

Behaviorism: Laws of the Observable



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

The Backdrop to Watson: Functionalism at the Univ. of Chicago

John Dewey, like James, was influenced by both Peirce and Darwin

Moved to the University of Chicago in 1894, bringing George Herbert Mead, Addison W. Moore, and James Rowland Angell



Contrast with structuralism: rejected elementarism
Rejected the reflex arc in favor of more holistic, adaptive view: a reflex is an instrument "for successful coordination"

Angell's Characterization of Functionalism

"Functional psychology...involves the...effort to discern and portray the typical operations of consciousness under actual life conditions, as over against the attempt to analyze and describe its elementary and complex contents...It is...synonymous with descriptions and theories of mental action as distinct from the material of mental constitution... The most essential quarrel which the functionalist has with structuralism in its thoroughgoing and consistent form...touches the feasibility and worth of the effort to get at mental process as it is under the conditions of actual experience rather than as it appears to a merely post mortem analysis...The functional psychologist...is wont to take his cue from the basal conception of the evolutionary movement, i.e., that for the most part organic structures and functions possess their present characteristics by virtue of the efficiency with which they fit into the extant conditions of life broadly designated the environment." (Angell, 1907)

Ivan Petrovich Pavlov: Physiologist



In vivo study of the physiology of the digestive system using fistulas

Role of nervous system in controlling digestive processes

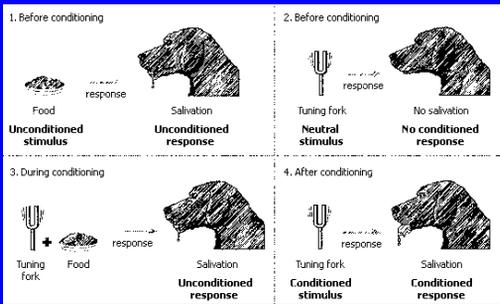
Investigated “psychic secretion”—secretion in response to food stimuli located at a distance

Treated phenomenon as a reflex, albeit a conditioned one.

These reflexes involve the cerebral cortex
unconditioned stimulus → unconditioned response
conditioned stimulus → conditioned response

“The Experimental Psychology and Psychopathology of Animals” (1903)

Classical conditioning



John Watson

Frustration with the functionalists at the University of Chicago
Sought refuge in Jacques Loeb and his studies of tropism in plants and animals



Dissertation on the relation between behavior in the white rat and the growth of the nervous system
Title: Animal Education: The Psychological Development of the White Rat

Emerging view: “Can't I find out by watching...[animal] behavior everything that the other students are finding out by using [human] O[bserver]s?”

Watson's Manifesto: "Psychology as the Behaviorist Views It"

Rejected focus on consciousness and use of introspection

Focus instead on behavior, with emphasis on control and prediction

Thinking as covert speech—thus the product of conditioning

Started with animals, but moved to humans

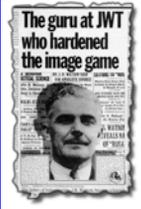
Little Albert study: "condition and control the emotions of human subjects."

Classical conditioning of fear



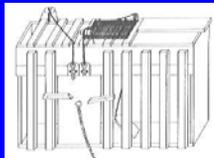
Fast Rise, Fast Fall

- Watson earned his Ph.D. in 1903 and joined the faculty
- He was appointed full professor and chair at Johns Hopkins in 1908
- President of the American Psychological Association in 1915
- Affair with a research assistant Rosalie Rayner ended his academic career in 1920
- New career in advertising



Edward Thorndike: The 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.*

Active learning

- "The lecture and demonstration methods represent an approach to a limiting extreme in which the teacher lets the student find out nothing which he could possibly be told or shown. . .They ask of him only that he attend to, and do his best to understand, questions which he did not himself frame and answers which he did not himself work out."

Identical Elements Theory of the Transfer of Training

- Transfer between a learning situation and an application situation determined by the number of elements the two share
- Contrast: general faculties that may be trained by practice

Development in Philosophy: Logical Positivism

Concerned about the epistemological status of new scientific (and possibly pseudo-scientific) developments in the early 20th century, several 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

Learning Theory: Clark Hull

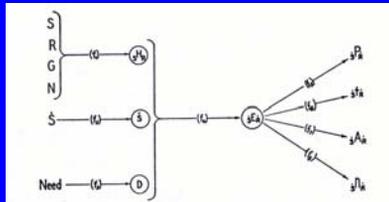


Broad early interests: effects of tobacco, hypnosis, intelligent machines

"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)

Laws of Learning

Quest for a mathematical account of learning
 Looking for laws by use of the hypothetical-deductive method
 Intervening variables fine as long as well-defined.



Edward Tolman: Purposive Behaviorism



Argued for a molar, not molecular perspective (reflexes, S-R 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*
- if rat learns to go from A to B, where will it go when released from C?

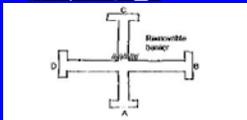


Fig. 1 The apparatus used in one of Tolman's experiments illustrating latent learning in a rat's maze.

Burrhus Frederic Skinner and his Epistemology

Operational definition of psychological terms—tie them to what can be experienced



Initially construed this as ruling out any mental (subjective) entities—radical behaviorism

Later developed a strategy for talking about the inner subjective life: "The irony is that while Boring must confine himself to an account of external behavior, I am still interested in Boring-from-within."

Skinner's Treatment of Private Mental Lives

But what are mental events for Skinner? Certainly they are physical, but what do we know of them?

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 as Effects, not 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

Skinner's use of the Theoretician's Dilemma

Uses Theoretician's Dilemma to argue against theories positing theoretical entities:

"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

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

If they are the product of multiple causes.



Can no longer be eliminated without losing predictive power

Skinner's Innovation: Operants



Skinner rejects S-R psychology, 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—too cognitive (errors as intentional acts in the attempt to solve a problem) and 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 (a la Darwin), Skinner was a functionalist, but very different from the 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 human behavior that had to be explained by an adequate psychology

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

Object of Chomsky's scathing review.

Is Skinner surreptitiously invoking intentional idioms?

Dennett:

Skinner's experimental design is supposed to eliminate the intentional, but it merely masks it. Skinner's nonintentional predictions work to the extent they do, not because Skinner has truly found nonintentional behavioral laws, but because the highly reliable intentional predictions underlying his experimental situations (the rat desires food and believes . . .) are disguised by leaving virtually no room in the environment for more than one bodily motion to be appropriate action and by leaving virtually no room in the environment for discrepancy to arise between the subject's beliefs and the reality."

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?
