

I'm not robot!



Behaviorism

What is Behaviourism ?

Observation Experimentation

Behavioral Conditioning

Practice

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What is the Behaviorism Theory?

- Behaviorism is a view that operates on a principle of "stimulus response."
- Behaviorism is the prediction and control of human behavior where independent thinking play no essential part of its teaching methods.
- To a behaviorist, human learning is solely an objective and experimental branch of natural science.

Behaviourism

Behaviourism

- All things should be looked at from the perspective of behaviour.
- Behaviourism argues that there is no mind, no thoughts, no feelings, and the only important thing to consider is behaviour.

The Behaviorist: B.F. Skinner

- 1904- 1990: believed that stimulus- response patterns conditioned behavior.
- His work differs from the theory of classic conditioning by focusing on changes of observable behavior; ignoring the possibility of processes occurring in the mind.
- Establishes chains of behavior by the use of reinforcements
- His method is known as Operant Conditioning
- Benjamin Bloom used his principles to develop his Mastery Learning

Skinner b. f. (1974). about behaviorism. About behaviorism skinner summary. About behaviorism skinner pdf. About behaviorism skinner book. Skinner about behaviorism (1974 pdf). What are watson and skinner's beliefs about behaviorism. About behaviorism bf skinner. About behaviorism skinner pdf download.

A much more effective work than Beyond Freedom and Dignity precisely because it takes more seriously the tradition (or the historical prejudices) of its opposition. --Robert Kirsch, Los Angeles Times About Behaviorism is an opportunity to match wits with one of the great men of psychology and to participate in some of its great debates. --James B. Rule, Newsday The battle over Skinner's ideas is just beginning. It promises to be one of the most interesting contests of our generation. --Gail Boyer, St. Louis Post-Dispatch ok about the controversial philosophy known as behaviorism, written by its leading exponent. Bibliography, index. B.F. SKINNER presented a formulation of operant behavior and a method for its investigation that are basic to the analysis of behavior now practiced in hundreds of laboratories throughout the world. For this work, Dr. Skinner was given teh National Medal of Science by President Lyndon Johnson and the Gold Medal of the American Psychological Foundation. Many practical applications of the method have been made in other sciences, such as physiology and psycho-pharmacology. The principles of operant conditioning led to programmed instruction and the modern conception of teaching machines, for which Dr. Skinner received many awards from educational organizations. He was also responsible for the first research in what has come to be called behavior therapy. American psychologist and social philosopher (1904-1990) B. F. SkinnerSkinner at the Harvard Psychology Department, c. 1950BornBurrhus Frederic Skinner(1904-03-20)March 20, 1904Susquehanna, Pennsylvania, U.S.DiedAugust 18, 1990(1990-08-18) (aged 86)Cambridge, Massachusetts, U.S.Alma materHamilton CollegeHarvard UniversityKnown forBehavior analysisOperant conditioningRadical behaviorismVerbal BehaviorSpouse(s)Yvonne (Eve) Blue (m. 1936)[1]AwardsNational Medal of Science (1968)Scientific careerFieldsPsychology, linguistics, philosophyInstitutionsUniversity of MinnesotaIndiana UniversityHarvard UniversityInfluencesCharles DarwinIvan PavlovErnst MachJacques LoebEdward ThorndikeWilliam JamesJean-Jacques RousseauHenry David ThoreauInfluencedMaxie Clarence Maultsby Jr. Shoshana Zuboff Signature Burrhus Frederic Skinner (March 20, 1904 - August 18, 1990) was an American psychologist, behaviorist, author, inventor, and social philosopher.[2][3][4][5] He was a professor of psychology at Harvard University from 1958 until his retirement in 1974.[6] Considering free will to be an illusion, Skinner saw human action as dependent on consequences of previous actions, a theory he would articulate as the principle of reinforcement: if the consequences to an action are bad, there is a high chance the action will not be repeated; if the consequences are good, the probability of the action being repeated becomes stronger.[7] Skinner developed behavior analysis, especially the philosophy of radical behaviorism,[8] and founded the experimental analysis of behavior, a school of experimental research psychology. He also used operant conditioning to strengthen behavior, considering the rate of response to be the most effective measure of response strength. To study operant conditioning, he invented the operant conditioning chamber (aka the Skinner box).[7] and to measure rate he invented the cumulative recorder. Using these tools, he and Charles Ferster produced Skinner's most influential experimental work, outlined in their 1957 book Schedules of Reinforcement.[9][10] Skinner was a prolific author, publishing 21 books and 180 articles.[11] He imagined the application of his ideas to the design of a human community in his 1948 utopian novel, Walden Two.[3] while his analysis of human behavior culminated in his 1958 work, Verbal Behavior.[12] Skinner, John B. Watson and Ivan Pavlov, are considered to be the pioneers of modern behaviorism. Accordingly, a June 2002 survey listed Skinner as the most influential psychologist of the 20th century.[13] Biography Skinner was born in Susquehanna, Pennsylvania, to Grace and William Skinner, the latter of whom was a lawyer. Skinner became an atheist after a Christian teacher tried to assuage his fear of the hell that his grandmother described.[14] His brother Edward, two and a half years younger, died at age 16 of a cerebral hemorrhage.[15] Skinner's closest friend as a young boy was Raphael Miller, whom he called Doc because his father was a doctor. Doc and Skinner became friends due to their parents' religiousness and both had an interest in contraptions and gadgets. They had set up a telegraph line between their houses to send messages to each other, although they had to call each other on the telephone due to the confusing messages sent back and forth. During one summer, Doc and Skinner started an elderberry business to gather berries and sell them door to door. They found that when they picked the ripe berries, the unripe ones came off the branches too, so they built a device that was able to separate them. The device was a bent piece of metal to form a trough. They would pour water down the trough into a bucket, and the ripe berries would sink into the bucket and the unripe ones would be pushed over the edge to be thrown away.[16] Education Skinner attended Hamilton College in New York with the intention of becoming a writer. He found himself at a social disadvantage at the college because of his intellectual attitude.[further explanation needed][17] He was a member of Lambda Chi Alpha fraternity.[16] He wrote for the school paper, but, as an atheist, he was critical of the traditional mores of his college. After receiving his Bachelor of Arts in English literature in 1926, he attended Harvard University, where he would later research and teach. While attending Harvard, a fellow student, Fred S. Keller, convinced Skinner that he could make an experimental science of the study of behavior. This led Skinner to invent a prototype for the Skinner box and to join Keller in the creation of other tools for small experiments.[17] After graduation, Skinner unsuccessfully tried to write a novel while he lived with his parents, a period that he later called the "Dark Years".[17] He became disillusioned with his literary skills despite encouragement from the renowned poet Robert Frost, concluding that he had little world experience and no strong personal perspective from which to write. His encounter with John B. Watson's behaviorism led him into graduate study in psychology and to the development of his own version of behaviorism.[17] Later life The gravestone of B. F. Skinner and his wife Eve at Mount Auburn Cemetery Skinner received a PhD from Harvard in 1931, and remained there as a researcher for some years. In 1936, he went to the University of Minnesota in Minneapolis to teach.[18] In 1945, he moved to Indiana University,[19] where he was chair of the psychology department from 1946 to 1947, before returning to Harvard as a tenured professor in 1948. He remained at Harvard for the rest of his life. In 1973, Skinner was one of the signers of the Humanist Manifesto II.[20] In 1936, Skinner married Yvonne "Eve" Blue. The couple had two daughters, Julie (later Vargas) and Deborah (later Buzan; married Barry Buzan).[21][22] Yvonne died in 1997.[23] and is buried in Mount Auburn Cemetery, Cambridge, Massachusetts.[17] Skinner's public exposure had increased in the 1970s, he remained active even after his retirement in 1974, until his death. In 1989, Skinner was diagnosed with leukemia and died on August 18, 1990, in Cambridge, Massachusetts. Ten days before his death, he was given the lifetime achievement award by the American Psychological Association and gave a talk concerning his work.[24] Contributions to psychology Behaviorism Main articles: Behaviorism and Radical behaviorism Skinner referred to his approach to the study of behavior as radical behaviorism,[25] which originated in the early 1900s as a reaction to depth psychology and other traditional forms of psychology, which often had difficulty making predictions that could be tested experimentally. This philosophy of behavioral science assumes that behavior is a consequence of environmental histories of reinforcement (see applied behavior analysis). In his words: The position can be stated as follows: what is felt or introspectively observed is not some nonphysical world of consciousness, mind, or mental life but the observer's own body. This does not mean, as I shall show later, that introspection is a kind of psychological research, nor does it mean (and this is the heart of the argument) that what are felt or introspectively observed are the causes of the behavior. An organism behaves as it does because of its current structure, but most of this is out of reach of introspection. At the moment we must content ourselves, as the methodological behaviorist insists, with a person's genetic and environment histories. What are introspectively observed are certain collateral products of those histories.... In this way we repair the major damage wrought by mentalism. When what a person does [is] attributed to what is going on inside him, investigation is brought to

Why explain the explanation? For twenty-five hundred years people have been preoccupied with feelings and mental life, but only recently has any interest been shown in a more precise analysis of the role of the environment. Ignorance of that role led in the first place to mental fictions, and it has been perpetuated by the explanatory practices which they gave rise to.[25] Foundation of Skinner's behaviorism Skinner's abhaviorism was largely set forth in his first book, *The Behavior of Organisms* (1938) [9]. There, he gives a systematic description of the manner in which environmental variables control behavior. He distinguished two sorts of behavior which are controlled in different ways: Respondent behaviors are elicited by stimuli, and may be modified through respondent conditioning, often called classical (or pavlovian) conditioning, in which a neutral stimulus is paired with an eliciting stimulus. Such behaviors may be measured by their latency or strength. Operant behaviors are "emitted", meaning that they are not induced by any particular stimulus. They are strengthened through operant conditioning (aka instrumental conditioning), in which the occurrence of a response yields a reinforcer. Such behaviors may be measured by their rate. Both of these sorts of behavior had already been studied experimentally, most notably: respondents, by Ivan Pavlov;[26] and operants, by Edward Thorndike.[27] Skinner's account differed in some ways from earlier ones,[28] and was one of the first accounts to bring them under one roof. The idea that behavior is strengthened or weakened by its consequences raises several questions. Among the most commonly asked are these: Operant responses are strengthened by reinforcement, but where do they come from in the first place? Once it is in the organism's repertoire, how is a response directed or controlled? How can very complex and seemingly novel behaviors be explained? 1. Origin of operant behavior Skinner's answer to the first question was very much like Darwin's answer to the question of the origin of a 'new' bodily structure, namely, variation and selection. Similarly, the behavior of an individual varies from moment to moment; a variation that is followed by reinforcement is strengthened and becomes prominent in that individual's behavioral repertoire. Shaping was Skinner's term for the gradual modification of behavior by the reinforcement of desired variations. Skinner believed that 'superstitious' behavior can arise when a response happens to be followed by reinforcement to which it is actually unrelated.[clarification needed] 2. Control of operant behavior The second question, "how is operant behavior controlled?" arises because, to begin with, the behavior is "emitted" without reference to any particular stimulus. Skinner answered this question by saying that a stimulus comes to control an operant if it is present when the response is reinforced and absent when it is not. For example, if lever-pressing only brings food when a light is on, a rat, or a child, will learn to press the lever only when the light is on. Skinner summarized this relationship by saying that a discriminative stimulus (e.g. light or sound) sets the occasion for the reinforcement (food) of the operant (lever-press). This three-term contingency (stimulus-response-reinforcer) is one of Skinner's most important concepts, and sets his theory apart from theories that use only pair-wise associations.[28] 3. Explaining complex behavior Most behavior of humans cannot easily be described in terms of individual responses reinforced one by one, and Skinner devoted a great deal of effort to the problem of behavioral complexity. Some complex behavior can be seen as a sequence of relatively simple responses, and here Skinner invoked the idea of "chaining". Chaining is based on the fact, experimentally demonstrated, that a discriminative stimulus not only sets the occasion for subsequent behavior, but it can also reinforce a behavior that precedes it. That is, a discriminative stimulus is also a "conditioned reinforcer". For example, the light that sets the occasion for lever pressing may also be used to reinforce "turning around" in the presence of a noise. This results in the sequence "noise - turn-around - light - press lever - food." Much longer chains can be built by adding more stimuli and responses. However, Skinner recognized that a great deal of behavior, especially human behavior, cannot be accounted for by gradual shaping or the construction of response sequences.[29] Complex behavior often appears suddenly in its final form, as when a person first finds his way to the elevator by following instructions given at the front desk. To account for such behavior, Skinner introduced the concept of rule-governed behavior. First, relatively simple behaviors come under the control of verbal stimuli: the child learns to "jump", "open the book", and so on. After a large number of responses come under such verbal control, a sequence of verbal stimuli can evoke an almost unlimited variety of complex responses.[29] Reinforcement Main article: Reinforcement Reinforcement, a key concept of behaviorism, is the primary process that shapes and controls behavior, and occurs in two ways: positive and negative. The Behavior Organisms (1938), Skinner defines negative reinforcement to be synonymous with punishment, i.e. the presentation of an aversive stimulus. This definition would subsequently be re-defined in Science and Human Behavior (1953). In what has now become the standard set of definitions, positive reinforcement is the strengthening of behavior by the occurrence of some event (e.g., praise after some behavior is performed), whereas negative reinforcement is the strengthening of behavior by the removal or avoidance of some aversive event (e.g., opening and raising an umbrella over your head on a rainy day is reinforced by the cessation of rain falling on you). Both types of reinforcement strengthen behavior, or increase the probability of a behavior reoccurring; the difference being in whether the reinforcing event is something applied (positive reinforcement) or something removed or avoided (negative reinforcement). Punishment can be the application of an aversive stimulus/event (positive punishment or punishment by contingent stimulation) or the removal of a desirable stimulus (negative punishment or punishment by contingent withdrawal). Though punishment is often used to suppress behavior, Skinner argued that this suppression is temporary and has a number of other, often unwanted, consequences.[30] Extinction is the absence of a rewarding stimulus, which weakens behavior. Writing in 1981, Skinner pointed out that Darwinian natural selection is, like reinforced behavior, "selection by consequences." Though, as he said, natural selection has now "made its case", he regretted that essentially the same process, "reinforcement", was less widely accepted as underlying human behavior.[31] Schedules of reinforcement Main article: Schedules of reinforcement Skinner recognized that behavior is typically reinforced more than once, and, together with Charles Ferster, he did an extensive analysis of the various ways in which reinforcements could be arranged over time, calling it the schedules of reinforcement.[10] The most notable schedules of reinforcement studied by Skinner were continuous, interval (fixed or variable), and ratio (fixed or variable). All are methods used in operant conditioning. Continuous reinforcement (CRF): each time a specific action is performed the subject receives a reward. This method is effective when teaching a new behavior because it quickly establishes an association between the target behavior and the reinforcer.[32] Interval schedule, based on the time intervals between reinforcements.[7] Fixed interval schedule (FI): A procedure in which reinforcements are presented at fixed time periods, provided that the appropriate response is made. This schedule yields a response rate that is low just after reinforcement and becomes rapid just before the next reinforcement is scheduled. Variable interval schedule (VI): A procedure in which behavior is reinforced after scheduled but unpredictable time durations following the previous reinforcement. This schedule yields the most stable rate of responding, with the average frequency of reinforcement determining the frequency of response. Ratio schedules: based on the ratio of responses to reinforcements.[7] Fixed ratio schedule (FR): A procedure in which reinforcement is delivered after a specific number of responses have been made. Variable ratio schedule (VR):[7] A procedure in which reinforcement comes after a number of responses that is randomized from one reinforcement to the next (e.g. slot machines). The lower the number of responses required, the higher the response rate tends to be. Variable ratio schedules tend to produce very rapid and steady responding rates in contrast with fixed ratio schedules where the frequency of response usually drops after the reinforcement occurs. Token economy "Skinnerian" principles have been used to create token economies in a number of institutions, such as psychiatric hospitals. When participants behave in desirable ways, their behavior is reinforced with tokens that can be changed for such items as candy, cigarettes, coffee, or the exclusive use of a radio or television set.[33] Verbal Behavior Main article: Verbal Behavior Challenged by Alfred North Whitehead during a casual discussion while at Harvard to provide an account of a randomly provided piece of verbal behavior.[34] Skinner set apart from attempting to extend his then-new functional, inductive approach to the complexity of human verbal behavior.[35] Developed over two decades, his work appeared in the book *Verbal Behavior*. Although Noam Chomsky was highly critical of Verbal Behavior, he conceded that Skinner's "S-R psychology" was worth a review.[36] (behavior analysts reject the "S-R" characterization; operant conditioning involves the emission of a response which then becomes more or less likely depending upon its consequence.)[36] Verbal Behavior had an uncharacteristically cool reception, partly as a result of Chomsky's review, partly because of Skinner's failure to address or rebut any of Chomsky's criticisms.[37] Skinner's peers may have been slow to adopt the ideas presented in Verbal Behavior because of the absence of experimental evidence—unlike the empirical density that marked Skinner's experimental work.[38] Scientific inventions Operant conditioning chamber Main article: Operant conditioning chamber An operant conditioning chamber (also known as a "Skinner box") is a laboratory apparatus used in the experimental analysis of animal behavior. It was invented by Skinner while he was a graduate student at Harvard University. As used by Skinner, the box had a lever (for rats), or a disk in one wall (for pigeons). A press on this "manipulandum" could deliver food to the animal through an opening in the wall, and responses reinforced in this way increased in frequency. By controlling this reinforcement together with discriminative stimuli such as lights and tones, or punishments such as electric shocks, experimenters have used the operant box to study a wide variety of topics, including schedules of reinforcement, discriminative control, delayed response ("memory"), punishment, and so on. By channeling research in these directions, the operant conditioning chamber has had a huge influence on course of research in animal learning and its applications. It enabled great progress on problems that could be studied by measuring the rate, probability, or force of a simple, repeatable response. However, it discouraged the study of behavioral processes not easily conceptualized in such terms—spatial learning, in particular, which is now studied in quite different ways, for example, by the use of the water maze.[28] Cumulative recorder The cumulative recorder makes a pen-and-ink record of simple repeated responses. Skinner designed it for use with the operant chamber as a convenient way to record and view the rate of responses such as a lever press or a key peck. In this device, a sheet of paper gradually unrolls over a cylinder. Each response steps a small pen across the paper, starting at one edge; when the pen reaches the other edge, it quickly resets to the initial side. The slope of the resulting ink line graphically displays the rate of the response; for example, rapid responses yield a steeply sloping line on the paper, slow responding yields a line of low slope. The cumulative recorder was a key tool used by Skinner in his analysis of behavior, and it was very widely adopted by other experimenters, gradually falling out of use with the advent of the laboratory computer and use of line graphs.[39] Skinner's major experimental exploration of response rates, presented in his book with Charles Ferster, *Schedules of Reinforcement*, is full of cumulative records produced by this device.[10] Air crib The air crib is an easily cleaned, temperature- and humidity-controlled box-bed intended to replace the standard infant crib.[40] Skinner invented the device to help his wife cope with the day-to-day tasks of child rearing. It was designed to make early childcare simpler (by reducing laundry, diaper rash, cradle cap, etc.), while allowing the baby to be more mobile and comfortable, and less prone to cry. Reportedly it had some success in these goals.[41] The air crib was a controversial invention. It was popularly mischaracterized as a cruel pen, and it was often compared to Skinner's operant conditioning chamber (aka the "Skinner box"). This association with laboratory animal experimentation discouraged its commercial success, though several companies attempted production.[41][42] In 2004 therapist Lauren Slater repeated unfounded rumors that Skinner had used his baby daughter in some of his experiments, and that she had subsequently committed suicide.[43] His outraged daughter publicly accused Slater of giving new life to old lies about her and her father and of inventing new ones, and faulted her not making a good-faith effort to check her facts before publishing.[44] Teaching machine The teaching machine, a mechanical invention to automate the task of programmatic learning The teaching machine was a mechanical device whose purpose was to administer a curriculum of programmed learning. The machine embodied key elements of Skinner's theory of learning and had important implications for education in general and classroom instruction in particular.[45] In use in education, the machine was a list of questions that could be viewed one at a time through a small window (see picture). There was also a mechanism through which the learner responded to each question. Upon delivering a correct answer, the learner would be rewarded.[46] Skinner advocated the use of teaching machines for a broad range of students (e.g., preschool aged adult) and instructional purposes (e.g., reading and music). For example, one machine that he engineered could teach rhythm. He wrote:[47] A relatively simple device supplies the necessary contingencies. The student taps a rhythmic pattern in unison with the device. "Unison" is specified very loosely at first (the student can be a little early or late at each tap) but the specifications are slowly sharpened. The process is repeated for various speeds and patterns. In another arrangement, the student echoes rhythmic patterns sounded by the machine, though not in unison, and again the specifications for an accurate reproduction are progressively sharpened. Rhythmic patterns can also be brought under the control of a printed score. The instructional potential of the teaching machine stemmed from several factors: it provided automatic, immediate and regular reinforcement without the use of aversive control; the material presented was coherent, yet varied and novel; the pace of learning could be adjusted to suit the individual. As a result, students were interested, attentive, and learned efficiently by producing the desired behavior, "learning by doing".[48] Teaching machines, though perhaps rudimentary, were not rigid instruments of instruction. They could be adjusted and improved based upon the students' performance. For example, if a student made many incorrect responses, the machine could be reprogrammed to provide less advanced prompts or questions—the idea being that students acquire behaviors most efficiently if they make few errors. Multiple-choice formats were not well-suited for teaching machines because they tended to increase student mistakes, and the contingencies of reinforcement were relatively uncontrolled. Not only useful in teaching explicit skills, machines could also promote the development of a repertoire of behaviors that Skinner called self-management. Effective self-management means attending to stimuli appropriate to a task, avoiding distractions, reducing the opportunity of reward for competing behaviors, and so on. For example, machines encourage students to pay attention before receiving a reward. Skinner contrasted this with the common classroom practice of initially capturing students' attention through a variety of stimuli (e.g., with a lively video) and delivering a reward (e.g., entertainment) before they students have actually performed any relevant behavior. This practice fails to reinforce correct behavior and actually counters the development of self-management. Skinner pioneered the use of teaching machines in the classroom, especially at the primary level. Today computers run software that performs similar teaching tasks, and there has been a resurgence of interest in the topic related to the development of adaptive learning systems.[49] Pigeon-guided missile Main article: Project Pigeon During World War II, the US Navy required a weapon effective against surface ships, such as the German Bismarck class battleships. Although missile and TV technology existed, the size of the primitive guidance systems available rendered automatic guidance impractical. To solve this problem, Skinner initiated Project Pigeon.[50][51] which was intended to provide a simple and effective guidance system. This system divided the nose cone of a missile into three compartments, with a pigeon placed in each. Lenses projected an image of distant objects onto a screen in front of each bird. Thus, when the missile was launched from an aircraft within sight of an enemy ship, an image of the ship would appear on the screen. The screen was hinged, such that pecks at the image of the ship would guide the missile toward the ship.[52] Despite an effective demonstration, the project was abandoned, and eventually more conventional solutions, such as those based on radar, became available. Skinner complained that "our problem was no one would take us seriously."[53] Verbal summator Early in his career Skinner became interested in "latent speech" and experimented with a device he called the verbal summator.[54] This device can be thought of as an auditory version of the Rorschach inkblots.[54] When using the device, human participants listened to incomprehensible auditory "garbage" but often read meaning into what they heard. Thus, as with the Rorschach blots, the device was intended to yield different meanings to different people. Skinner's interest in this device was brief, but he later used observations with the summator in creating his theory of verbal behavior. The device also led other researchers to invent new tests such as the tautophone test, the auditory perception test, and the Azzagzod test (when defined as ?[57]).[55] Influence on teaching Along with psychology, education has also been influenced by Skinner's views, which are extensively presented in his book *The Technology of Teaching*, as well as reflected in Fred S. Keller's personalized System of Instruction and Ogden R. Lindley's Precision Teaching. Skinner argued that education has two major purposes: to teach repertoires of both verbal and nonverbal behavior; and to interest students in learning. He recommended bringing students' behavior under appropriate control by providing reinforcement only in the presence of stimuli relevant to the learning task. Because he believed that human behavior can be affected by small consequences, something as simple as "the opportunity to move forward after completing one stage of an activity" can be an effective reinforcer. Skinner was convinced that, to learn, a student must engage in behavior, and not just passively receive information.[45]:389 Skinner believed that effective teaching must be based on positive reinforcement which is, he argued, more effective at changing and establishing behavior than punishment. He suggested that the main thing people learn from being punished is how to avoid punishment. For example, if a child is forced to practice playing an instrument, the child comes to associate practicing with punishment and thus develops feelings of dreadfulness and wishes to avoid practicing the instrument. This view had obvious implications for the then widespread practice of rote learning and punitive discipline in education. The use of educational activities as punishment may induce rebellious behavior such as vandalism or absence.[56] Because teachers are primarily responsible for modifying student behavior, Skinner argued that teachers must learn effective ways of teaching. In *The Technology of Teaching* (1968), Skinner has a chapter on why teachers fail:[57]:93–113 He says that teachers have not been given an in-depth understanding of teaching and learning. Without knowing the science underpinning teaching, teachers will often use behavior that projected subconscious thoughts. Skinner's interest in projective testing was brief, but he later used observations with the summator in creating his theory of verbal behavior. The device also led other researchers to invent new tests such as the tautophone test, the auditory perception test, and the Azzagzod test (when defined as ?[57]).[55] Influence on teaching Along with psychology, education has also been influenced by Skinner's views, which are extensively presented in his book *The Technology of Teaching*, as well as reflected in Fred S. Keller's personalized System of Instruction and Ogden R. Lindley's Precision Teaching. 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