Jean Piaget (1896-1980)

- No other person has been so influential in child development.
- The 36th Annual Meeting of the Jean Piaget Society will take place in Baltimore, June 5-7, 2006.

Mr. Cognitive Development.

Why?

Three Reasons to Know Piaget

1. He was the first: the founder, the start!
2. He captured the essence of kids at different stages.
3. Gave us a new view on development. - Active Child!

What’s going on in there?

Piaget watched his kids grow up. And he used these careful observations of his children to form some ideas about what's going on in a child's mind.
Stupid Kid Tricks

- Infants: Out of sight, out of mind.
- Toddlers are Egocentric! (mountain task)
- Toddlers don’t conserve (centration)
- Children are terrible at hypotheticals.

**Why is this? What is going on?**

Child Scientist

- Metaphor of child as scientist.
- Scientists have theories about how the world works.
- Maybe kids do too! And just like scientists, sometimes they are wrong!
- All about the evidence: we construct knowledge through action and observation (constructivist).

Piaget’s Daughter

“Jacqueline had a visit from a little boy who, in the course of the afternoon got into a terrible temper. He screamed and pushed at his playpen, stamping his feet. Jacqueline stood watching in amazement, never having witnessed such a scene. The next day, she herself screamed in her playpen and stamped her foot.” (Piaget, 1951, p.63)

Schemes (or theories, categories, ideas, or plans)

- Schemes - “organize experience and knowledge.”
  - Theories about why things are the way they are.
    - Why does mommy feed me?
    - Why do we have to learn this stuff?
  - Categories of things that go together
    - Things I can suck, used to play baseball, despise…

Schemes change

- Infant schemes based on actions.
  - Eat, suck, grasp, step on without falling.
- Toddler schemes based on functions.
  - Tools, pets, friends.
- Older children’s schemes are based on concepts.
  - Addition, subtraction, Peace, love, war.
- How does this change occur?

Schemes change through Adaptation

- In *assimilation*, new experiences are incorporated into existing schemes.
  - Mommy preparing a bottle…
- In *accommodation*, existing schemes must be modified to incorporate new information.
  - Mommy drinks bottle herself. Huh?
Equilibration

• Usually things are in balance.
• Periodically, all schemes prove to be inadequate. Nothing makes sense (*disequilibrium - like Neo in Matrix*).
• Equilibration is the drive to a new state of balance.

“Hey kid! I’ll trade you five whole pennies for that boring dollar bill!”
“Hey kid! Which one do you want?”

Why is everybody laughing at me?

• I don’t get it!
  Stop it?
• All right! That’s it! I’m going to change!

Stages of Cognitive Development

4

7.2 Piaget’s Four Stages of Cognitive Development

• The Sensorimotor Stage
• The Preoperational Stage
• The Concrete Operational Stage
• The Formal Operational Stage

The Sensorimotor Stage

• From birth to approximately 2 years.
• Concerned, as the name suggests, mostly with the senses and motor development.
• If you’ve ever seen a baby: you know this one.
Stage 1 Terms

- Primary circular reactions (4 mo)
- All about me! (e.g., thumb sucking).
- Secondary circular reactions (8 mo)
  - Objects can be fun too!
- Tertiary circular reactions (12 mo)
  - Actions among objects.

Stage 1 Terms

- Means-end: move it! I want that! (lasts till 12 months).
- Experimentation: Look out infant scientist on the loose! (up till 18 mo)
  - Drop it! Does it break?
  - Pull it! Does it cry?

The Preoperational Stage

- Can use **Symbols** to solve problems!
- Lasts from approximately 2 to 7 years of age.
- Children can use language but are many weaknesses in their thinking
  > Egocentrism

Egocentric!

Piaget's three-mountain problem. Young preoperational children are egocentric. They cannot easily assume another person's perspective and often say that another child viewing the mountain from a different vantage point sees exactly what they see from their own location.

Centration

Causes children to fail **conservation**
Reversibility

Can I get it back together?

Helps solve Conservation Problem

Concrete Operational Stage

- From 7 to 11 years: Here and now.
- Thinking based on mental operations (logical, mathematical, spatial operations)
- Operations can be reversed. (solves conservation)
- Limit: focus on the real, not the abstract.

Concrete Limitations

- Art teacher: Draw me a picture of someone with 3 eyes.
- 9-year-old: How? Nobody has three eyes.

Formal Operational Stage

- Begins at about 11.
- Children now able to think hypothetically and abstractly.
- Can envision multiple realities.
  - “What would happen if?”
- Systematic in solving problems, use deductive reasoning.

Do you buy this?

- Break into Small Groups
- Names on paper
- Do you think Piaget is right?
- Why or why not?
- What examples have you seen?
- Do you have any questions about Piaget's Theory?

Research supports view of active child, but...
**Weaknesses of Piaget’s Theory**
- Infants are more competent than Piaget thought.
- More sensitive tasks indicate infants can do some of these things.
- Older kids often revert
- Mechanisms are vague
  - Assimilation and accommodation?

**Assimilation & Accommodation**

**More weaknesses**
- Not really stagelike.
  - Much variability across tasks
    - Kids are not consistent performers
  - training Piagetian concepts
    - Can learn conservation.
- Undervalues sociocultural environment
  - If ask once in conservation, they do it.
- Peers, teachers, parents all have effects.

**Modern Theories of Child Development**

**Vygotsky (1896-1934)**
- Indirect effects of culture on behavior.
- Because the ultimate goal is for children to be: “productive members of society”
- We have to consider how society can impact children’s development.

**Vygotsky’s Theory of Cognitive Development**
- Zone of proximal development - what you can do with help.
- Scaffolding - the help
- Private speech - the help you give yourself.
What’s a metaphor?

- Cows, silly! That’s where they eat grass.
- Psychologist like to use metaphors to help us understand things.
- Piaget thought of the child as a tiny scientist.
- Information-Processing accounts believe children are like computers.

A metaphor

- Information processing says we are LIKE PC’s in that both process information,
- BUT the programs we run and our hardware is very different.
- The challenge of cognitive psychology is to discover OUR programs and hardware.

Basic Features of the Information-Processing Approach

- People and computers are both symbol processors with hardware and software.
- Hardware includes sensory, working, and long-term memory.
- Software is task-specific (and let’s face it the implementation is for one kind of hardware).

Basic Features (cont)

- Not stages! Our operating system works continuously and develops gradually, piece-by-piece. There are no abrupt changes in thought. Even though behavior might be.
- Piaget talked of insight, but information processing people talk of continual, gradual change and learning.

Hardware looks like this

![Diagram showing the flow of information from the environment through sensory, working, and long-term memory, leading to a response.](image-url)
Information processing models have become more complicated as our understanding of the neurology involved grows.

But the idea of kids as information processors stays the same.

Information Flow
- **Sensory store** holds raw sensory input.
- **Short-term store** processes and holds information for several seconds.
  - Primary memory and working memory are other names for short-term store.
- **Long-term store** (vast and relatively permanent storehouse of information)
- Executive control processes (metacognition) are involved in planning and monitoring what is attended to and what is done with the input.

5 Developmental Changes

5 Changes in Processing

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<thead>
<tr>
<th>+Strategies &amp; +Experience</th>
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<tbody>
<tr>
<td>+Capacity</td>
</tr>
<tr>
<td>+Inhibition &amp; +Executive Control</td>
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<tr>
<td>+Automatic Processing</td>
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<tr>
<td>+Speed of Processing</td>
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Short term gets more experienced with age

The development of strategies (deliberately implemented, goal-directed operations used to aid task performance)

Think of a network of lots of facts.

**Early**: fewer facts and fewer connections.

**Later**: lots of facts lots of connections.
Short term memory gets larger with age

- Development of the short-term store
- Span of apprehension (number of items that people can keep in mind at any one time)
- First graders: 2.5 digits
- Fourth graders: 3 digits
- Adults: 3.5 digits

How much can children hold?

+Inhibition & Executive Control

- Can inhibit distractions.
- Better at planning and flexibly implementing problem solving (Executive Control).
- All linked to development of the Frontal Lobe.
- What children know about thinking, meta-cognitive awareness, develops gradually during childhood.

+Automatic Processing

- Older children execute more processes automatically.
- Implicit memory - don’t have to think about it.
- E.g. don’t have to worry about reading the words, just thinks about their meaning.

+Processing Speed

- Changes in processing speed
- 4 year olds are 1/3 as fast as us.
- 8 year olds are 1/2 as fast.
- Biological maturation is primarily responsible for age-related differences.
- Increased myelination in the associative areas of brain
- Although past experiences can influence processing speed within particular domain.

Core-Knowledge Approaches to Cognitive Development

- Each child develops distinct domain-specific conceptual structures reflecting experience: Physics, Biology, Psychology, etc.
- There are core modules -- specialized parts of the brain that help us process specific types of information.
Physics 101! For infants!

- Objects can’t go through walls! (Spelke)
- One object hitting another will make it go! (Kotovsky)
- Objects can’t float in mid air! (Baillargeon)

Physics Phacts!

Support

- Animals can grow! (Rosengren)
- Animals have blood in ’em!
- Animals have parents!
- Animals can be healed!
- Animals move on their own! (Gottfried)

Biology 101

Hop, Hop, Hop?

Psychology 101: Mind reading for infants!

- Theory of mind (2-5yrs).
- 2yrs – desire.
- 3yrs – mental worlds.
- 4yrs – False Belief tasks.