

Mature Behaviorism: Laws of the Observable



Figure out what behaviors they find rewarding, and then reward them with those behaviors

Foundations in Philosophy of Science: Logical Positivism

Concerned about the epistemological status of new scientific (and possibly pseudo-scientific) developments in the early 20th century, several scientists and philosophers sought to explicate the foundations of science

In sensory experience (positive knowledge)

And in logic

Logic provided the way to build from sensory experience to scientific theories

Hypothetical-Deductive Method: Theories are hypotheses tested by the statements derived from them

Variants on a Theme

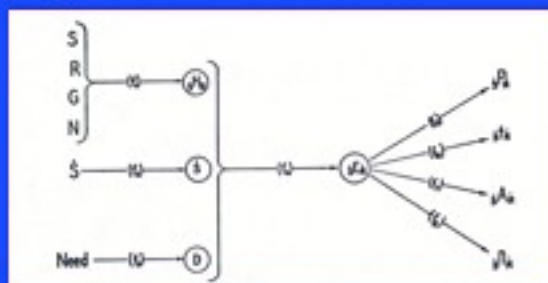
- Inspired by Pavlov, Watson, and others, the fundamental theme of behaviorists in psychology was that psychology should seek laws or principles that explained behavior
- Challenged to explain the full range of behaviors exhibited by humans and other animals, individual psychologists over the first half of the 20th century pursued different variants on that theme
- Intervening (in the head) variable theories
 - Clark Hull--learning theory
 - Edward Tolman--purposes and maps
- Theories that focused on reinforcement of behavior
 - Edward Thorndike--law of effect
 - B. F. Skinner--operant conditioning

Clark Hull's Laws of Learning

Quest for a mathematical account of learning

Looking for laws by employing the hypothetical-deductive method

Intervening (in the head) variables fine as long as well-defined.



Clark Hull's Learning Theory



Broad early interests: effects of tobacco, hypnosis, intelligent machines

"It has struck me many times of late that the human organism is one of the most extraordinary machines – and yet a machine. And it has struck me more than once that so far as thinking processes go, a machine could be built which would do every essential thing that the body does (except grow) as far as concerns thinking, etc." (Idea Book, 1926)

Clicker Question

What type of theory did Tolman defend for explaining rat's learning to run mazes

- A. Learning involves strengthening more frequent connections between stimuli and responses
- B. Learning involves strengthening more successful connections between stimuli and responses
- C. Learning involves construction of mental maps that can be used to guide behavior
- D. Learning involves developing a sequence of S-R connections that together constitute a route

Clicker Question

Latent learning refers to

- A. Learning that only occurs when behavior is rewarded
- B. Learning that occurs even without rewards
- C. Learning that occurs even when the animal is not exposed to the maze
- D. Learning that occurs only when the animal is hungry and focused on finding food

Edward Tolman's Purposive Behaviorism

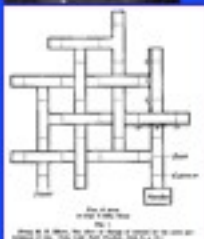


Argued for a **molar** (more holistic), not **molecular** perspective
Reflexes, S-R [stimulus-response] pairs are molecular

Articulated an intervening variable theory of learning, not a stimulus-response theory

Animals and humans engage in *latent learning*: build up knowledge of their environment from engaging the environment

- rats running mazes—with and without rewards—developed *cognitive maps*

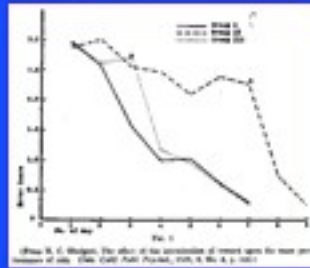


Tolman: From S-R to Maps

"We believe that in the course of learning something like a field map of the environment gets established in the rat's brain. We agree with the other school that the rat in running a maze is exposed to stimuli and is finally led as a result of these stimuli to the responses which actually occur. We feel, however, that the **intervening brain processes are more complicated, more patterned and often, pragmatically speaking, more autonomous than do the stimulus-response psychologists.** . . . we assert that the central office itself is far more like a **map control room than it is like an old-fashioned telephone exchange.** The stimuli, which are allowed in, are not connected by just simple one-to-one switches to the outgoing responses. Rather, the incoming impulses are usually worked over and elaborated in the central control room into a tentative, cognitive-like map of the environment. And it is this tentative map, indicating routes and paths and environmental relationships, which finally determines what responses, if any, the animal will finally release."

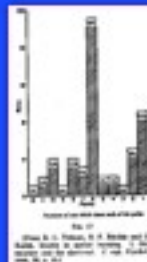
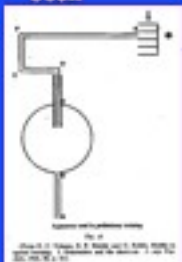
Latent Learning

- Control rats learn with food reward on all trials
- Experimental rats get to explore the maze without food reward for several days.
 - When they get food reward, their performance improves immediately (not through gradual learning)
 - Conclusion: they had been learning without reinforcement



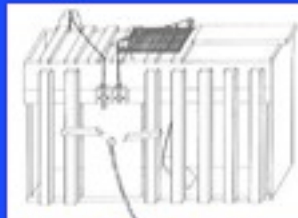
Organisms Learn More than is Intended

- Lashley had reported that rats climbed out of the maze, went to the food area, and climbed back in
- Tolman trained rats on a maze with a circuitous route to the food
- When that path is blocked and others made available, rats tended to choose one that took them to where the food had been



Edward Thorndike's Law of Effect

Thorndike's puzzle box:
Animals, generally hungry cats, were placed in the box. To escape they had to solve the puzzle.



Observed trial and error learning. Cat would try various strategies until one worked. On repeat trials, gradually reduce time to respond. Not insight but successful strategies gradually "stamped in."

Law of Effect: successful behaviors led to stronger neural connections.

Clicker Question

What is Skinner's objection to explaining behavior in terms of associations of ideas?

- A. Ideas are not physical entities and so are irrelevant to science
- B. The real associations are found in the world and they are what explain behavior
- C. There is no mechanism by which ideas become associated
- D. Ideas require a mind, which animals do not have



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Clicker Question

How would Skinner respond to Tolman's account of cognitive maps

- A. Maps don't really exist in the head
- B. The real contingencies that determine behavior are those found in the environment
- C. Tolman's experiments were poorly designed; with better experiments the rats would not have needed maps
- D. Behavior is determined by instinctual feelings, not by cognitive maps



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Burrhus Frederic Skinner's Operant Conditioning

Skinner rejects S-R psychology (e.g., Pavlov, Watson), which focuses only on bringing existing responses under the control of new stimuli. How do new responses arise?

Turns to Thorndike's Law of Effect

- Behaviors that are reinforced increase in probability
- Those that are not reinforced decrease in probability

Rejects Thorndike's construal as trial and error as too cognitive (errors as intentional acts in the attempt to solve a problem). Also, Thorndike doesn't emphasize the role of reinforcers increasing the probability of any behavior that elicits them.

By putting the emphasis on behavior as being shaped by consequences (à la Darwin), Skinner was a functionalist, but very different from mentalistic functionalists like James



Shaping and Complex Behaviors

Shaping:

Begin by reinforcing a behavior that is only remotely similar to the target. Then reinforce variants of it that are closer to the target.

Verbal behavior

Skinner was well aware that language was the distinctive and most important human behavior that an adequate psychology had to explain

Proposed that if words counted as both stimuli and reinforcers, he could develop an operant theory of language use

Became the target of Noam Chomsky's scathing review

Skinner and his Epistemology

- Operational definition of psychological terms—operationally define them in terms of things that can be observed in behavior
- Initially construed this as ruling out any mental (subjective) entities
 - radical behaviorism
- Later developed a strategy for talking about the inner subjective life as covert behavior under operant control
 - “The irony is that while Boring must confine himself to an account of external behavior, I am still interested in Boring-from-within.”



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Analytical/Philosophical Behaviorism

- Like Skinner, philosophers Gilbert Ryle and Ludwig Wittgenstein raised objections to appealing to hidden mental events to explain behavior
 - Ryle called the mind “the ghost in the machine”
 - Wittgenstein thought philosophical therapy was the remedy
- Talk of beliefs is not talk of some internal mental state but rather talk about tendencies to behave
 - One learns mentalistic vocabulary in terms of behaviors or tendencies to behave
- Problem: translations of mental terms almost always involve some other mental term



Skinner's use of the Theoretician's Dilemma

Uses Theoretician's Dilemma to show the pointlessness of positing mental states as theoretical intermediates:

"The objection to inner states is not that they do not exist, but that they are not relevant in a functional analysis. . . . Unless there is a weak spot in our causal chain so that the second link is not lawfully determined by the first, or the third by the second, then the first and third links must be lawfully related"

If Stimulus→Mental Events →Response
then Stimulus→ Response



Skinner's Treatment of Private Mental Lives

But Skinner accepted that internal mental events existed, so what did he take them to be?

Certainly they are physical, but what else?

How can we talk about them?

Learn language by having words brought under stimulus control. But those teaching us our language cannot observe events in our private lives so as to link our responses to them. Limited to what is public.

"It is social reinforcement which leads the individual to *know himself*. It is only through the gradual growth of the verbal community that the individual becomes '*conscious*'. He comes to see himself only as other see him, or at least only as others insist that he see himself."

Mental Events: Treat Only as Effects, not as Causes

Suppose mental events were intervening steps in the causal pathway from stimulus to response

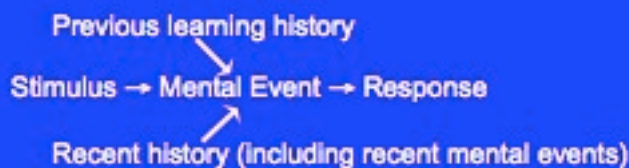
Stimulus→Mental Events →Response

Mental events (1) are not observable and (2) not independently controllable

Controllability important both for experimentation and for clinical use. If you cannot control it, it is not a worthy focus of "scientific" inquiry

How could mental events be more than idle intermediates in causal chain?

If they are the product of multiple causes.



Critics then claims that mental events could no longer be eliminated without losing predictive power

BEYOND
FREEDOM
&
DIGNITY
B.F.
SKINNER

Skinnerian Utopias

What are some good things to do once we understand what causes behavior?

- Remove reinforcers that promote conflict
- Remove reinforcers that promote inequality and discrimination

If human life, including the unhappy parts of human life, are the product of the histories of reinforcement individuals have received, then it is irresponsible not to arrange these reinforcers, as much as possible, so as to make human life happier.

But why these "enlightenment" ends?
Was he conditioned to advance those ends?



Skinner at Walden Pond

B.F. Skinner
WALDEN
TWO

Clicker Question

Assuming it were possible to arrange reinforcers in a way that would result in a society without conflict and in which well-being of everyone is protected, would you want to live in such a society?

- A. Yes
- B. No
- C. Uncertain