Revisiting last week’s discussion…

- Categorical perception of speech sounds
  - Have it at birth
  - Lose it by end of first year if not used
  - Can regain it with re-exposure up to puberty (roughly)

- Categorical perception is ONLY one TINY part of language learning!
  - Presented here to demonstrate the interaction of nature (biology) and nurture (environmental input)

Chapter 2: Infancy

Module 2.2
Cognitive Development in Infancy
Looking Ahead

- What are the fundamental features of Piaget’s theories of cognitive development?
- How do infants process information?
- How is infant intelligence measured?
- By what processes do children learn to use language?
- How do children influence adults’ language?

PIAGET’S APPROACH TO COGNITIVE DEVELOPMENT

“genetic epistemology”- a study of the origins (genesis) of knowledge (epistemology)
Key Elements of Piaget's Theory

- **Action = Knowledge**
  - Four universal stages in fixed order
  - Development = physical maturation *and* exposure to relevant experiences

![Diagram showing Piaget's Cognitive Development Stages]

1. Sensorimotor (birth - 2 years old)
2. Preoperational (2 - 7 years old)
3. Concrete Operational (7 - 11 years old)
4. Formal Operational (adolescence - adulthood)
Key Elements of Piaget’s Theory

- *Action = Knowledge*
  - Four universal stages in fixed order
  - Development = physical maturation *and* exposure to relevant experiences
  - Schemes adapt and change
    - Assimilation
    - Accommodation

What principles underlie this cognitive growth?

- Assimilation
  - **Assimilation** occurs when the perception of a new event or object occurs to the learner in an existing schema and is usually used in the context of self motivation.
What principles underlie this cognitive growth?

- **Assimilation**
  - *Assimilation* occurs when the perception of a new event or object occurs to the learner in an existing schema and is usually used in the context of self motivation.

- **Accommodation**
  - *Accommodation* is when one accommodates the experiences according to the outcome of the tasks.

- **Equilibration**
  - The result of assimilation and accommodation as the learner changes his/her way of thinking in order to arrive at a correct or different answer. *This is the upper level of development (and usually marks a stage change).*
Earliest Stage of Cognitive Growth

Stage 1: Sensorimotor Period
- Invariant order of stages
- Individual differences in rate
- Transitions include characteristics of both stages

A Closer Look

- **Substage 1: Simple Reflexes**
  - First month of life
    - Various various inborn reflexes
      - At center of a baby’s physical and cognitive life
      - Determine nature of infant’s interactions with world
    - At the same time, some of reflexes begin to accommodate the infant’s experiences
A Closer Look

Substage 2: First Habits and Primary Circular Reactions
1 to 4 months of age
- Beginning of coordination of what were separate actions into single, integrated activities
- Activities that engage baby’s interests are repeated simply for sake of continuing to experience it
  - Circular reaction
  - Primary circular reaction

A Closer Look

Substage 3: Secondary Circular Reactions
4 to 8 months of age
- Child begins to act upon outside world
- Infants now seek to repeat enjoyable events in their environments that are produced through chance activities
- Secondary circular reactions
A Closer Look

Substage 4: Coordination of Secondary Circular Reactions
8 months to 12 months

- Beginning of *goal-directed behavior*
  - Several schemes are combined and coordinated to generate single act to solve problem
  - Means to attain particular ends and skill in anticipating future circumstances due in part to *object permanence*

Object Permanence

Before Object Permanence

After Object Permanence
A Closer Look

Substage 5: Tertiary Circular Reactions
12 to 18 months
- Development of schemes regarding deliberate variation of actions that bring desirable consequences
- Carrying out miniature experiments to observe consequences

A Closer Look

Substage 6: Beginnings of Thought
18 months to 2 years
- Capacity for mental representation or symbolic thought
  - Mental representation
  - Understanding causality
  - Ability to pretend
  - Deferred imitation
### Assessing Piagetian Theory

**PROS**
- Descriptions of child cognitive development was accurate in many ways
  - Piaget was pioneering figure in field of development
  - Children learn by acting on environment
  - Broad outlines of sequence of cognitive development and increasing cognitive accomplishments are generally accurate

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**CONS**
- Substantial disagreement over validity of the theory and many of its specific predictions
  - Stage conception questioned
  - Connection between motor development and cognitive development exaggerated
  - Object permanence can occur earlier under certain conditions
  - Onset of age of imitation questioned
  - Cultural variations not considered

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### INFORMATION-PROCESSING APPROACHES TO COGNITIVE DEVELOPMENT
What is information-processing?

- Identifies the way that individuals take in, store, and use information
- **Involves** quantitative changes in ability to organize and manipulate information
- **Increases** sophistication, speed, and capacity in information processing characterizes cognitive growth
- **Focuses** on types of “mental programs” used when seeking to solve problems

What are the foundations of the IP approach?

*Encoding—storage—retrieval*

```
Encoding (initial recording of information) → Storage (information saved for future use) → Retrieval (recovery of stored information)
```
How does cognition compute?

- Encoding
- Storage
- Retrieval

How long do memories last?

- Researchers disagree on the age from which memories can be retrieved
  - Early studies → infantile amnesia
  - Myers → clear evidence of early memory

- Physical trace of a memory in brain appears to be relatively permanent
  - Memories may not be easily, or accurately, retrieved
What role does language play in determining the way early memories are recalled?

So…do infants remember?

- Theoretical possibility for interfered memories to remain intact from a very young age

- In most cases memories of personal experiences in infancy do not last into adulthood

- Memories of personal experience seem not to become accurate before age 18 to 24 months
Individual Differences in Intelligence

Information-Processing Approaches
- Infant information-processing speed may correlate most strongly with later intelligence

What is infant intelligence?

<table>
<thead>
<tr>
<th>Age</th>
<th>Mental Scale</th>
<th>Motor Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 months</td>
<td>Turns head to sound</td>
<td>Heels head erect/steady for 15 seconds</td>
</tr>
<tr>
<td></td>
<td>Reacts to disappearance of face</td>
<td>Sits with support</td>
</tr>
<tr>
<td>6 months</td>
<td>Lifts cup by handle</td>
<td>Sits alone for 30 seconds</td>
</tr>
<tr>
<td></td>
<td>Looks at pictures in back</td>
<td>Grasps foot with hands</td>
</tr>
<tr>
<td>12 months</td>
<td>Builds tower of 2 cubes</td>
<td>Walks with help</td>
</tr>
<tr>
<td></td>
<td>Turns pages of book</td>
<td>Grasps pencil in middle</td>
</tr>
<tr>
<td>17–19 months</td>
<td>Initiates crayon stroke</td>
<td>Stands alone on right foot</td>
</tr>
<tr>
<td></td>
<td>Identifies objects in play</td>
<td>Walks up stairs with help</td>
</tr>
<tr>
<td>23–25 months</td>
<td>Matches pictures</td>
<td>Loses 3 beads</td>
</tr>
<tr>
<td></td>
<td>Initiates a 2-word sentence</td>
<td>Jumps distance of 4 inches</td>
</tr>
<tr>
<td>38–42 months</td>
<td>Names 4 colors</td>
<td>Copies circle</td>
</tr>
<tr>
<td></td>
<td>Uses past tense</td>
<td>Hops twice on 1 foot</td>
</tr>
<tr>
<td></td>
<td>Identifies gender</td>
<td>Walks down stairs, alternating feet.</td>
</tr>
</tbody>
</table>

Are developmental scales useful?

YES
- Provide a good snapshot of current developmental level
- Provide objective assessment of behavior relative to norms

NO
- Do not provide good prediction for future development