A brief history of cognitive development

- What’s the point?
- Source of teachers’ ideas about children, learning
- Historical views of childhood: Why learn this?
- Research on child dev & education is shaped by historical, cultural beliefs about children.
- Prior to scientific study of human development…
- Views of childhood governed by religion; economics
- Two views of childhood (medieval-17th C.)
Two Concepts of Childhood

**Medieval/Populist**

- Stage of immaturity ends soon after infancy
- Children were viewed with amusement and “coddled”
- Working-class children provided essential labor; were treated as adults
- Schooling: optional or an annoyance; obtained at any age.

**17th C./Moralist**

- Religious pedagogues: no coddling!
- Children ignorant and crude; “affront to reason”
- Also sweet; in state of grace
- 1st Western view of child-hood as distinct stage
- Education to “tend and water” fragile minds; nurture “thinking Christians”
Childhood as a distinct stage of development? Three traditions

- Empiricism (J. Locke, 1632-1704)
- Nativism (J.J. Rousseau, 1712-1778)
- Constructivism:
  - Logical: *Piaget*
  - Social: *Vygotsky*
Locke’s Empiricism

• Children are *tabula rasa* or “blank slates”
  • Fit with liberal, democratic thinking of Enlightenment
  • Possible to educate all people to become equals

• Learning by children:
  • Shaped by repetition; punishment and reward
  • Principles of education: Use reward (praise) and punishment (disapproval); model good behavior
  • Through *association* and imitation
Basic learning processes

**Classical Conditioning**

1. UCS $\rightarrow$ UCR  
   [food ] $\rightarrow$ [salivate] 

2. CS $\rightarrow$ UCS  
   Neutral stimulus (ex: bell )  
   w/ noise  
   *(repetition & pairing)* 

3. CS $\rightarrow$ CR  
   [bell ] $\rightarrow$ [salivate]  

**Operant Conditioning**

- Reinforcement increases chance of repeating behavior  
- Punishment decreases likelihood of repeating behavior
Nativism through history

Plato, Kant, Rousseau

Ethologists (e.g., Lorenz)

Gesell: preformationism

Dominance of behaviorism

Chomsky

New Nativism*

Sociobiology; Behavioral Genetics
• How would we put this stuff to the test?
• What would be evidence in favor of empiricism or nativism?
Status of Empiricism and Nativism (Child Development)

• Not either/or:
  • Genes, biological processes, and experience in the environment interact in every aspect of development

• Range of reaction:

(eye color) (IQ)
Constructivist ideas of cognitive development: Piaget & Vygotsky

- Child is an active participant in their learning

- Piaget: child has drive to explore and differentiate
  - Goals, interests
  - Information isn’t just “out there”
  - Child actively integrates new knowledge with previous knowledge
Constructivist ideas of cognitive development

- Piaget’s constructivism
  - Main question: How does intelligence grow?
  - Definition of intelligence: adaptation to reality
    - Assimilation and Accommodation
  - Infant has: reflexes; drive to explore

- Vygotsky’s socio-cultural theory
  - Culture gives tools to “mediate” action in environment
  - Internalization of cultural learning
    - with scaffolding by social agents
Piaget’s Stages of Development

- Sensorimotor (infancy)
- Preoperational (preschool)
- Concrete operational (middle childhood)
- Formal operational (adolescence)
Preoperational thought a la Piaget

- Use of “mental substitutes”
  - Language, pretense, imitation, “language play”
- Centration
  - Conservation errors; egocentrism

Unable to reason or think hypothetically
Perceptually bound: can’t use abstract relations

Many educators still accept this description*
A few of the many problems with Piaget’s stages of thinking

- Problems w/ Piaget’s view
  - Adults are illogical (often!)
    - Keil: What is the “illusion of explanatory understanding?”
  - Kids can learn scientific reasoning skills (wk. 9)
  - Perceptually bound??
- Hypothetical thought:
  - What is Harris’ argument? Age or education?
  - “What would it be like to be a cat?”
Some ways we are illogical

• Representativeness heuristic:
  • on NPR (for example): “Well, I use a deer whistle, and I’ve never hit a deer, so they work! Them scientists don’t know nuthin’!”

• Which is more likely?
  • Large bridge will collapse in CA w/in 5 yrs.
  • CA will be hit by big earthquake, which will cause a large bridge to collapse, w/in 5 yrs.
Are preschoolers perceptually bound?

Can they use an abstract rule to match objects by shape or function?
Results: 4-year-olds can adopt, use abstract rule
“…like to be a cat?”

- 9-yr-old: “With a human brain? It would be cool, because I wouldn’t have to try disgusting new foods. I wouldn’t have to go to school… but [on the other hand] I couldn’t play GameBoy!”

- 5-year-old: “That would be silly. I’d be ‘meow meow’… I want to do a cow instead! … and [I’d have] 15 whiskers…. and hide in the garage, because cats get scared…. and run and hide. … I would… sleep in a box.”

[Zaporozhets & Elonkin: “…the [preschool] child expresses judgments… as isolated instances in the general flow of practical and playful activity… [but] do not form any particular plan of thinking” (1971:232)]

Piaget in the final evaluation?
Information Processing and “Neuroconstructivism”

• What is this??

• **IP**: distinct cognitive functions (e.g., attention, working memory, retrieval, inhibition of action) can be understood...
  • ...by detailing limits and relations
  • ...predict errors/inefficiencies in learning and thinking.

• **Neuroconstr**: Describe neural pathways, structures, and modulatory processes that underlie cognitive functions
  • e.g., effects of [drugs; sleep; motivation] on learning, remembering, attention, etc.
Example: Attention & control of behavior

• Bracken Jones et al: What is the question?
• example of the behavior…
• What did they find? Should teachers care?
• What’s missing from their account?
• Relevant brain structures:
Executive attention in action
Summary so far...

• Empiricism & nativism: long history & continued influence, but not useful by themselves

• Constructivist models avoid some problems
  • Piaget’s theory, still big in education, has big problems
  • Vygotsky’s model: too vague to explain or predict how education & development interact
  • Information Processing approaches are more useful, but:
    • often based on adult data/models, not child development;
    • tend to oversimplify functional interactions;
    • tend to put cognition “in the head,” don’t consider the structure of a dynamic environment