• Child language acquisition
• Acquisition of phonology

Background reading:

• CL Ch 9, §1, “The study of language acquisition”
• CL Ch 9, §2, “Phonological development”
1. Main ideas: Child language acquisition

- Adults can speak and understand their native language(s) because they have a **lexicon** and **mental grammar** of that language:
  - **lexicon**
  - **mental grammar**
1. Main ideas: Child language acquisition

- **Adults** can speak and understand their native language(s) because they have a **lexicon** and **mental grammar** of that language:
  - **lexicon** — where sounds, meaning, and other unpredictable information are stored for each morpheme
  - **mental grammar** — rules and principles that handle systematic patterns, including phonology, morphology, and syntax
1. Main ideas: Child language acquisition

- **Adults** can speak and understand their native language(s) because they have a **lexicon** and **mental grammar** of that language.

- How does a child acquiring a native language (first language; L1) get to this **target** adult state?
  - **lexicon:**
  
  - **mental grammar:**
1. Main ideas: Child language acquisition

- **Adults** can speak and understand their native language(s) because they have a **lexicon** and **mental grammar** of that language

- How does a child acquiring a native language (first language; L1) get to this **target** adult state?
  - **lexicon**: morpheme sound and meaning information must be learned and stored
  - **mental grammar**: How does this develop?

- Any (normally developing) infant has the potential to develop the mental grammar of any language
1. Main ideas: Child language acquisition

- Proposal:
  - Infants all start out with their mental grammar at the same *(universal)* original/default settings: “Universal Grammar”
  - When infants are exposed to language data, they will begin to develop the mental grammar needed to produce and comprehend a particular adult language *(the target language)*

We can analyze each stage of a child’s developing mental grammar with the same tools we use for adult languages.
2. L1 acquisition and mental grammar

• A child in the process of acquiring a language goes through different **stages** of development
  - These stages reflect **intermediate mental grammars** on the way to the adult grammar

• A child often shows **variable** behavior
  - A rule may be applied only some of the time
  - Multiple versions of a rule may be in use

• But we can still find a great deal of **systematicity** in children’s language behavior
2. L1 acquisition and mental grammar

- “Learning” a native language is not the same as learning to do math or ride a bike
  - This is why the term **acquisition**, not “learning,” is typically used for this process

- Children do not acquire language because their parents “teach” it to them
  - More about this in a later class

- Children acquire language through contact between
  - the **language data** in the environment
  - the (universal) acquisition mechanism of the **mental grammar**
• Studying the process of language acquisition can give us important insight into:
  - the nature of the mental grammar for a particular language
  - the range of the characteristics of possible human mental grammars: Are there ‘mistakes’ that children never make?
3. Phonological development

• **Distinguishing** different speech sounds
  - 6-8 months: Infants can distinguish among almost all of the sound categories used in the world’s languages
  - 10-12 months: Infants have difficulty distinguishing sound categories that are **not contrastive** in their target language

• What does this change suggest about the child’s mental grammar?
3. Phonological development

• 10-12 months: Infants have difficulty distinguishing sound categories that are not contrastive in their target language.

• This developmental change is evidence for the beginning of a language-specific phonological grammar.
  - They are developing an inventory of contrastive sounds (phonemes).
3. Phonological development

- **Babbling** — approximately 6 to 12 months
  - The most frequent consonants used in babbling are very consistent even for babies acquiring different target languages

Table 9.1 from *CL*, p 353 | What generalizations can we make?

**Cross-linguistic similarities in babbling**

<table>
<thead>
<tr>
<th>Frequently found</th>
<th>Infrequently found</th>
</tr>
</thead>
<tbody>
<tr>
<td>p b m</td>
<td>f v θ ŋ</td>
</tr>
<tr>
<td>t d n</td>
<td>s h w j</td>
</tr>
<tr>
<td>k g</td>
<td>ñ</td>
</tr>
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<td></td>
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<td><strong>t</strong> <strong>d</strong> <strong>n</strong></td>
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</tr>
<tr>
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<td><strong>l</strong> <strong>r</strong> <strong>ŋ</strong></td>
</tr>
<tr>
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- Labials are common
- Oral and nasal stops are common
- Fricatives are rare, except [s, h]
- Liquids are rare but glides are common
3. Phonological development

- **Babbling** — approximately 6 to 12 months
  - The most frequent consonants used in babbling are very consistent across target languages
  - The most frequent consonants used are also frequent sounds in adult languages

- Does this tell us something about UG? (This question is controversial!)
3. Phonological development

- **Babbling** — approximately 6 to 12 months
  - The most frequent consonants used in babbling are very consistent across target languages
  - The most frequent consonants used are also frequent sounds in adult languages

- Does this tell us about UG? (Controversial!)
  - Maybe these consonants are typically early and common because **UG prefers them**
  - But maybe it is because of **articulation and perception** factors that do *not* depend on UG
3. Phonological development

- Individual children develop differently, but some **general patterns** can be observed:
  - Vowels develop before consonants
  - Stops are usually the earliest consonants
  - Labial is usually the first place of articulation (note: sighted children only!)
  - New phoneme categories are distinguished in word-initial position before other positions

- What factors might lead to these patterns?
In many cases, children are able to **distinguish between phonemes they hear** even before they can produce them.

- How do we know this?
- What are the implications for the child’s **mental grammar**?
3. Phonological development

- In many cases, children are able to distinguish between phonemes they hear even before they can produce them.

- We often find that comprehension is more adult-like than production.
  - Example: A child pronounces both mouse and mouth as [maws], but can point to the correct pictures in a comprehension experiment.

- What are the implications of this pattern?
3. Phonological development

• A child pronounces both *mouse* and *mouth* as [maws], but can point to the correct pictures in a comprehension experiment.

• What are the **implications** of this pattern?
  - How is each of these morphemes represented in the child’s **mental lexicon**?
3. Phonological development

• A child pronounces both *mouse* and *mouth* as [maws], but can point to the correct pictures in a comprehension experiment.

• What are the **implications** of this pattern?
  - How is each of these morphemes represented in the child’s **mental lexicon**?
    • ![Mouse] /maws/
    • ![Mouth] /mawθ/
  - How can we explain the child’s **pronunciation**?
    • [maws]
3. Phonological development

- If a child has an adult-like **phonemic** form, but produces a non-adult-like **phonetic** form...
  - Phonemic form: 😁 /mawθ/
  - Phonetic form: [maws]
3. Phonological development

• If a child has an adult-like **phonemic** form, but produces a non-adult-like **phonetic** form...
  - Phonemic form: \( /\text{maw}\theta/ \)
  - Phonetic form: \([\text{maws}]\)

• The child’s developing grammar must have a **phonological rule** that is not part of the adult grammar
3. Phonological development

- Writing child-specific phonological rules
  - Same as for adult phonological rules:
    - Rule format (A → B / X _ Y)
    - Use of **sound properties**
  - One difference: A child-specific rule may have **no environment** if a certain natural class changes into something else **everywhere**
    - Rule in such a case is only “A → B”, no “ / ...”

- *Mouth* example: A rule for /mawθ/ → [maws]?
3. Phonological development

- Writing child-specific phonological rules
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- *Mouth* example: **voiceless interdental → alveolar**
3. Phonological development

• Example from A, age 1;11

(a) cup [ tʌp ]
(b) goat [ dowt ]
(c) dog [ dɔt ]

okay [ otej ]
Grampa [ dæmpə ]
egg [ ejt ]

fork [ fɔrт ]
digger [ dɪdɹ ]

• What systematic patterns can we see here?

(Hint: Think about phonetic properties and natural classes)

• What rule(s) should we propose for A at this stage?
3. Phonological development

- Example from A, age 1;11

(a) cup [ tʌp ]  (b) goat [ dəʊt ]  (c) dog [ dɔt ]
ok *ay [ ətʃ ]  Grampa [ dæmpə ]  egg [ eʃ ]
for k [ fɔt ]  dig ger [ dɪdʒ ]

- What systematic patterns can we see here?
  - /k/ produced as [t] in all positions
  - /ɡ/ produced as [d] in initial and medial positions and as [t] in final position

- General rule?
3. Phonological development

- Example from A, age 1;11

  (a)  
  \textit{cup} \quad [ \textit{tʌp} ]

  (b)  
  \textit{goat} \quad [ \textit{dowt} ]

  (c)  
  \textit{dog} \quad [ \textit{dɔt} ]

  \textit{okay} \quad [ \textit{oˈtej} ]

  \textit{Grampa} \quad [ \textit{dæmpə} ]

  \textit{egg} \quad [ \textit{ejt} ]

  \textit{fork} \quad [ \textit{fɔrt} ]

  \textit{digger} \quad [ \textit{dɪdɹə} ]

- What systematic patterns can we see here?
  - /k/ produced as [t] in all positions
  - /g/ produced as [d] in initial and medial positions and as [t] in final position

- Generalize? Velar stops $\rightarrow$ alveolar
  Apparently also: Voiced stops $\rightarrow$ voiceless / _#
3. Phonological development

• A consistently applied this rule until about age 2;6
  - Then 2 wks of variable [t]~[k] for /k/ (likewise /g/)
    Sometimes, A would visibly correct her first production: “[ tʌp ] ... [ kʌp ]”
  - After that, she settled on consistent [k] and [g]
  - Only one lexical item showed confusion about which phoneme it contained: gear [ dɪɻ ]
3. Phonological development

• A **consistently** applied this rule until about age 2;6
  - Then 2 wks of **variable** [t]~[k] for /k/ (likewise /g/)
    Sometimes, A would visibly **correct** her first production: “[ tʌp ] ... [ kʌp ]”
  - After that, she settled on consistent [k] and [g]
  - Only one lexical item showed confusion about which phoneme it contained: *gear* [ diʌ ]

• Just for fun: This actually happened, literally last week, when I misheard something A said about a bad smell (A is now 4;6)
4. Methods in acquisition research

- **Naturalistic** approach
  - Observe and record child language
  - Online data repository: [CHILDES](#)

- Advantages of the naturalistic approach

- Disadvantages
4. Methods in acquisition research

• **Naturalistic** approach
  - Observe and record child language
  - Online data repository: CHILDES

• Advantages of the naturalistic approach
  - Data comparatively easy to collect
  - Shows language as it is used in context

• Disadvantages
  - Rare structures may not be collected
  - How can we tell what a child’s mental grammar will accept as grammatical?
4. Methods in acquisition research

• **Experimental** approach
  - Explicitly test children’s ability to produce, comprehend, or imitate language

• Advantages of this approach

• Disadvantages
4. Methods in acquisition research

- **Experimental** approach
  - Explicitly test children’s ability to produce, comprehend, or imitate language

- Advantages of this approach
  - Can study comprehension
  - Can investigate specific linguistic structures

- Disadvantages
  - Difficult to design good experiments for children
  - The relatively artificial context may affect aspects of children’s language behavior
4. Methods in acquisition research

Examples of experimental methods used in child language research

• Video
  - Infant Language Lab (1999) — Johns Hopkins
    Video is old, but shows actual infants being tested

• Research lab web sites with photos & information about the methods they use
  - Bergelson Lab — Duke U
  - BabyLab — U Potsdam
  - Penn Infant Language Center — U Pennsylvania