

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 → UCR

[food] [salivate]

2. CS → UCS

Neutral stimulus (ex: bell)
w/ noise

(repetition & pairing)

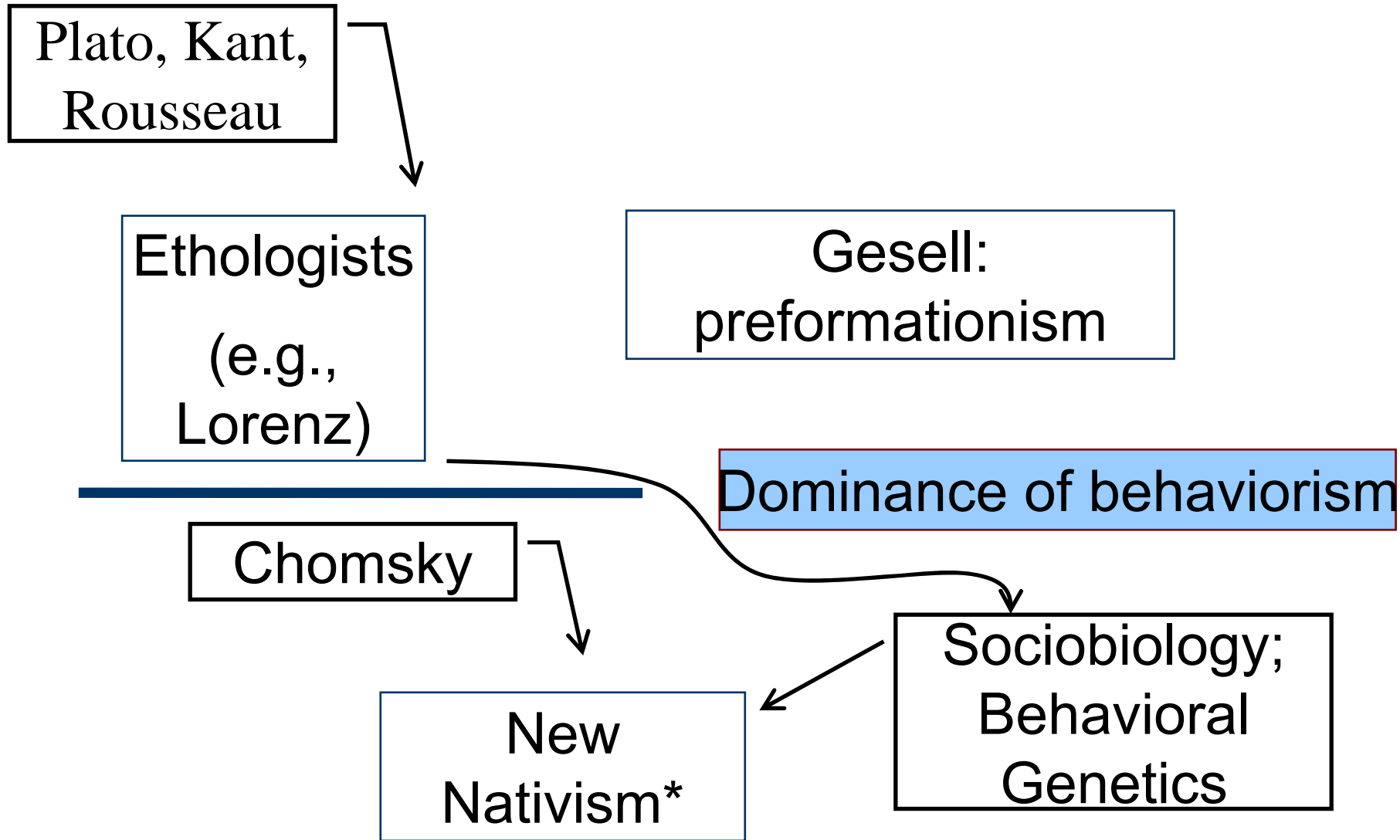
3. CS → CR

[bell] → [salivate]

Operant Conditioning

- Reinforcement increases chance of repeating behavior
- Punishment decreases likelihood of repeating behavior

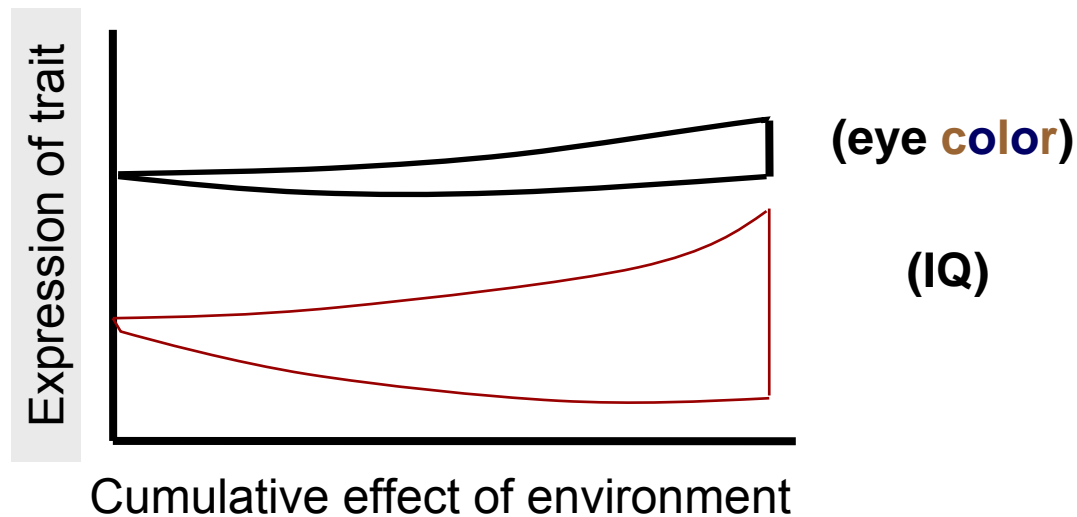
Nativism through history



- 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:



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.



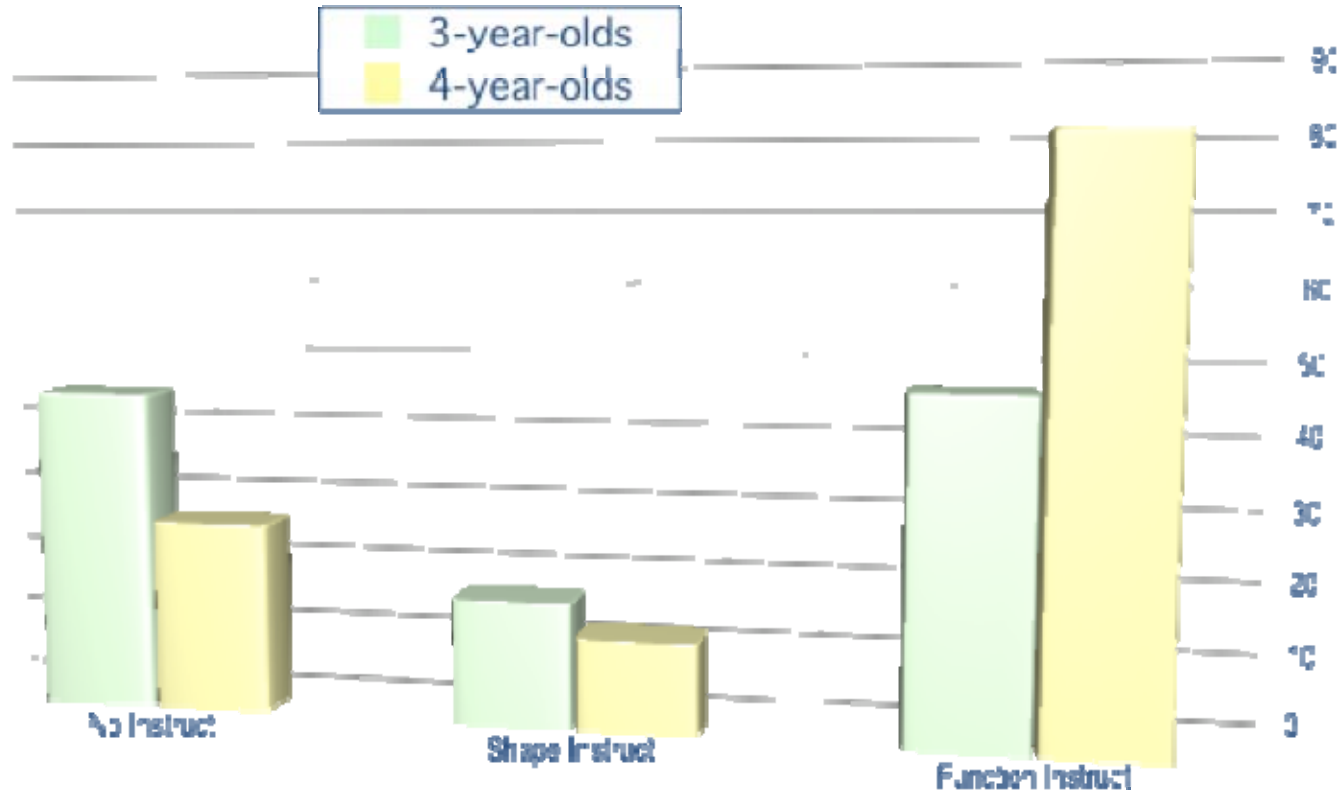
Are preschoolers perceptually bound?

Can they use an abstract rule to match objects by shape or function?



Results: 4-year-olds can adopt, use abstract rule

Percentage of Function-Based Responses



“...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:

QuickTime™ and a
TIFF (Uncompressed) decompressor
are needed to see this picture.

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Executive attention in action

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are needed to see this picture.

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