Development Part II

Cognitive Development
Overview

• Piaget’s stages
• Challenges to Piaget
• Executive function
• Theory of mind
Jean Piaget
August 9, 1896 –
September 16, 1980

Swiss philosopher, natural
scientist and
developmental theorist

Father of modern cognitive
developmental psychology
General approach: learning is an active process

• Infant or child is like a scientist or detective

• He or she is constantly testing hypotheses about the physical and social worlds
Several Key Concepts

- **Schemas**: action patterns or a mental representation through which an infant organizes the world.

- **Assimilation**: children’s use of existing schemas to interpret and act on the environment.

- **Accommodation**: changes in schemas to adapt to something new in the environment.
Two-year-old Gabriella has learned the schema for "cow" from her picture books.

Gabriella sees a moose and calls it a "cow." She is trying to assimilate this new animal into an existing schema. Her mother tells her, "No, it's a moose."

Gabriella accommodates her schema for large, shaggy animals and continues to modify that schema to include "mommy moose," "baby moose," and so forth.
Piaget’s Stage Theory

Formal operations (12+)

Concrete operations
Ages 7 to 12

Preoperational stage
Ages 2 to 7

Sensorimotor stage
Ages 0 to 2

- Different way of reasoning at each stage
- Discontinuous development
- Ages are approximate
- But order of stages cannot vary
Sensorimotor stage

Ages 0 to 2

Abilities: Babies learn about the world through their senses and motor activity

Limitation: Can't form mental representations

Stage ends when child achieves mental representation and object permanence

Preoperational stage

Ages 2 to 7

Concrete operations

Ages 7 to 12

Formal operations (12+)

Sensorimotor stage
Object Permanence

• The knowledge that objects continue to exist when you are not presently acting on them or sensing them.

http://www.youtube.com/watch?v=ue8y-JVhjS0&feature=related

See also: http://www.youtube.com/watch?v=pCwiYCQr3xs&feature=gv
A not B error

- Infant continues to search at the first hiding location after object is hidden in the new location.

- Infant seems to understand the “permanence” of the object only in relation to their own action

https://www.youtube.com/watch?v=4jW668F7HdA
The beginnings of mental representation

- After lots of practice manipulating objects, the infant learns:
  - to coordinate different schemas
  - that objects exist independent of any particular action on them
  - to predict the consequences of actions without actually having to perform the actions
Preoperational Stage

- **Formal operations (12+)**
- **Concrete operations**
  - Ages 7 to 12
- **Preoperational stage**
  - Ages 2 to 7
- **Sensorimotor stage**
  - Ages 0 to 2

Capacity for representational thought. **Failure to interrelate different dimensions. Only pays attention to one feature of a situation at a time. Egocentrism**
Failure to conserve quantity

Same?

Same?
Video: Lack of Conservation (2 min.)

http://www.youtube.com/watch?v=GLj0IIZFLKvg&feature=related
Egocentrism

- Young children are **egocentric** in the sense that they have difficulty understanding perspectives that are different from their own.

- Piaget developed the mountain task: child has to reason about the objects that are in view from perspective of a doll.
Video: Egocentrism (1 min.)

Children younger than 7 tend to choose the picture that matches their own perspective rather than the doll’s
Last two stages of Piaget’s theory

- **Concrete operations**: child can manipulate mental states, transform them, reverse them

- **Formal operations**: child can think systematically about abstract, hypothetical possibilities
Evaluation of Piaget’s theories

• Many of Piaget’s findings have held up

• Some of his explanations for his findings were wrong
  – Piaget underestimated children’s abilities
  – The stages are not discrete

• Recent research insights:
  – even infants have built-in understanding of the physical world and some concept of object permanence
  – importance of executive control processes
Infants do have some understanding of object permanence.
Four-month-olds were shown a rod that moved back and forth behind an occluding block. After they became habituated to this display and stopped looking at it, they were shown the displays in A and B.

In this display the rod that moved back and forth was unbroken.

This display was made of two aligned rod pieces that moved back and forth together.

The infants spent much more time looking at B than at A.
Video: responses to magical events (2 min.)

segment from Scientific American Frontiers: It's a kids' world (season 5: 3/29/1995)
https://www.youtube.com/watch?v=LdDYHm8AUn4 (starting at around 18:00)
Challenge to egocentrism

• A different perspective-taking task (Hughes)

• Task: hide the little boy so the policeman can’t find them
Video: successful perspective taking (17 secs.)

http://www.open2.net/healtheducation/family_childdevelopment/development/methods_video_perspectives3.html
Executive Control: Development of Prefrontal Cortex

- Foremost part of the frontal lobes
- Matures slowly: one of the last areas of the brain to fully develop
- Involved in executive control processes
- Overrides automatic responses (impulses)
Video: “A not B error” reinterpreted (2 min.)

Segment from Scientific American Frontiers: Make up your mind (season 13: 10/15/2002)
https://www.youtube.com/watch?v=rBzUKiTHR-I (starting at around 1:20)
Executive control contributes to demonstrating object permanence

• To avoid the “A not B error,” the infant must inhibit a practiced and previously rewarded behavior

• This process depends on the prefrontal cortex which is slow to mature
Social Cognition and Theory of Mind

- Preschoolers have the rudiments of a theory of mind: children's ability to reason about their own mental states as well as the mental states of other people.

- Limitations can be seen in children's poor performance with false belief tasks.
Video: theory of mind (7 min.)

segment from Scientific American Frontiers: It's a kids' world (season 5: 3/29/1995)
https://www.youtube.com/watch?v=LdDYHm8AU4 (starting at around 34:30)
Theory of Mind

• Previous video shows failures to
  – distinguish between one’s previous and most recent mental state
  – understand that other people can have the wrong knowledge (false belief task)
  – understand that other people can be deceived

• These complex mental abilities develop around 4-5 yrs of age