Unlike Hull and Tolman, but like Thorndike and Watson, Skinner considers private experience to be part of what a behavioral science must explain. According to his radical behaviorism, mental activity may be treated in the same manner as other activity, and private stimuli, such as those that produce pain, may be treated as other stimuli. Skinner believes that society teaches us to identify items of personal experience, just as it teaches us to identify objects in the world. It is harder for our teachers to identify our private experiences, since they must rely on our behavior to do so; consequently, we can never know our own experience as well as we can know the objects of the world.

In 1966, Skinner set forth his views on innate behavior. He suggested that the factors that change behavior during the course of an individual's lifetime are similar to those that change the bodily and behavioral characteristics of a species during the course of evolution. Variation, selection, and heredity act in essentially the same way in both cases, and it is a mistake to try to separate the influence of nature and nurture in dealing with specific cases. Had Skinner published such a paper twenty years before he did, we might have seen less interest in the exceptions to the laws of learning. But he did not.

Criticism of Skinner is often misplaced. Frequently he is criticized as though he were the distillation of all views of all people who have called themselves behaviorists. Most often, though, he is criticized as though he were Hull, because Hull's influence was so great and because so many of his students have kept his basic ideas alive. There are serious criticisms that do apply to Skinner, however. The most serious is his failure to appreciate the significance of his early thoughts regarding the unit of behavior. Too often he reverts to molecular analyses that convince critics that his views really are the same as those of Hull.

The power of his approach is well illustrated in the success of professional animal trainers, such as the Brelsands, and in the series of papers describing the Columban simulations. In the latter series, pigeons have been trained to show behaviors that indicate self-concept, communication, and note leaving. Other researchers have shown that pigeons can show self-control and that rats can react to fairly subtle differences in sequences of events acting over prolonged periods of time; these topics will be covered in Chapter 9. These are the sorts of demonstrations that show the applications of Skinner's theory, and we could have benefited from them long ago.

GLOSSARY

Adjusting schedule Schedule of reinforcement in which the value of the interreinforcement interval or the response requirement changes as time passes since the last reinforcement. For example, an adjusting schedule could begin with a value of FR 10 and increase that value by ten every twenty seconds. This should lead to high response rates, since, in effect, the schedule penalizes low response rates.

Alternative schedule Schedule of reinforcement in which reinforcement depends on the passage of time or the fulfilling of a response requirement.

Chaining (Chained schedule) The joining together of a sequence of behaviors by a series of discriminative stimuli that also act as conditioned reinforcers. The occurrence of the first behavior produces the S0 for the second member of the chain, and so on. The appearance of the S0 acts to reinforce the first behavior and set the occasion for the second member, which leads to the appearance of the next S0.

Component Basic unit of a multiple schedule, consisting of a specific S0, schedule of reinforcement, and duration. Components are presented successively. One example of a component would be a two-minute period in which a green light was lighted and in which a VR 25 schedule was in effect.

Concept learning Discrimination learning in which the class of stimuli involved do not consist of specific concrete things like lights and tones. The concept may be "all four-legged creatures" or all true statements. We train concepts by presenting numerous examples of instances of the concept and reinforcing responses by our subject and by presenting noninstances without reinforcement.

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Concurrent schedule Schedule of reinforcement in which two or more independent schedules are simultaneously in effect, with a lever or key corresponding to each. For example, two different VI schedules may be available, with two response keys present, one for each schedule. A subject may get into the habit of switching keys, since the longer the time spent on one key, the more likely reinforcement becomes for responses on the second key. Switches between keys therefore may be reinforced. To prevent this, a changeover delay (COD) is usually used with concurrent schedules. A COD prevents the receipt of reinforcement for responding on a key for some fixed time (a few seconds) after a switch from the other key to that key.

Conditioned reinforcer According to some usages, such as that of Hull, all reinforcers that do not reduce drives arising from bodily needs are assumed to be conditioned reinforcers; their power derives from an association with primary reinforcers. Skinner's view defines conditioned reinforcers as things that act as reinforcers because of some pairing with already-effective reinforcers. The latter may act as such for a variety of reasons, and the difference between conditioned and other reinforcers lies only in the fact that conditioned reinforcers act as such only after association with effective reinforcers.

Concurrent schedule Reinforcement schedule in which reinforcement is delivered only after the passage of time and the completion of a response requirement. For example, 47 responses may be followed by reinforcement if two minutes have passed since the last response.

Contingencies Another word for schedule. When Skinner speaks of the contingencies responsible for the development or maintenance of a behavior, he refers to the requirements that govern the delivery of reinforcement. These may depend upon the passage of time, the occurrence of specific responses, the presence of specific stimuli, or a combination of these things.

Differential reinforcement Another way of describing the selecting of behaviors, depending upon reinforcement of some responses in the presence of some stimuli and the nonreinforcement of other responses in the presence of other stimuli. Shaping, discrimination learning, and all of our learned behavior may be viewed as the result of differential reinforcement.

Discriminative stimulus Operants usually are reinforced only in the presence of some class of stimuli, the S<sup>p</sup>. Skinner believes that such stimuli come to "set the occasion" for reinforcement, thus acting as discriminative stimuli. He also believes that stimuli that elicit reflex behavior or conditioned reflex behavior operate differently, by eliciting the responses which they control.

DRH schedule Schedule of reinforcement that reinforces high rates of responding. A differential reinforcement of high rates schedule requires that some number of responses occur within a fixed time period if reinforcement is to be received.

DRK schedule Schedule of reinforcement that reinforces low rates of responding. A differential reinforcement of low rates schedule requires that no responses occur during some fixed period since the last response if reinforcement is to be received.

Dynamic laws Factors that influence the strength of a reflex, conditioned reflex, or operant response, which show their influence as the behavior repeatedly occurs. For example, the law of fatigue and the laws of conditioning and extinction are such laws.

Empirical law of effect Skinner's version of the law of effect, which holds that reinforcers need not share any properties except their ability to act as reinforcers. We discover that something acts as a reinforcer under given conditions; we do not concern ourselves over why it does so. (For example, we do not ask whether it reduces drives or if it is pleasure producing.) The law of effect is thus an empirical generalization. It is a useful rule that we have found to apply in a large number of cases, and its value and usefulness depend upon how far we may extend its application. Why reinforcers act as they do is an unanswerable question.

Fixed-interval schedule Schedule of reinforcement that requires that a set period of time pass, after which the first response produces reinforcement. Fixed interval is symbolized as FI.

Fixed-ratio schedule Schedule of reinforcement that requires that a set number of responses occur to produce each reinforcement. Fixed ratio is symbolized as FR.

Fixed-time schedule Schedule of reinforcement that provides reinforcement after fixed periods of time since the last reinforcement, independent of the subject's behavior. This schedule is indistinguishable from classical delays, symbolized as FT.

Heterogeneous chain The same topography is performed by each member of a chain, carrying a marked member.

Homogeneous chain Composed of a chain of VI schedules, each member of which is similar. For example, one schedule requires that two responses occur in the time of one stimulus and the pressing of that stimulus to reinforcement is required of all members (for example, unlike in a heterogeneous chain).

Induction Actually used this term to describe the observed changes resulting from reinforcement of one stimulus.

Instinctive drift Nickerson's term for the disruptive or interfering effects of consummatory performances on the operant.

Limited bold A required number of responses or FI schedule that occurs within some set period. For example, the schedule has requirements, but in this example, on a VI schedule, reinforcement occurs only after the passage of time. In other words, if they occur, that reinforcement will be given.

Matching law Also known as matching law. Also a matching relative of the relative matching explanation of the matching effect. See Chapter 9.

Methodological behaviorism (1945) to the view that behavior is learned, not necessarily only with respect to the past. It is opposed this view of behavior, as opposed to the radical behaviorism.

Mixed schedule Schedule in which two or more different response requirements are present during different periods of time, that is.

For example,
classical delayed conditioning. Fixed time is symbolized as FT.

Heterogeneous chain Chain of behaviors that are not of the same topography. For example, the rat Pliny performed a chain consisting of pulling a string, carrying a marble, and dropping it. (See homogeneous chain.)

Homogeneous chain Schedule of reinforcement composed of a chain of behaviors in which the behaviors in each member of the chain are topographically similar. For example, a chain FR 2 VR 8 schedule requires that two lever presses occur in the presence of one stimulus, which leads to a change in the S^0, and the pressing an average of eight times then leads to reinforcement. The response required in both members (for example, lever pressing) is the same, unlike in a heterogeneous chain.

Induction Actually means “generalization.” Skinner used this term, after Sherrington, to refer to induced changes in responding to one stimulus, as the result of reinforcement for responding to a similar stimulus.

Instinctive drift Name given by the Brels (1961) to the disruptive effect of species-specific (instinctive) consummatory behavior on the learned (operant) performances of their animal subjects.

Limited hold A requirement that may be added to a VI or FI schedule, such that a response must occur within some set period of time (the LH value) after the schedule has made reinforcement available. For example, on a FI one-minute LH two-second schedule, reinforcement is available for two seconds after the passage of a minute. If a response does not occur, that reinforcement is lost.

Matching law Also called the molar law of effect. The matching law holds that relative response rates match relative reinforcement frequencies. For an explanation of what this means and what it signifies, see Chapter 9.

Methodological behaviorism Name given by Skinner (1945) to the view that holds that we can deal objectively with observable behavior and that mind exists, but cannot be meaningfully studied. Skinner opposed this view and labeled his contrary position radical behaviorism.

Mixed schedule Schedule of reinforcement in which two or more different schedules are in effect for set periods of time, these periods appearing in sequence. For example, a mixed FI 2 VI 3 schedule might alternate two-minute periods, in which FI 2 and then VI 3 schedules were in force. If these periods are signaled by discriminative stimuli, we have a multiple schedule.

Multiple schedule A mixed schedule in which different S's signal the schedules that are in effect.

Negative punishment This occurs when a response decreases in frequency when its occurrence is followed by the offset of something. For example, a bit of misbehavior may be followed by the turning off of a television set. Like negative reinforcement, the behavior removes some stimulus. Like other cases of punishment, this produces a decrease in the frequency of the behavior which causes this consequence.

Negative reinforcement An increase in the frequency of a response that produces the offset of something. Like negative punishment, negative reinforcement involves the termination of something: like positive reinforcement, it leads to an increase in responding. When we pull a window shade to stop the sun from shining in our eyes, the negative reinforcement that results makes it more probable that we repeat that act the next time the sunlight annoys us.

Operant Class of responses that vary together in strength as a function of the consequences produced by members of the class. Pressing a lever acts as an operant, as does creative behavior, going to the store, and a myriad of other behaviors. We can identify an operant class only after we have observed that a given behavior is influenced by its consequences. It may take some time to identify most or all of the responses that make up an operant.

Operant conditioning The process whereby an operant class is shown to become more frequent (that is, to increase in strength) as a function of the consequences it produces. Thus, a rat may more frequently press a lever when presses are reinforced with food, and an infant may increase its emission of vocalizations when vocalizations are followed by praise and attention.

Positive reinforcer A consequence of behavior that produces an increase in the frequency of that class of behavior.

Punishment The decrease in frequency of an operant behavior as a function of the consequences it produces. Skinner argued that punishment is not a basic effect and that effects attributed to it depend upon side effects of the aversive events used as pun-
issers. We now know that he was mistaken and that punishers seem to work in a way opposite to the effects of reinforcers.

Radical behaviorism Position described by Skinner in 1945 and 1963, which proposes a philosophy for a science of psychology, independent of specific theories of learning, whether Skinner's or anyone else's. According to this view, the entire subject matter of psychology may be treated as activity (behavior) and therefore mental activity is essentially the same in kind as physical activity: we may speak of thinking and seeing as behaviors, just as we do when we speak of walking and talking. Radical behaviorism argues against the usefulness and the existence of intervening variables and especially of internal copies of the world. Some writers have pointed out the similarities between this point of view and that of modern European phenomenologists, such as Merleau-Ponty and Sartre. There is little doubt that Skinner named this view after the radical empiricism of William James.

Reflex For Skinner, refers to order. The discovery of a reflex is the discovery of an orderly relationship between the world and behavior. Skinner extended a masterly analysis of the concept of the reflex to conditioned reflexes and operants in the 1930s.

Respondent Skinner's term for reflex and conditioned reflex behavior, which is elicited by an identifiable stimulus. Respondent conditioning is his term for Pavlovian conditioning, or conditioning of Type S.

Response class The set of behaviors that change in frequency together. This applies to reflexes, conditioned reflexes, and operant behavior. The response class may be composed of members that do not intuitively seem to go together. For example, aggression is no doubt a number of response classes, some controlled by external stimuli, and others by consequences. Each class may contain members discoverable only after long observation of behavior under a variety of conditions.

Schedule of reinforcement Rule by which reinforcers are delivered. The rule may include requirement for (as in ratio schedules), temporal requirements (as in interval schedules), or both. The first major analysis of reinforcement schedules and their effects was published by Ferster and Skinner in 1957.

Shaping Commonly used term for the method of successive approximations. This method involves the selective reinforcement of some subset of a class of operant responses. This leads to extinction of the nonreinforced members and a consequent increase in the variations of behaviors emitted. The requirement for reinforcement may be progressively restricted until the final product is a set of behaviors very different from the original behavior class.

Static laws In Skinner's early papers on the identification of reflexes, static laws refer to changes in responsiveness visible with single elicitations of the reflex. For example, we may see an increase in the magnitude of the response as we apply stronger eliciting stimuli. On a given occasion, a stronger stimulus produces a stronger response, irrespective of when the last stimulation was given.

Stimulus class The set of stimuli that may be shown to control a reflex, conditioned reflex, or operant class of responses. Like the response class, the stimulus class may be composed of elements that may not seem intuitively obvious. What we call "concepts" are names for stimulus classes.

Stimulus control The effect of external stimuli on behavior. The study of stimulus generalization and discrimination learning is now called the study of "stimulus control."

Tandem schedule Two or more schedules of reinforcement arranged in sequence, so that the requirement of one schedule must be met before the next schedule begins. Food or other reinforcement is delivered only after all schedules in the sequence have run. If different stimuli signal the successive schedules, it is a chained schedule.

Theoretical law of effect Attempts to explain the fact that reinforcers work as they do by postulating some underlying process. For example, Hull's suggestion that reinforcers work by reducing biological drives was a theoretical law of effect. One could suggest that all reinforcers promote survival, produce pleasure, or share some other characteristic. All such attempts have failed, and Skinner believed that we only waste time and effort by trying to work out a theoretical law of effect. His reasons are the same as those he uses to argue against theories of any kind.

Theory For Skinner, a translation of terms. For example, if we attribute intelligence to properties of the brain, information processing mechanisms, a "smarts" center (to use Stephen Gould's term), or the like, we are proposing a theory. More generally, theories involve the use of intervening variables, rather than the independent and dependent variables we should be interested in. Acceptable expla-
nations refer only to the phenomena to be explained and the concrete conditions that influence them. The translation of these basic terms into hypothetical entities (habits, motives, and so on) should be avoided.

**Token economy** Method of psychotherapy originated by Ayllon and Azrin in the early 1960s. Patients, for whom other methods of therapy had failed, were reinforced for grooming, working, eating in an acceptable manner, and other activities.

**Type R** Skinner's term for behavior that is sensitive to its consequences—that is, operant behavior. Type R conditioning is therefore operant conditioning.

**Type S** Skinner's term for classical conditioning, in which the emphasis is placed on the eliciting CS rather than upon the consequences of the elicited behavior. Classical conditioning is conditioning of Type S.

**Unfinished causal sequences** Skinner's term for the common practice of explaining behavior and experience by reference to some hypothetical inner state or process. Hence, we may explain unruly behavior as the product of aggressiveness and the ability to recite well as the result of a good memory. In both cases, we have done no more than name the behavior involved and, unless we explain aggressiveness and memory, we are left with unfinished causal sequences, not real explanations.

**Variable-interval schedule** Schedule of reinforcement, symbolized as VI. This schedule provides reinforcement for the first response that occurs after some mean interval of time has passed since the last reinforcement. For example, a VI six-minute schedule would reinforce the first response occurring after an average of six minutes. Some interreinforcement intervals could be as short as a few seconds and others could be ten minutes long or longer.

**Variable-ratio schedule** Schedule of reinforcement, symbolized as VR. This schedule provides reinforcement after the completion of some number of responses. The number varies from reinforcement to reinforcement, and the value of the schedule is the mean number of responses required. Thus, a VR 25 schedule provides reinforcement after a varying number of responses, the average requirement being 25.

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**RECOMMENDED READINGS**


This is still considered the most perceptive evaluation of Skinner's theory. It was written by a former colleague.


This is a collection of Skinner's papers selected from publications since 1930. The reader will find many topics covered, dealing with theory, application, and others of personal interest to Skinner.


Skinner explains what is meant by radical behaviorism in this clear and entertaining little book.


This is the third and last volume of Skinner's autobiography, covering the period beginning with his return to Harvard in the late 1940s to the 1980s. It is more a professional than a personal autobiography and provides many insights into Skinner's treatment of psychology.


This special issue of this journal is composed of six statements by Skinner dealing with basic issues, each followed by commentators' statements. Skinner replies to approximately 150 such commentators.