Behaviorism: Laws of the Observable
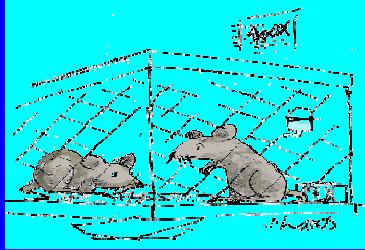

Figure out what behaviors they find rewarding, and
then reward them with those behaviors

Behaviorism versus Behavioral Research

- According to Wilfred Sellars: a person is a behaviorist, loosely or attitudinally speaking, if they insist on confirming "hypotheses about psychological events in terms of behavioral criteria"
- This is too weak: behavioral research
- Graham:
  1. Methodological: Psychology is the science of behavior. Psychology is not the science of mind.
  2. Psychological: Behavior can be described and explained without making reference to mental events or to internal psychological processes. The sources of behavior are external (in the environment), not internal (in the mind).
  3. Analytic/philosophical: In the course of theory development in psychology, if, somehow, mental terms or concepts are deployed in describing or explaining behavior, then either (a) these terms or concepts should be eliminated and replaced by behavioral terms or (b) they can and should be translated or paraphrased into behavioral concepts.

Analytical/Philosophical

- Gilbert Ryle and Ludwig Wittgenstein raised objections to appealing to hidden mental events to explain behavior
  - Ryle: ghost in the machine
  - Wittgenstein: need philosophical therapy
- 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
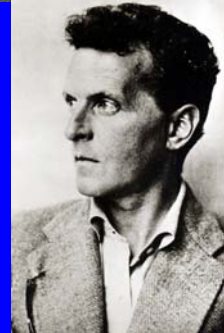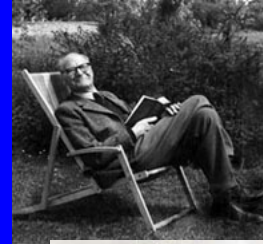
Edward Thorndike: The Law of Effect

Thorndike's puzzle box:
    Animals, generally hungry cats, were placed in the box. To escape they had to solve the puzzle.
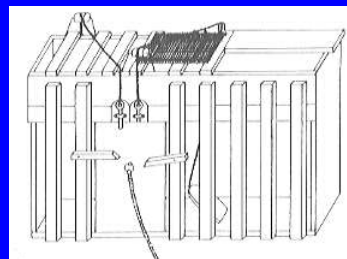
Observed trial and error learning. Cat would try various strategies until one worked. On repeat trials, gradually reduce time to respond. Not insight but successful strategies gradually "stamped in."

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.
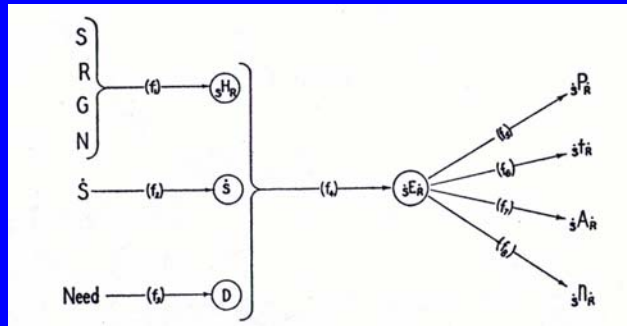

Edward Tolman: Purposive Behaviorism

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?
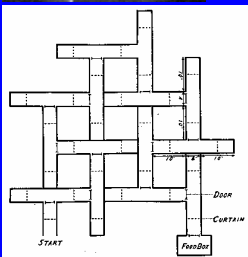

Plan of maze
14-Unit T-Alley Maze
Fig. 1
(From M. H. Elliott, The effect of change of reward on the maze performance of rats. *Univ. Calif. Publ. Psychol.*, 1928, 4, p. 20.)

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 rate learn with food reward on all trials
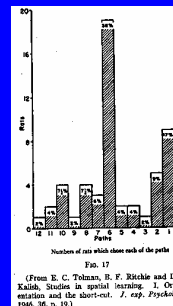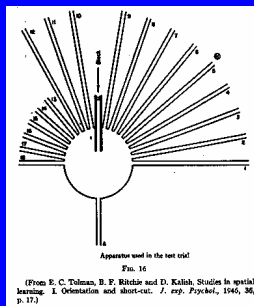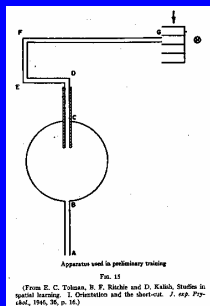- Experimental rats get to explore the maze without food reward for several days.
  - When they get food reward, their performance improves dramatically
    - Conclusion: they had been learning without reinforcement
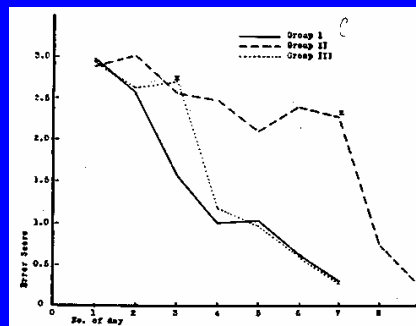
(From H. C. Blodgett, The effect of the introduction of reward upon the maze performance of rats. *Univ. Calif. Publ. Psychol.*, 1929, 4, No. 8, p. 120.)

Learning More than Intended

- Lashley: 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

Apparatus used in preliminary training

FIG. 15
(From E. C. Tolman, B. F. Ritchie and D. Kalish, Studies in spatial learning. I. Orientation and the short-cut. *J. exp. Psychol.*, 1946, 36, p. 16.)

Apparatus used in the test trial

FIG. 16
(From E. C. Tolman, B. F. Ritchie and D. Kalish, Studies in spatial learning. I. Orientation and short-cut. *J. exp. Psychol.*, 1946, 36, p. 17.)

FIG. 17
(From E. C. Tolman, B. F. Ritchie and D. Kalish, Studies in spatial learning. I. Orientation and the short-cut. *J. exp. Psychol.*, 1946, 36, p. 19.)

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 on Theories

- "The term 'theory' will . . . refer here . . . to any explanation of an observed fact which appeals to events taking place somewhere else, at some other level of observation, described in different terms, and measured, if at all, in different dimensions."
  - Physiological events
  - Mental events
  - Conceptual intermediates
- "Theories -- whether neural, mental, or conceptual -- talk about intervening steps in these relationships. But instead of prompting us to search for and explore relevant variables, they frequently have quite the opposite effect. When we attribute behavior to a neural or mental event, real or conceptual, we are likely to forget that we still have the task of accounting for the neural or mental event."
  - Appeal to covert events offers no explanatory gain

Skinner's use of the Theoretician's Dilemma

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

"The objection to inner states in 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"
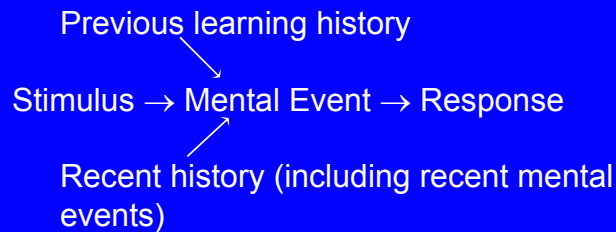

If Stimulus→Mental Events →Response
        then Stimulus→ Response

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

If they are the product of multiple causes.

Previous learning history

Stimulus → Mental Event → Response

Recent history (including recent mental events)

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 reinforces 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 Noam Chomsky's scathing review.

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$\rightarrow$Mental Events $\rightarrow$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

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."
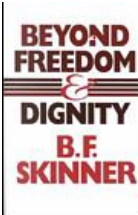
Skinnerian Utopias

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?

Skinner at Walden Pond