# Application Of Operant Conditioning To Reinstate Verbal Behavior In Psychotics

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In operant conditioning, behavior is controlled by explicitly arranging the consequences of the response, the explicit consequence being termed reinforcement. For example, a lever-press by a rat activates a mechanism which releases food. If the rat has been deprived of food, lever-pressing responses will increase in frequency. If this relationship between food and response holds only when a light is on, the organism may discriminate between light on and light off, that is, there will be no lever-pressing responses when the light is turned off, but turning it on will occasion such responses. From this simple case, extensions can be made to more complicated cases which may involve control of schedules of reinforcement. These procedures have recently been extended to the study of psychopharmacology (*5*), controlled production of stomach ulcers (*4*), obtaining psychophysical curves from pigeons (*3*), conditioning cooperative behavior in children (*2*), programming machines which teach academic subjects (*11*), analyzing the effects of noise on human behavior (*1*), and decreasing stuttering (7), to mention a few examples.

The following account is a preliminary report of the use of operant conditioning to reinstate verbal behavior in two hospitalized mute psychotics. Patient A, classified as a catatonic schizophrenic, 40, became completely mute almost immediately upon commitment 19 years ago. He was recorded as withdrawn and exhibiting little psychomotor activity. Patient B, classified as schizophrenic, mixed type, with catatonic features predominating, was 43, and was committed after a psychotic break in 1942, when he was combative. He completely stopped verbalizing 14 years ago. Each *S* was handled by a different *E* (experimenter). The *E*'s were ignorant of each other's activities until pressed to report their cases. This study covers the period prior to such report.

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## Case Histories

*Patient A —*

The *S* was brought to a group therapy session with other chronic schizophrenics (who were verbal), but he sat in the position in which he was placed and continued the withdrawal behaviors which characterized him. He remained impassive and stared ahead even when cigarettes, which other members accepted, were offered to him and were waved before his face. At one session, when *E* removed cigarettes from his pocket, a package of chewing gum accidentally fell out. The *S*'s eyes moved toward the gum and then returned to their usual position. This response was chosen by *E* as one with which he would start to work, using the method of successive approximation (*9*). (This method finds use where *E* desires to produce responses which are not present in the current repertoire of the organism and which are considerably removed from those which are available. The *E* then attempts to 'shape' the available behaviors into the desired form, capitalizing upon both the variability and regularity of successive behaviors. The shaping process involves the reinforcement of those parts of a selected response which are successively in the desired direction and the nonreinforcement of those which are not. For example, a pigeon may be initially reinforced when it moves its head. When this movement occurs regularly, only an upward movement may be reinforced, with downward movement not reinforced. The pigeon may now stretch its neck, with this movement reinforced. Eventually the pigeon may be trained to peck at a disc which was initially high above its head and at which it would normally never peck. In the case of the psychotic under discussion, the succession was eye movement, which brought into play occasional facial movements, including those of the mouth, lip movements, vocalizations, word utterance, and finally, verbal behavior.)

The *S* met individually with *E* three times a week. Group sessions also continued. The following sequence of procedures was introduced in the private sessions. Although the weeks are numbered consecutively, they did not follow at regular intervals since other duties kept *E* from seeing *S* every week.

Weeks 1, 2. A stick of gum was held before *S*'s face, and *E* waited until *S*'s eyes moved toward it. When this response occurred, *E* as a consequence gave him the gum. By the end of the second week, response probability in the presence of the gum was increased to such an extent that *S*'s eyes moved toward the gum as soon as it was held up.

Weeks 3, 4. The *E* now held the gum before *S*, waiting until he noticed movement in *S*'s lips before giving it to him. Toward the end of the first session of the third week, a lip movement spontaneously occurred, which *E* promptly reinforced. By the end of this week, both lip movement and eye movement occurred when the gum was held up. The *E* then withheld giving *S* the gum until *S* spontaneously made a vocalization, at which time *E* gave *S* the gum. By the end of this week, holding up the gum readily occasioned eye movement toward it, lip movement, and a vocalization resembling a croak.

Weeks 5, 6. The *E* held up the gum, and said, 'Say *gum, gum,*' repeating these words each time *S* vocalized. Giving *S* the gum was made contingent upon vocalizations increasingly approximating *gum*. At the sixth session (at the end of Week 6), when *E* said, 'Say *gum, gum,*' *S* suddenly said, 'Gum, please.' This response was accompanied by reinstatement of other responses of this class, that is, *S* answered questions regarding his name and age.

Thereafter, he responded to questions by *E* both in individual sessions and in group sessions, but answered no one else. Responses to the discriminative stimuli of the room generalized to *E* on the ward; he greeted *E* on two occasions in the group room. He read from signs in *E*'s office upon request by *E*.

Since the response now seemed to be under the strong stimulus control of *E*, *the person*, attempt was made to generalize the stimulus to other people. Accordingly, a nurse was brought into the private room; *S* smiled at her. After a month, he began answering her questions. Later, when he brought his coat to a volunteer worker on the ward, she interpreted the gesture as a desire to go outdoors and conducted him there. Upon informing *E* of the incident, she was instructed to obey *S* only as a consequence of explicit verbal requests by him. The *S* thereafter vocalized requests

These instructions have now been given to other hospital personnel, and *S* regularly initiates verbal requests when nonverbal requests have no reinforcing consequences. Upon being taken to the commissary, he said, 'Ping pong,' to the volunteer worker and played a game with her. Other patients, visitors, and members of hospital-society-at-large continue, however, to interpret nonverbal requests and to reinforce them by obeying *S*.

*Patient B* —

This patient, with a combative history prior to mutism, habitually lay on a bench in the day room in the same position, rising only for meals and for bed. Weekly visits were begun by *E* and an attendant. During these visits, *E* urged *S* to attend group therapy sessions which were being held elsewhere in the hospital. The *E* offered *S* chewing gum. This was not accepted during the first two visits, but was accepted on the third visit and thereafter. On the sixth visit, *E* made receipt of the gum contingent upon *S*'s going to the group room and so informed *S*. The *S* then altered his posture to look at *E* and accompanied him to the group room, where he seated himself in a chair and was given the gum. Thereafter, he came to this room when the attendants called for him.

Group Sessions 1-4. Gum reinforcement was provided for coming to the first two weekly sessions, but starting with the third, it was made contingent upon *S*'s participation in the announced group activity. The group (whose other members were verbal) was arranged in a semicircle. The *E* announced that each *S* would, when his turn came, give the name of an animal. The *E* immediately provided gum to each *S* who did so. The *S* did not respond and skipped his turn three times around. The same response occurred during the fourth session.

Group Session 5. The activity announced was drawing a person; *E* provided paper and colored chalk and visited each *S* in turn to examine the paper. The *S* had drawn a stick figure and was reinforced with gum. Two of the other patients, spontaneously and without prior prompting by *E*, asked to see the drawing and complimented *S*. Attendants reported that on the following day, *S*, when introduced to two ward visitors, smiled and said, 'I'm glad to see you.' The incident was followed by no particular explicit consequences.

Group Session 6. The announced activity was to give the name of a city or town in Illinois. The *S*, in his turn, said, 'Chicago.' He was reinforced by *E*, who gave him chewing gum, and again two members of the group congratulated him for responding. Thereafter, he responded whenever his turn came.

After the tenth session in the group, gum reinforcement was discontinued. The *S* has continued to respond vocally in the situations in which he was reinforced by *E* but not in others. He never initiates conversations, but he will answer various direct questions in the *group sessions*. He will not, however, respond vocally to questions asked *on the ward*, even when put by *E*.

## Discussion

Both *S*'s came from special therapy wards of patients selected because of depressed verbal behavior and long stay in the hospital; tranquilizing drugs were not used. The extent to which reinstatement of verbal behavior was related to the special treatment offered the patients in the special wards set up for them cannot readily be assayed. Among the special treatments accorded them were group therapy sessions. Nevertheless, the similarities between the pattern of reacquisition of verbal behavior by the patients and the patterns of learning encountered in laboratory studies suggest that the conditioning procedures themselves were involved in the reinstatement of verbal behavior.

In the case of Patient A, the speaking response itself was gradually shaped. The anatomical relation between the muscles of chewing and speaking probably had some part in *E*'s effectiveness. When a word was finally produced, the response was reinstated along with other response members of its class, which had not been reinforced. The economy of this

process is apparent, since it eliminates the necessity of getting *S* to produce *every* desired response in order to increase his repertoire. In this case, *E* concentrated on one verbal response, and in reinstating it, reinstated verbal responses in general. On the stimulus side, when the response came under the stimulus control of *E*, the stimulus could be generalized to other members of *E*'s class of discriminative *stimuli*, namely, people. This may have relevance for the clinical inference of the importance for future interpersonal relations of prior identification with some person. In the case of Patient B, the stimulus control involved a *given setting*, the rooms where he had been reinforced. The discrimination of *E* in one case, and not in the other, may be explained in terms of the establishment of operant discrimination, which also involves extinction (*9*). Operant discrimination is established when a response in the presence of $S^D$, a discriminative stimulus, is reinforced, and a response in the presence of $S^\Delta$, a stimulus other than $S^D$, is not. After some time, the response will occur when $S^D$ is presented, but not when $S^\Delta$ is presented; the response discriminates $S^D$ from $S^\Delta$, it having been extinguished when $S^\Delta$ was presented. In the case of Patient A, *E* was with *S* on the ward, in the group room, and privately. Reinforcement occurred in all occasions. But *S* was on the ward (and other rooms) without *E*, and therefore without reinforcement for those responses which were occasioned by the ward and which only *E* reinforced. Hence, these responses would extinguish in the ward alone, but would continue in the presence of *E*, defining discrimination of *E* from other stimuli. In the case of Patient B, this process may have been delayed by the fact that *E* and the other patients reinforced only in a specific room. It will be recalled that attendants rather than *E* brought *S* to the group room.

Interestingly, in the group sessions, when Patient B emitted the responses which *E* reinforced, other psychotic patients also reinforced Patient B. They were thereby responding, on the occasion of *S*'s responses (discriminative stimuli for them), in the same way that *E* did. The term *identification*, used as a label here, shares some behavioral referents with the term as used in the preceding paragraph and might be explained behaviorally in terms of the *generalized reinforcer* (*10*). These behaviors by the patients are similar to behaviors reported in client-centered group sessions, where clients increase in reflective behaviors as counseling progresses, and in psychoanalytic group sessions, where patients increasingly make analytic interpretations of each other. Here, the patients are also behaving like the therapist. While this parallel lends itself to the facetious thought that operant group sessions may produce operant conditioners, it does suggest that psychotics are behaving, with regard to responses by the major source of reinforcement in the group, according to the same laws which govern such group behaviors of non-hospitalized *S*'s.

The various diagnostic labels applied to psychotics are based to a considerable extent upon differences between responses considered abnormal, for example, hallucinations, delusions of persecution, and the like. The therapeutic process is accordingly at times seen in terms of eliminating the abnormal behaviors or states. Experimental laboratory work indicates that it is often extremely difficult to *eliminate* behavior; extinction is extremely difficult where the schedule of reinforcement has been a vari-

able interval schedule (*6*), that is, reinforcement has been irregular, as it is in most of our behaviors. Such behaviors persist for considerable periods without reinforcement. Experimental laboratory work has provided us quite readily with procedures to *increase* responses. In the case of psychotics, this would suggest focusing attention on whatever *normal* behaviors *S* has; an appropriate operant, no matter how small or insignificant, even if it is confined to an eye movement, may possibly be raised to greater probability, and shaped to normal behavior (*8*). Stated otherwise, abnormal behaviors and normal behaviors can be viewed as reciprocally related, and psychotics as exhibiting considerable abnormal behavior, or little normal behavior. Normal behavior probability can be increased by decreasing probability of abnormal behaviors, or abnormal behaviors can be decreased by the controlled increase of normal behaviors. This preliminary report suggests that a plan of attack based upon the latter approach may be worth further investigation.

## Summary

Verbal behavior was reinstated in two psychotics, classified as schizophrenics, who had been mute for 10 and 14 years. The procedures utilized involved application of operant conditioning. The relationship of such procedures, based on controlled laboratory investigations with men and animals, to procedures based on clinical practice with human patients was discussed and was considered as directing our attention to shaping and increasing the probability of what normal behaviors the psychotic possesses.

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