

Theories of development

IIE 366: Developmental
Psychology
Greg Francis
Lecture 14

Chapter 6: Theories of Cognitive Development



Module 6.1 Setting the Stage: Piaget's
Theory

Module 6.2 Modern Theories of Cognitive
Development

Module 6.3 Understanding in Core Domains

Children and Their Development, 4/e by Robert Kail

6.1 Setting the Stage: Piaget's Theory

Basic Principles of Piaget's Theory
Stages of Cognitive Development
Piaget's Contributions to Child
Development

6.1 Basic Principles of Piaget's Theory

- Metaphor of child as scientist
- Children are naturally curious and create theories about how the world works
- In *assimilation*, new experiences are readily incorporated into existing theories
- In *accommodation*, existing theories are modified based on experience

6.1 Basic Principles of Piaget's Theory

- Assimilation and accommodation are usually in balance, or equilibrium
- When balance is upset, children reorganize their theories to restore equilibrium, a process Piaget called *equilibration*
- Process results in qualitatively different and more advanced theories

6.1 Basic Principles of Piaget's Theory

- Children periodically reach a point where their theories are wrong most of the time and so they must reorganize thinking about the social and physical worlds
- Three reorganizations of theories lead to four stages of cognitive development
- Piaget believed all children pass through stages in same order

6.1 Stages of Cognitive Development

- The *sensorimotor stage* spans from birth to approximately 2 years of age
- Begins with reflexive responding and ends with using symbols
- *Object permanence*: understanding that objects exist independently
- *Goal-directed efforts*: trial and error (intentional behavior)

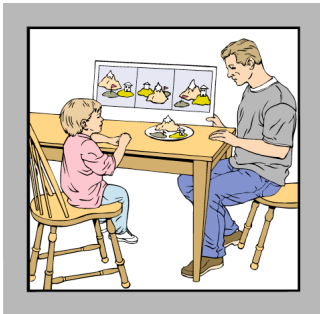


6.1 Stages of Cognitive Development

- *Preoperational stage* spans ages 2 to 7 years
- Children use symbols but there are many errors in thinking
 - > Egocentrism: can only interpret the world from their own perspective (three mountains problem)
 - > Centration: concentrate on only one aspect of situation (conservation problems)
 - > confuse appearance and reality

Three Mountains Problem

Children can describe the scene from their own point of view
But not from the point of view of someone else



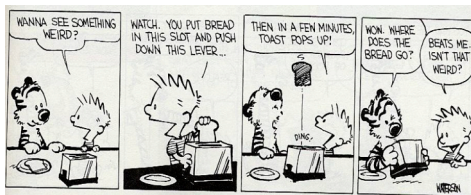
6.1: Stages of Cognitive Development

Conservation Tasks

| Type of Conservation | Starting Configuration | Transformation | Final Configuration |
|----------------------|---|---|--|
| Liquid quantity | Is there the same amount of water in each glass? | Pour water from one glass into a shorter, wider glass. | Now is there the same amount of water in each glass, or does one have more? |
| Number | Are there the same number of pennies in each row? | Stretch out the top row of pennies, push together the bottom row. | Now are there the same number of pennies in each row, or does one row have more? |
| Length | Are these sticks the same length? | Move one stick to the left and the other to the right. | Now are the sticks the same length, or is one longer? |
| Mass | Does each ball have the same amount of clay? | Roll one ball so that it looks like a sausage. | Now does each piece have the same amount of clay, or does one have more? |
| Area | Does each cow have the same amount of grass to eat? | Spread out the squares in one field. | Now does each cow have the same amount to eat, or does one cow have more? |

6.1: Stages of Cognitive Development

Conservation Tasks



6.1: Stages of Cognitive Development

6.1 Stages of Cognitive Development

- *Concrete operational stage* spans ages 7 to 11 years
- Thinking based on *mental operations* (strategies and rules that make thinking more systematic and powerful)
- Operations can be reversed
- Focus on the real and concrete, not the abstract
- Does not always think through the possibilities



6.1 Stages of Cognitive Development

- *Formal operational stage* spans from roughly age 11 to adulthood
- Adolescents can think hypothetically
- Use deductive reasoning to draw appropriate conclusions from facts

| | | | | | | |
|---|---|---|---|---|---|---|
| | 1 | | 6 | 7 | | 4 |
| | 4 | 2 | | | | |
| 8 | 7 | 3 | | 6 | | |
| | 8 | | 7 | | 2 | |
| | | 8 | 9 | 3 | | |
| 3 | | | 6 | | 1 | |
| | 8 | | | 6 | 4 | 5 |
| | | | | | 1 | 7 |
| 4 | | 9 | 8 | | 6 | |

6.1 Piaget's Contributions to Child Development

- Piaget's contributions:
 - > the study of cognitive development itself
 - > a new, constructivist view of children
 - > fascinating, often counterintuitive, discoveries

6.1 Piaget's Contributions to Child Development

- Weaknesses of theory:
 - > underestimates cognitive competence in infants; overestimates in adolescence
 - > components too vague to test
 - > Accommodation, assimilation, equilibration
 - > stage model doesn't account for variability
 - > undervalues influence of sociocultural forces

6.2 Modern Theories of Cognitive Development

The Sociocultural Perspective:
Vygotsky's Theory
Information Processing
Core-Knowledge Theories

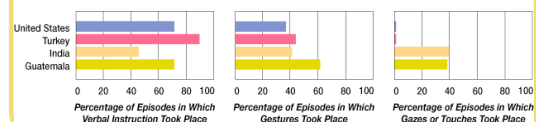
6.2 The Sociocultural Perspective: Vygotsky's Theory

- Cognitive development is inseparable from social and cultural contexts
- *Zone of proximal development*: difference between what one can do alone or with assistance
- Scaffolding: teaching style that matches assistance to learner's needs
- *Private speech*: comments intended to regulate own behavior
- *Inner speech*: thought, derives from private speech



Cultural Differences in Parental Scaffolding

- All cultures use scaffolding
- But sometimes in different ways
- E.g., Parents try to get children to operate a novel toy
 - Divide task in to subtasks
 - Parents do some tasks themselves

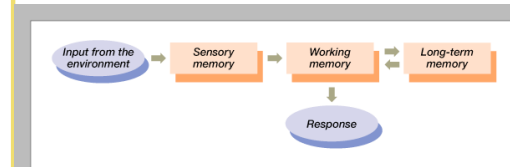


6.2: The Sociocultural Perspective

6.2 Information Processing

- People and computers are both symbol processors
- Distinction between hardware and software
- Hardware includes sensory, working, and long-term memory
- Software is task specific

Mental Hardware



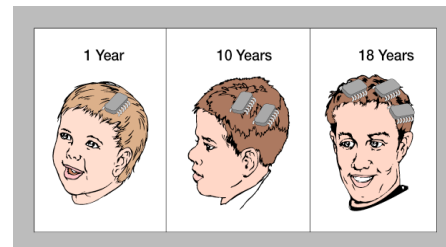
6.2: Information Processing

6.2 How Information Processing Changes with Development

- More efficient strategies
 - How to find a missing toy?
- Increased working memory capacity
- More effective inhibitory and executive processes
- Increased automatic processing
- Increased speed of processing



Increased Working Memory



6.2: How Information Processing Changes with Development

6.2 Core-Knowledge Theories

- Much knowledge is general
- Also distinctive domains of knowledge, some of which are acquired early in life
- Some forms of knowledge so important for survival that learning of these is simplified
- Children rapidly acquire language and knowledge of objects, people, and living things
 - Contrast with learning logic or calculus!

6.2 Core-Knowledge Theories

- Builds on Piaget's metaphor of child as scientist
- Research traces children's knowledge of
 - > naive physics (understanding objects)
 - > naive psychology (theory of mind)
 - > and naive biology (understanding unique properties of animate objects)

6.3 Understanding in Core Domains

Understanding Objects and Their Properties
 Understanding Living Things
 Understanding People

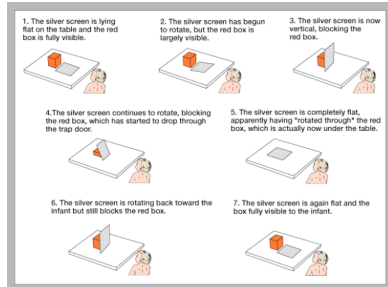
6.3 Understanding Objects and Their Properties

- Babies understand objects earlier than Piaget proposed
- Infants rapidly create reasonably accurate theory of some basic properties of objects
- Infant's theories are far from complete and physical properties can be understood at many different levels

Object Permanence and the "Impossible Event"

4.5 month babies look longer the impossible event.

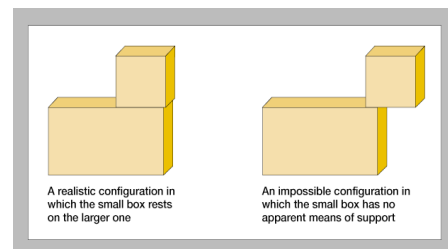
Look shorter if the screen stops at the red box.



6.3: Understanding Objects and Their Properties

"Impossible" Physics Problem

6-7 month infants look longer at the unsupported case.



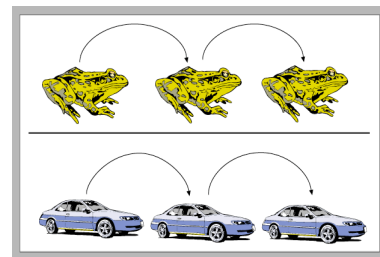
6.3: Understanding Objects and Their Properties

6.3 Understanding Living Things

- Infants and toddlers use motion to identify animate objects
- By preschool years, naïve theories of biology include understanding of movement, growth, internal parts, and inheritance
- Ideas of illness and healing also present

Movement in Animate and Inanimate Objects

Preschoolers report that only a frog actually moves itself.



6.3: Understanding Living Things

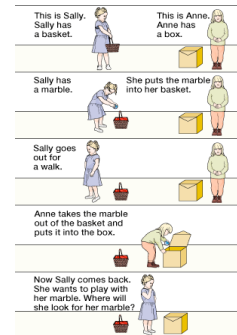
6.3 Understanding People

- Children use naïve psychology to predict how people will act
- Even 1-year-olds have understanding of intentionality
- Between ages 2 and 5, children develop a *theory of mind*
 - ♦ Relationship between mind and behavior
 - ♦ 3-year-olds understand that there are different mental states
 - » "I think", "I forget"...

Theory of Mind

4 year olds can identify Sally's mental state and predict correctly where she will look.

3.5 year olds cannot.



6.3: Understanding People

Next time

- Focus on research of Jean Piaget
- Object permanence