** ***the***	Contractible copula
Prepositions ***around*** ***behind***	Third person singular regular (He *walk**s***)
Prepositional phrases	Third person singular irregular (He *does*)
Inverted copula & auxiliary	Modals ***could*** ***would***
Pronouns ***they*** ***we*** ***them*** ***us***	Prepositions ***beside*** ***between***
Possessives ***hers*** ***his***	Wh questions + inverted auxiliary
	Wh questions + inverted copula
	Possessives ***its*** ***our*** ***ours*** ***their*** ***theirs***
	Reflexive pronouns ***myself***, ***herself***, ***himself***, ***yourself, ourselves, themselves***

Break

Syntactic Development

Noun phrase development

- 2 years: modification with adjective
  - *Big dog*, *nice cat*

- 3 years: still mostly 1 element + noun
  - Modification with determiners (Articles, possessive pronouns, some quantifiers, some demonstratives)
  - Post-noun phrase modifiers (e.g., adverbs like “here”, “there”)

Noun phrase development

- 4 years: mastery of determiner usage
  - Also post-nominal prepositional phrase modifiers (e.g., the cat *in the car*)

- Relative clauses (e.g., the cat that the dog chased) don't come until school age!
  - Require complex transformation from within clause
  - **the cat**$_1$ that the dog chased ___$_1$

Verb phrase development

- Verbs are common in the single-word stage (both transitive and intransitive)

- Verb phrases contain complex elements, including tense and aspect

Tense and aspect

- **Tense** is the morpho-syntactic expression of time
  - Past/present tense overtly marked in English: *she walk-**s*** vs. *she walk-**ed***
  - Future time indicated through other elements, e.g. temporal modifiers (*tomorrow*, *next week*) or modal auxiliaries (*will/shall*)
- **Aspect:** the manner in which an action occurs
  - Progressive (ongoing): *I **am** walk-**ing***
  - Perfect (completed): *I **have** walk-**ed***
- **Tense** and **aspect** can co-occur:
  - Present progressive: *I am walking*
  - Past progressive: *I was walking*

Tense and aspect

- Tense develops first
- Aspect begins to develop around age 3
- By age 4, children have developed a flexible system of tense/aspect
  - Can talk about events that happened at a different time with multiple aspects

Prepositional phrase development

- Prepositional phrases often used as modifiers (i.e., provide additional information) for verb and noun phrases
- Amount and complexity increases from ~2.5 years to ~6 years

BOX 9.1

Examples of Prepositions and Prepositional Phrases of Preschoolers

27 months:	Come **on**.
	Granpa's **in woods**.
36 months:	I'm pouring it **in**.
41 months:	Hi dad, yell **at him** to come back.
42 months:	It's time **for my baby** to go *to bed*.
52 months:	He's doing it **with his feet**.
56 months:	Now it's time **for them** to go **to the store with mommy**.

Infinitives

- Infinitives: untensed form of the verb
  - E.g. going to, want to, have to, etc.
  - “to want”
- Semi-infinitives emerge around 2 ½ (e.g., “gonna” “wanna”)
- By age 3, they precede verbs (e.g., “wanna play”)
  - Relatively complex syntactic construction
- Become more and more complex from there (e.g., negative infinitives, noun phrase between two verbs)

Sentence types

- Declarative: Makes a statement
- Interrogative: Asks a question
- Imperative: Gives a demand/command
- Negative: States that something is false

Declarative sentences

- Simple subject + verb + object formation (~30 months)
  - He ate pizza.
- Subject + auxiliary + verb + object (~33 months, MLU 2.5-3.0)
  - He **is** eating pizza.
- Subject + verb + indirect object + object (~48 months)
  - He gave **me** the pizza.
- Subject + verb + object + to/for + indirect object (beyond)
  - He gave the pizza **to me**
  - He bought the pizza **for me**

Questions (interrogatives)

- Questions emerge in the one-word stage: “Doggie?” “Wassat?”
- Then, interrogatives progress through three phases of development
  1. Questions constrained to routines (where, what) and no auxiliary transformation
  2. Use of a subject and predicate, developing auxiliary transformation in yes-no and WH-questions
  3. Auxiliary transformation more complete

- What this?
- What Mommy doing?
- Where Daddy go?

MLU 1.75-2.25

- What Doggie eating?
- Daddy go work?
- What is that?
- Where is Mommy?

MLU 2.25-2.75

- Where are we going?
- Do you like pizza?

MLU 2.7-3.5
~3 years

Imperatives

- Examples:
  - Pick me up
  - Give me one
  - Throw it to me
- Emerge around 2.5 years – why so early?

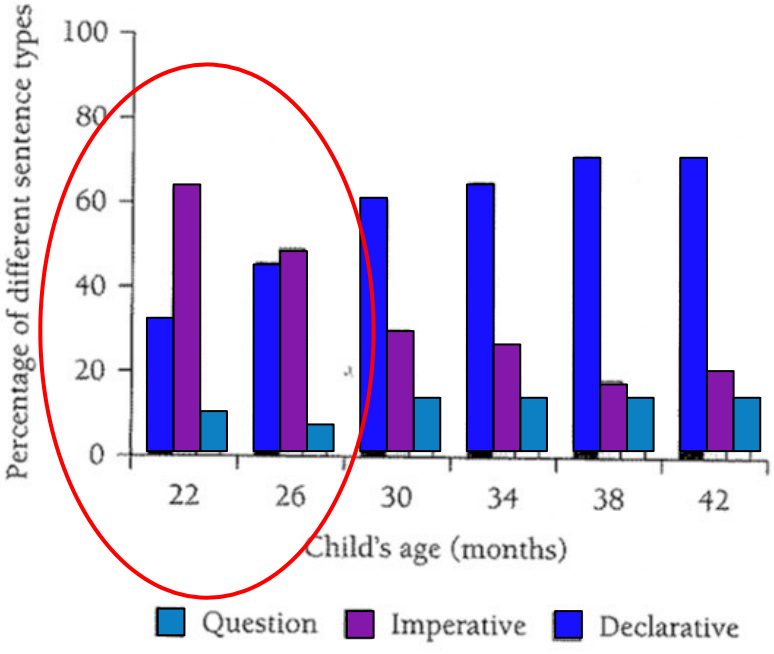
Imperatives

- Examples:
  - Pick me up
  - Give me one
  - Throw it to me
- Emerge around 2.5 years – why so early?
  - Likely a reflection of early ego-centric cognitive state and internal desires

Negative Sentences

- “No” – within first 50 words
- Three stages of negation development:
  1. Negative + sentence nucleus (e.g., “No do it” “No you go home”)
  2. Subject + negative + verb (e.g., “I can’t do it” “She no kick”)
  3. Auxiliaries, uncontracted (e.g., “This is not funny” “I didn’t do it”

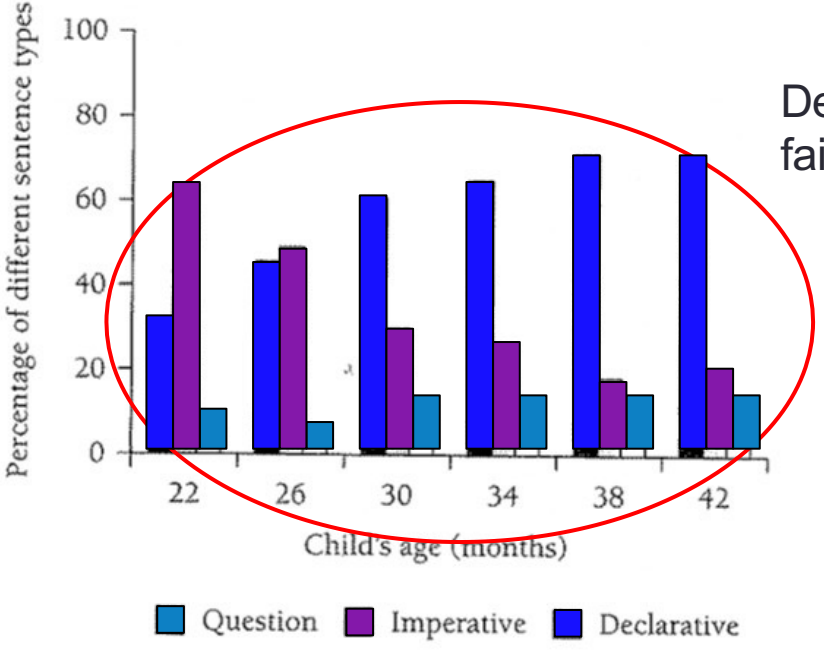
Beyond two words



DEVELOPMENTAL CHANGES IN THE TYPES OF SIMPLE SENTENCES CHILDREN PRODUCE FROM 22 TO 42 MONTHS

Imperatives dominate early on, then taper off.

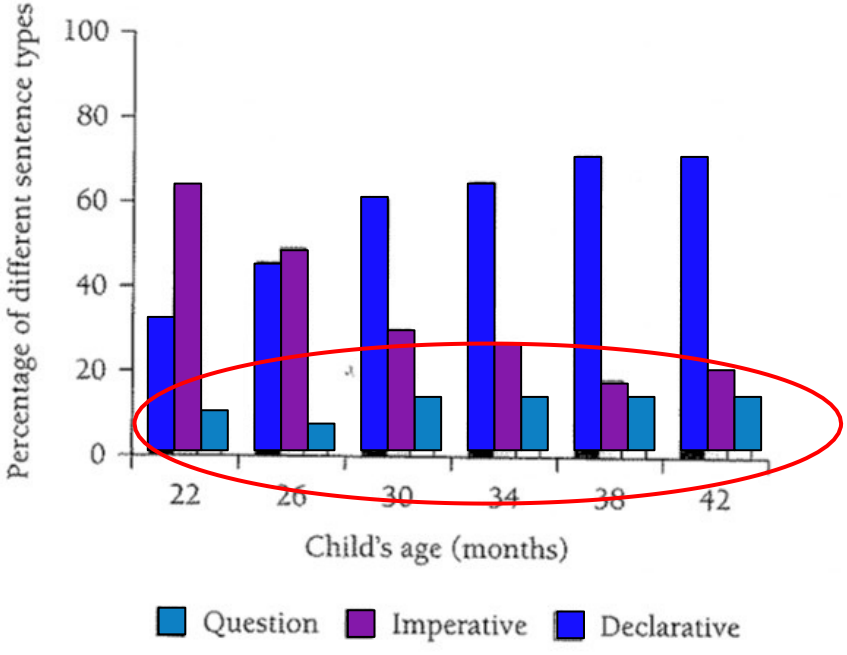
Beyond two words



DEVELOPMENTAL CHANGES IN THE TYPES OF SIMPLE SENTENCES CHILDREN PRODUCE FROM 22 TO 42 MONTHS

Declaratives always a fairly large proportion

Beyond two words



DEVELOPMENTAL CHANGES IN THE TYPES OF SIMPLE SENTENCES CHILDREN PRODUCE FROM 22 TO 42 MONTHS

Questions always a fairly small proportion

Comprehension vs. Production

- Lack of morphemes or structures in speech of children doesn't mean children don't *know* them

- Telegraphic children prefer adult structures, e.g. "throw me the ball", over their own telegraphic versions ("throw ball") Shipley, Smith, & Gleitman (1969)

- Children make (implicit) acceptability judgments before they produce the corresponding structures
  - E.g., they discriminate between "find the dog for me" and "find was dog for me" Gerken & McIntosh (1993)

Production vs. Production

- Children have knowledge of grammatical constructions even before they can produce all the words themselves
  - What was previously thought to be telegraphic speech might just be a severe form of “baby accent”
- Dye 2011: 2- and 3-year-old French children have phonetic placeholders for auxiliary words (like “am” and “are”), and use them as they would use the actual words
  - “The continuum ranged from target or near-target forms down to barely audible forms (some of which required identification through spectral analysis) or even puffs of air"

Break

Phonological Development

Phonological Development

- In order to produce speech, an infant must:
  - **Learn the phonological system of the language**
    - Phonemic inventory (set of speech sounds in the language)
    - Phonological rules (processes that modify speech sounds in phonological context)
    - Phonotactic constraints (possible sound sequences of the language)
  - **Develop phonetic procedures for producing speech sounds**
    - Consonants, vowels, transitions between sounds

Phonetic & phonological errors

- **Phonetic errors:** can't correctly produce a speech sound
  - Producing speech requires complex and rapid movement and coordination of articulators
- **Phonological errors:** a child makes an error despite being able to produce the phoneme
  - Could reflect lack of phonological knowledge (e.g., the sequences of phonemes that comprise a word)
  - Could reflect phonological processes that the child has developed in order to ease phonetic pressures
    - Which must eventually be un-learned

Phonetic & phonemic inventory

- We assume that the ability to produce a speech sound means that it is part of both the phonetic and phonemic inventory
  - I.e., in order to be able to produce the sound, assume there is a phonemic “target” in mind
- The inability to produce a speech sound means that it is not part of the phonetic inventory
  - **A speech sound not in the phonetic inventory *could* still be part of the phonemic inventory**
  - i.e., the “target” is there, but not how to reach it

Phonetic & phonemic inventory

- If a child can say “big” “bike” “bite” “back”
  - /b/ is part of their phonetic & phonemic inventories
- If the child can say “lake” “like” “lick” “lay”
  - /l/ is also part of their phonetic & phonemic inventories
  - If the child *can’t*, [l] is definitely not in the phonetic inventory, but /l/ may very well be part of the phonemic inventory
  - Categorical perception experiments can help determine whether the inability to produce /l/ is due to a phonemic or phonetic problem

Simplification

- Simplification is a natural strategy that children use to make tasks easier
- Children simplify sentences by leaving out function words (telegraphic speech):
  - “Doggie eat supper”
- Just as they simplify pronunciation by leaving out syllables:
  - “police car” [pis] car

Simplification

- When a child changes an utterance, it will always be in the direction of becoming more phonetically simple
- Children's simplified productions are not imitations of adult speech
  - They likely have never heard an adult say [pis] car!
- Rather, children's simplified productions are the result of **developmental phonological processes** applied to **adult-like underlying representations**

Developmental phonological processes

- **(Adult) Phonological processes/rules:** rules that adjust the phonetic instantiation of phonemes in context
  - Transform underlying phonological representations into surface phonetic representations
- **Developmental phonological processes/rules:** rules that children use in order to facilitate production during development that are later reversed
  - Can be thought of as the same *kind* of phonological processes that adults have

Syllable shapes

Simple

Complex

C V	“bee”	/bi/
C_1 V C_1 V	“Mommy”	/mami/
C_1 V C_1	“coke”	/koʊk/
C_1 V C_2	“coat”	/koʊt/
C C V	“blu”	/blu/
C C V C	“black”	/blæk/
C C C V C	“strike”	/stɹaɪk/
C C C V C C	“strict”	/stɹɪkt/

Simplification

- Many early phonological “errors” are in fact **developmental phonological processes** that reduce syllables closer to the (phonetically) ideal CV unit

Productivity

- How much is a rule *actually a rule*?
  - E.g., past tense –ed in English is highly productive
  - Past tense vowel shift is not productive

- In developmental phonological processes a rule/process is productive if it occurs in at least 30% of opportunities

- In developmental phonological processes, when use drops below 30%, the process has been *suppressed*

Productivity

- **Naturally suppressed:** process use drops below 30% due to maturation

- **Remediated:** process use drops below 30% due to speech therapy

Summary

- As a process is suppressed, the sound changes of that process no longer occur, resulting in the use of an entire class of phonemes
  - Ex: when Deletion of Final Consonant is suppressed, child will use final consonants
  - Does NOT guarantee that they will use the *correct* final consonants.

Blocking

- **Blocked Process:** the presence of a process cannot be seen because another process masks its use
- E.g., **deletion of final consonants** can interact with **stopping**
  - Deletion: /pʊʃ/ → [pʊ]
  - Stopping: /pʊʃ/ → [pʊt]
- Deletion can prevent us from ascertaining whether stopping occurs or not

With stopping process

Underlying Representation	/pʊʃ/
Stopping	pʊt
Deletion	pʊ
Surface Representation	[pʊ]

Blocking

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Without stopping process

Underlying Representation	/pʊʃ/
---	---
Deletion	pʊ
Surface Representation	[pʊ]

Same output!

Blocking

- When evaluating whether a child has suppressed a developmental phonological process, need to be careful in analyzing speech data

Phonology Summary

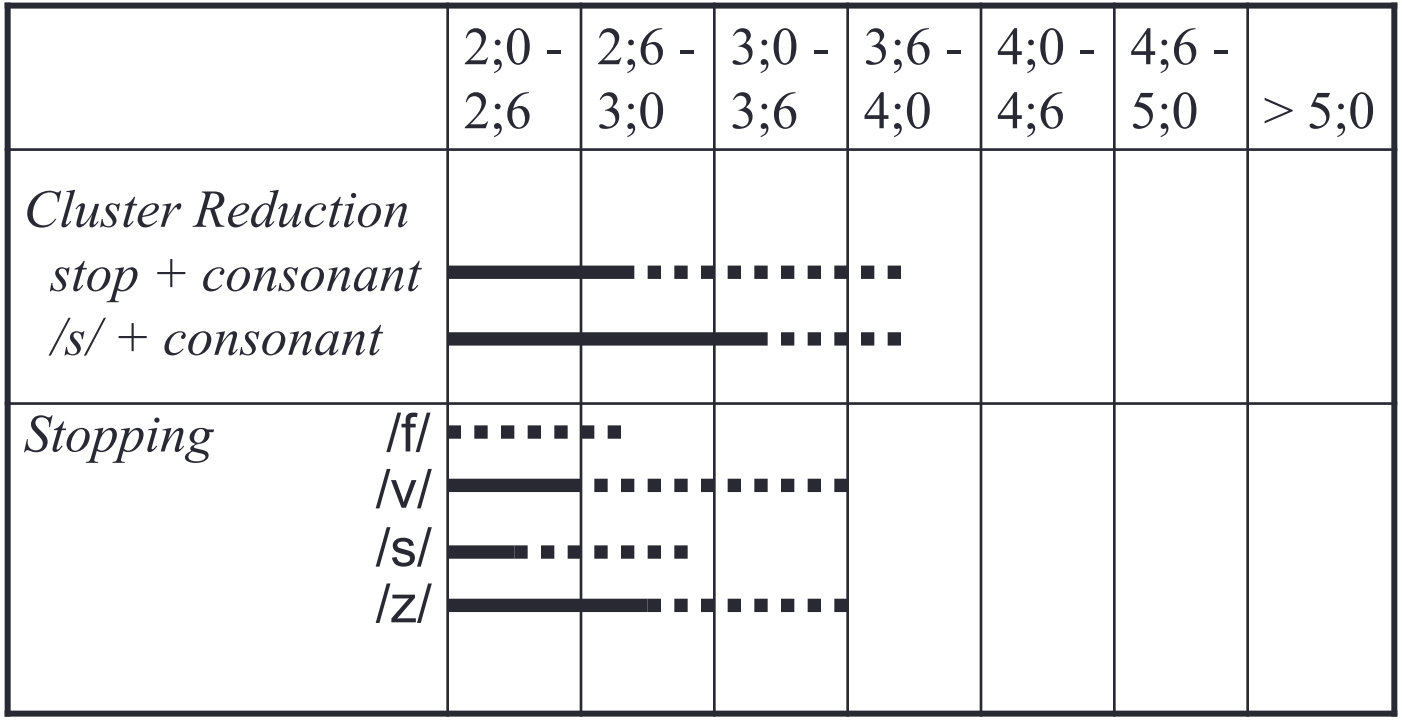
- As kids get older, developmental phonological processes are dropped and production is more adultlike

- Two reasons (interrelated):
  - The child acquires the motor control abilities to produce more complex movements
  - The child's phonological system develops and becomes more adult-like

Developmental phonological processes: chronology

	2;0 - 2;6	2;6 - 3;0	3;0 - 3;6	3;6 - 4;0	4;0 - 4;6	4;6 - 5;0	> 5;0
Syllable Reduction	———	———	———	····			
Final Consonant Deletion	———	———	····				
Reduplication	———	···					
Consonant Harmony	———	····					

Developmental phonological processes: chronology



Developmental phonological processes: chronology

	2;0 - 2;6	2;6 - 3;0	3;0 - 3;6	3;6 - 4;0	4;0 - 4;6	4;6 - 5;0	> 5;0
Fronting /k,g,ŋ/	———	·····					
Gliding /r/→ [w]	———	———	·····	·····	·····	·····	·····
Context-Sensitive Voicing	———	·····					

Developmental Milestones

6 Months

- Babbling
- Vocalizing with intonation
- Responds to name
- Responds to human voices by turning head/eyes
- Responds appropriately to friendly/angry emotional tone

12 months

- Uses one or more words with meaning
- Understands simple instructions
- Uses speech in a social way
- Communicative turn-taking
- Gestures (+ vocalizations) to get needs met
- Some echolalia
- Object permanence
- Frontal consonants + some vowels
- Responds to joint attention
- Babbles with intonation

18 months

- Vocabulary of about 5-20 words
- Vocabulary mostly nouns (>60%)
- Some echolalia
- Jargon with emotional content
- Learning ~1 word per week
- Point to objects of interest (initiating joint attention)
- Point to major body parts when asked

24 months

- 50-200 words expressively
- Can name many objects in surroundings
- Uses some prepositions, focused on physical relations (e.g. in, on, under)
- Combines words into short sentences
- Most utterances contain two or more words
- At least 2/3 of what child says is intelligible (more to familiar adults)
- Rhythm and fluency often poor
- Volume and pitch of voice not yet well-controlled
- Uses two pronouns correctly (I, me, you)

36 months

- Has almost 1,000 words in vocabulary
- Uses some plurals and past tenses
- Auxiliary and copula, as well as articles are being used
- Knows basic parts of body (be able to indicate these if not name)
- Uses 3-4 word sentences
- Should be about 90% intelligible, even by strangers
- Verbs begin to predominate
- Understands most simple questions
- Tells short stories that can be followed
- Can give gender, name, age

48 months

- Understands 2,000 words; uses 1,000 - 1,500 words
- Can use most prepositions
- Constructs complete sentences of at least 4-5 words
- Asks and answers many types of questions
- Knows several colors
- Rote counting to 10, number concepts up to 3
- Only a few phonetic/phonologic errors persist (e.g., th, s, z, r, l)
- Understands such concepts as longer, larger, when a contrast is presented
- Understands size, quantity, and quality adjectives

60 months

- Mostly building upon what has already been mastered
- Can group objects categorically
- Can identify minor body parts
- Phonetic inventory should be complete
- Only remaining phonological process should be gliding (if any at all)
- Understands behind/ahead, first/last
- Asks “when” questions (concept of time)

Recap

- Morpho-syntactic development:
  - Mean length of utterance (MLU) in morphemes better captures grammatical development than age
  - MLU correlated with age, but distinct from it!
  - Brown's stages of morpho-syntactic development marked by increased morphological complexity (inflectional rules) and syntactic complexity (more complex phrases and sentences) and presence of new functional words/morphemes
- Phonological development
  - Acquisition of phonemic inventory
  - Developmental phonological processes that simplify phonetic pressures
  - Suppression of developmental phonological processes to better match adult phonology