Theories of Cognitive Development

How Children Develop (4th)
Chapter 4

What is a theory?

- A logically self-consistent for describing a related set of natural or social phenomena.
- It originates from and is supported by experimental evidence.
- It must be.
- Theories deal with much broader sets of universals than do hypotheses.

Why developmental theories?

1. Provide a framework for understanding important phenomena
2. Raise crucial questions about human nature
3. Motivate new research studies that lead to a better understanding of children

Why not just one theory?

- Child development is a complex and varied process: no single theory accounts for all of it.
- Theories of cognitive and social development, focus on different capabilities.
What is cognition?

Cognition refers to all activity, processes, and products of the mind.

1. Memory
2. Categorization
3. Problem solving
4. Creativity, dreaming
5. Language

Important issues in cognitive development:
1. Stage-like versus continuous development
2. Nature and nurture
3. Domain general versus domain specific

Questions Addressed by Theories of Cognitive Development

<table>
<thead>
<tr>
<th>Theory</th>
<th>Main Question Addressed</th>
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<tbody>
<tr>
<td>Piagetian</td>
<td>Nature-nurture, continuity/discontinuity, the active child</td>
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<tr>
<td>Information-processing</td>
<td>Nature-nurture, how change occurs</td>
</tr>
<tr>
<td>Core-knowledge</td>
<td>Nature-nurture, continuity/discontinuity</td>
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<tr>
<td>Sociocultural</td>
<td>Nature-nurture, influence of the sociocultural context, how change occurs</td>
</tr>
<tr>
<td>Dynamic-systems</td>
<td>Nature-nurture, the active child, how change occurs</td>
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Piaget's Theory of Cognitive Development

- **History**
  - Before appearance in 1920s, no recognizable field of cognitive development

- **Reasons for longevity**
  - Descriptions of children’s thinking at different ages
  - Exceptional breadth
  - Plausible depiction nature and nurture in cognitive development

A Constructivist Approach

- Jean Piaget’s theory remains the standard against which all other theories are judged
  - Often labeled constructivist because it depicts children as constructing knowledge for themselves

- Children are seen as
  - Active
  - Learning many important lessons on their own
  - Intrinsically motivated to learn
  - Generating hypotheses, performing experiments, drawing conclusions
Primary Research Methods

- Naturalistic Observation / Clinical Interview
  - Piaget's observed own children during infancy
  - Older children in real situations (e.g., playing games outside)

<table>
<thead>
<tr>
<th>Pros?</th>
<th>Cons?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ecological</td>
<td>Possible bias re: own</td>
</tr>
<tr>
<td>No ethics board</td>
<td>No ethics board</td>
</tr>
<tr>
<td>Anytime, anywhere</td>
<td>Being watched changes behavior</td>
</tr>
</tbody>
</table>

Sources of Continuity

- Three processes work together from birth to propel development forward
  - **Assimilation**: The process by which people translate incoming information into a form they can understand
  - **Accommodation**: The process by which people adapt current knowledge structures in response to new experiences
  - **Equilibration**: The process by which people balance assimilation and accommodation to create stable understanding

Discontinuities

- The discontinuous aspects of Piaget’s theory are distinct, hierarchical stages
- Central properties of Piaget’s stage theory:
  - Qualitative change
  - Broad applicability across topics and contexts
  - Brief transitions
  - Invariant sequence
- Hypothesized that children progress through four stages of cognitive development, each building on the previous one

Stages

- **Sensorimotor** (Birth–2 years)
  - Understands world through senses and actions
- **Preoperational** (2–7 years)
  - Understands world through language and mental images
- **Concrete operational** (7–12 years)
  - Understands world through logical thinking and categories
- **Formal operational** (12 years onward)
  - Understands world through hypothetical thinking and scientific reasoning
Substage 4 (8–12 months)

- Begin searching for hidden objects
- Fragile mental representations
- A-Not-B Error
• Substage 4 (8–12 months)
  • Begin searching for hidden objects
  • Fragile mental representations
  • A-Not-B Error

• Substage 5 (12–18 months)
  • Active exploration of potential use of objects

• Substage 6 (18–24 months)
  • Enduring mental representations
  • Make-believe play: pretend to eat, sleep, drive car.
  • Deferred Imitation

The Eyes Have It!
This toddler’s techniques for applying eye makeup may not exactly mirror those he has seen his mother use, but they are close enough to provide a compelling illustration of deferred imitation, a skill that children gain during their second year.
Stages

Sensorimotor
Birth–2 years
Understands world through senses and actions

Preoperational
2–7 years
Understands world through language and mental images

Concrete operational
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Development in:
- Symbolic Representation

Weaknesses in:
- Egocentrism
  - The 3 Mountain Task
  - Taking other people’s perspectives
- Centration

Procedures used to test conservation of liquid quantity, solid quantity, and number

Egocentric Conversations

My dad is a policeman...

I have a real big dog...

He caught a robber once...

He licks my face all the time...
Piaget's Three-Mountain Task

When asked to predict which side of a balance scale, like the one shown, would go down if the arm were allowed to move, 5- and 6-year-olds almost always center their attention on the amount of weight and ignore the distances of the weights from the fulcrum.

Thus, they would predict that the left side would go down, although it is the right side that would actually drop.

Piaget's Theory

The Balance Scale: An Example of Centration

Stages

- Sensorimotor
  - Birth–2 years
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- Preoperational
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- Concrete operational
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- Formal operational
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Concrete operational stage (7-11 years)

Children begin to reason logically about concrete objects and events in their world.

Children cannot think in purely abstract terms or generate systematic scientific hypothesis-testing experiments.

But: able to solve conservation tasks

- Piaget terms horizontal decalage for sequential mastery of concepts across content areas within a single stage.
- Predicted child conserves number before length, liquid: Why?

Limits of Concrete Operational Thought

- Logical thought for concrete information that is perceived

Work poorly when applied to

Succeed (physical): If stick A is longer than stick B and stick B is longer than stick C, then is stick A is longer than stick C?

Fail (hypothetical): Trains leave Pittsburgh and New York at the same time and every hour the distance between them halves. When will they meet?

Inhelder and Piaget’s Pendulum Problem

- The task is to compare the motions of longer and shorter strings, with lighter and heavier weights attached, to determine the influence of weight, string length, and dropping point on the time it takes for the pendulum to swing back and forth.
- Children below age 12 usually perform unsystematic experiments and draw incorrect conclusions.

Formal Operational Stage (12 and onward)

- According to Piaget, this stage is not universal

- Characteristics:
  - Hypothetical Thinking
    - Truth, justice, morality
  - Systematic Reasoning of all possible outcomes
    - Scientific Method
      Hypothetic-deductive reasoning: develop a general theory, produce hypotheses, test hypotheses.
Piaget's Theory: Formative Operational Stage

Teenagers' emerging ability to understand that their reality is only one of many possible realities may cause teens to develop a taste for science fiction.

### Piaget's Stages of Cognitive Development

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<tr>
<th>Stage</th>
<th>Approximate Age</th>
<th>New Ways of Knowing</th>
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<tr>
<td>Sensorimotor</td>
<td>Birth to 2 years</td>
<td>Infants know the world through their senses and through their actions. For example, they learn what dogs look like and what petting them feels like. Toddlers and young children acquire the ability to internally represent the world through language and mental imagery. They also begin to be able to see the world from other people's perspectives, not just from their own.</td>
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<td>Preoperational</td>
<td>3–7 years</td>
<td>Toddlers and young children acquire the ability to internally represent the world through language and mental imagery. They also begin to be able to see the world from other people's perspectives, not just from their own.</td>
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<td>Concrete operational</td>
<td>7–12 years</td>
<td>Children become able to think logically, not just intuitively. They can classify objects into coherent categories and understand that events are often influenced by multiple factors, not just one. Adolescents can think systematically and reason about what might be as well as what is. This allows them to understand politics, ethics, and science fiction, as well as to engage in scientific reasoning.</td>
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### Piaget's Theory and Legacy

- Although Piaget's theory remains highly influential, some weaknesses are now apparent.

  - The stage model depicts children's thinking as being more consistent than it is.
  - Infants and young children are more cognitively competent than Piaget recognized.
  - Piaget's theory understates the contribution of the social world to cognitive development.
  - Piaget's theory is vague about the cognitive processes that give rise to children's thinking and about the mechanisms that produce cognitive growth.

### Piaget and Education

- Emphasis on Discovery Learning:
  - Children encouraged to discover information themselves.

- Teachers provide activities to promote exploration and discovery.

### Sensitivity to Readiness to Learn:

- Learning must be based on level of child's thinking.

- New skills not imposed until child is ready and interested

- Individual differences