

## SELF-REINFORCEMENT: THEORETICAL AND METHODOLOGICAL CONSIDERATIONS

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How behavior is viewed determines which facets of human functioning are studied most thoroughly and which are ignored or disavowed. Conceptions thus delimit research and are, in turn, shaped by findings from paradigms embodying that particular view. Theorists who exclude self-regulatory functions from their concept of human potentialities restrict the scope of their research to external influences on behavior. Detailed analysis of behavior as a function of external consequences provides confirmatory evidence that behavior is indeed subject to external control. However, limiting the scope of scientific inquiry not only yields redundant results but, by disregarding other significant determinants and processes, it can reinforce a truncated image of human nature.

From the perspective of social learning theory (Bandura, 1976), people are seen as capable of exercising some control over their own behavior. Among the various self-regulatory phenomena that have been investigated within this framework, self-reinforcement occupies a prominent position. In this process, individuals regulate their behavior by making self-reward conditional upon matching self-prescribed standards of performance. Acknowledgement of self-regulatory processes has added a new dimension to experimental analyses of reinforcement. Results of such studies have provided the impetus for extending the range of reinforcement practices in programs designed to effect personal change. Interest was shifted from managing behavior through imposition of contingencies to developing skills in self-regulation. In the latter approach, control is vested to a large extent in the hands of individuals themselves: They set their own goals, they monitor and evaluate their own performances, and they serve as their own reinforcing agents (Goldfried and Merbaum, 1973; Mahoney and Thoresen, 1974). The present paper discusses some major substantive issues in the conceptualization of self-reinforcement.

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## Multifaceted criteria of self-reinforcement

A self-reinforcement event has several defining properties.

*Control of Reinforcers.* One important feature is that the organism exercises full control over the reinforcers so that they are freely available for the taking. In studies of self-reinforcement, subjects have at their disposal a generous supply of tangible rewards which they are free to administer to themselves at any time in whatever quantities they choose (Bandura and Kupers, 1964; Bandura and Perloff, 1967; Mahoney and Bandura, 1972). Symbolic and evaluative reinforcers have received less study, but, here too, people can produce self-approving and self-critical reactions most anytime.

*Conditional Self-Administration of Reinforcers.* Although reinforcers are freely available, their self-administration is made conditional upon performing requisite behaviors. Therefore, a second critical feature of self-reinforcement is the self-prescription of a performance requirement. This entails self-denial of rewards until the appropriate or conditional behavior has been achieved. The regulated use of incentives may involve not only performance requirements but also exercise of control over the amount of self-reward (Bandura and Kupers, 1964; Bandura and Mahoney, 1974).

*Adoption of Performance Standards.* Self-reinforcement requires adoption of performance standards for determining the occasions on which a given behavior warrants self-reward. Performances that match or exceed the minimum criterion serve as discriminative cues for self-reward, whereas reinforcers are withheld for substandard performances. The standards by which the adequacy of behavior is judged vary in complexity ranging from simple qualitative discernments of behavior to relational rules.

For most human activities there are no absolute measures of adequacy. The speed with which distances are run or the scores obtained on tests, in themselves, convey insufficient information for self-appraisal. When adequacy is defined relationally, performances are evaluated by comparing them with the attainments of others. A student, who achieves a score of 115 points on an examination and whose personal standard is to be in the upper ten percent of the group, will have no basis for making either a positive or negative self-assessment, without knowing the accomplishments of others. In performances gauged by social criteria, self-appraisals require relational comparisons of at least three sources of information to judge a given performance: absolute performance level, one's own personal standards, and a social referent. The referential comparisons may take different forms for different tasks. For some regular activities, standardized norms based on representative groups are used to determine one's relative standing. For other endeavors, people compare themselves to particular associates in similar situations. In most activities, individuals use their previous behavior as the reference against which to judge their ongoing performances apart from any social comparison.

In brief, the criteria that together constitute a self-reinforcement event include self-administration of freely available rewards contingent upon performances that meet adopted standards.

## Distinction between operation and process of self-reinforcement

Theorizing and research in the area of self-reinforcement distinguish between the *operation* and the *process* of self-reinforcement. The operation is defined by the self-

administration of freely accessible reinforcers contingent upon requisite performances; the process refers to the resulting increase in the conditional performances. Social learning theory views the process by which consequences affect behavior as similar regardless of whether reinforcers are administered by oneself or by others. It is before rewards are administered that the main differences between externally- and self-regulated reinforcement arise. As we have previously seen, the latter practice entails at least three component processes: adoption of, and adherence to, reference standards; comparison of performance against standards to determine when it is appropriate to engage in self-reward; and self-privation of reinforcers for insufficient performances.

A complete understanding of self-reinforcement requires two separate lines of research for which the methodologies necessarily differ (Bandura, 1974). One line of investigation is designed to explain how referential standards for determining the occasions for self-reward are acquired, maintained, and modified. In experiments conducted for this purpose, influences likely to affect establishment of standards are the independent variables, and the performance attainments, which individuals self-reward and self-punish, constitute the dependent events.

The second line of research is designed to measure whether self-administered consequences do, in fact, enhance performance. In testing for enhancement effects, self-administered consequences represent the independent variables and performances levels the dependent ones.

The issue of when individuals choose to reward themselves and whether the self-administered rewards influence their behavior are separable; both must be investigated for a full understanding of self-reinforcement. The different methodologies are emphasized here because some writers (Premack and Anglin, 1973) have failed to distinguish studies investigating induction of self-reward standards from those measuring performance enhancement through self-reward. Such misconstruals can be read as inventive post-mortems for mistaken dependent variables (Bandura, 1974).

### **Acquisition of performance standards**

Behavioral standards for determining self-reinforcing responses can be established either by tuition or by modeling. In the former process, adults prescribe standards that define the behavior worthy of reward. They generally respond positively when children achieve or exceed the standards and negatively when their behavior falls short of the valued levels. As a result of such differential reactions, children eventually come to respond to their own behavior in self-rewarding or self-punishing ways, depending on how it departs from the evaluative standards set by others.

Transmitting performance standards by means of differential consequences has not been analyzed experimentally with humans, but the process is illustrated in studies with infrahuman subjects (Bandura and Mahoney, 1974; Mahoney and Bandura, 1972). Standards are established by instituting performance requirements for self-reward and by administering negative consequences when animals reward themselves for insufficient performances. By progressively raising response requirements animals adopt increasingly higher performance standards for each self-reward. Once established, the perfor-

mance requirements continue to be self-imposed on both familiar and novel tasks long after negative consequences for unmerited self-reward have been discontinued.

The influence of modeling in the transmission of differential standards of self-reward has received substantial attention. In the paradigm typically used to study this process (Bandura and Kupers, 1964), children observe models performing a task in which the models adopt either high or low performance standards for self-reward. When models attain or exceed their performance requirements, the models reward themselves tangibly and voice self-praise, but when they fall short of their self-prescribed requirements, they deny themselves freely available rewards and react self-critically. Observers later perform the task alone, and the performance attainments for which they reward themselves with freely available reinforcers are recorded.

The findings show that children tend to adopt standards modeled by others, judge their own performances relative to those standards, and reinforce themselves accordingly (Bandura and Kupers, 1964). Children exposed to models who set high standards reward themselves only when they achieve superior performances, whereas children exposed to models who regard low achievements as sufficient reinforce themselves for minimal performances. The behavioral standards of adults are affected by modeling influences as are those of children (Marston, 1965). Modeling has proved to be a highly efficacious way of instituting not only performance standards, but even the generosity with which differential attainments are self-reward (Bandura, 1971).

Having established the influential role of modeling in the acquisition of performance standards, experimentation then focused on theoretically relevant variables that affect the adoption process. Competence disparity between model and observer is one such factor (Bandura and Whalen, 1966). Ordinarily people favor reference models with ability similar to theirs over highly divergent ones whose attainments can be matched only occasionally through great effort. However, when exposed to uniformly high standards, a conducive relationship between models and observers, and bestowal of public recognition on models for upholding excellence, observers adopt, and adhere to, stringent standards of self-reward though they seldom attain the lofty performances (Bandura, Grusec, and Menlove, 1967).

Learning performance standards is complicated by the multiplicity of social influences, many of which conflict. The disparities involve inconsistencies in the standards exemplified by different models or by the same models on different occasions (Bandura, Grusec, and Menlove, 1967; Allen and Liebert, 1969; Hildebrandt, Feldman, and Dittrichs, 1973), or contradictions between the standards that are prescribed and those that are modeled (McMains and Liebert, 1968; Mischel and Liebert, 1966; Ormiston, 1972; Rosenhan, Frederick, and Burrowes, 1968). Observers must therefore process the conflicting information and eventually arrive at a personal standard against which to measure their own performances. Opposing influences that include lenient alternatives tend to reduce adoption of high standards, but the relative power of the influences is determined by a number of interacting variables. Some of these include characteristics of the observers, such as their achievement orientation, and their predilection to perceive events as being either personally or externally determined (Soule and Firestone, 1975; Stouwie, Hetherington, and Parke, 1970).

### **Generalization of performance standards of self-reward**

Development of self-regulatory functions would have limited value if they never generalized beyond the specific activity on which they were established. Indeed, the principal goal of social development is to transmit general standards of conduct that can serve as guides for self-regulation of behavior across a variety of activities.

Generic standards are best transmitted by varying the nature of the activities while requiring a similar level of performance for self-reward. The development of achievement standards typifies this process. Adults who subscribe to high standards of accomplishment expect children to excel in whatever academic subjects they are pursuing. After children adopt the criterion that only superior performances deserve self-reward, they tend to apply similar standards to their performance in new academic activities.

Self-regulated reinforcement generally involves not only adherence to performance requirements but also control over the magnitude of self-reward on each appropriate occasion. Findings of the program of research examining self-reinforcement processes with infrahuman subjects provide some evidence for the generalizability of both aspects of self-control. After animals learn to self-reward their own performances on different tasks in limited amounts, they transfer this dual self-regulation of reinforcement to new activities in which reinforcers are freely available independently of responding (Bandura and Mahoney, 1974). Adherence to performance requirements is more stringent, however, than adherence to self-limitation in amount of reward for conditional performances. To interrupt rewarding activities repeatedly for less preferred work when the rewards are under one's own control is both a taxing order and an impressive demonstration of self-regulation.

Standards of self-reward will generalize to some extent even when acquired on a single task. Children who, through modeling, adopt high performance standards of self-reward tend to apply similar standards on later occasions to somewhat different activities in dissimilar situations (Lepper, Sagotsky, and Mailer, 1975; Sagotsky and Lepper, 1976).

### **Discriminative activation of self-reinforcement**

Development of self-reinforcement functions does not create an unvarying control mechanism within the organism, as implied by theories of internalization that portray incorporated entities as continuous internal overseers of conduct. Self-reinforcing influences operate only if activated, and there are many factors that selectively control their activation. Hence, the same behavior is not uniformly self-rewarded or self-punished irrespective of the circumstances under which it is performed.

Self-reinforcement contingencies that are customarily applied to certain classes of behavior can be temporarily suspended by relabeling the activities and by environmental arrangements that obscure or distort the relationship between actions and the effects they produce (Bandura, 1973). Moreover, people learn to discriminate between situations in which self-reward is contingent upon performance and those in which it is appropriate to reward one-self noncontingently.

The way in which contextual influences operate in discriminative activation of self-reinforcement is graphically revealed in experimentation with infrahuman subjects (Bandura, Mahoney, and Dirks, 1976). During acquisition, animals were required to work before rewarding themselves in certain environmental contexts, but not in others. As a result of such differential experiences, animals consistently self-imposed performance requirements for self-reward in the appropriate settings, but they rarely made self-reward contingent upon performance in settings where rewarding themselves without working beforehand was permissible.

In humans, the activation of self-reinforcing and self-punishing responses is regulated by more complex environmental cues, and by how one construes one's conduct, its links to social effects, and the effects themselves (Bandura, 1973). The cognitive and situational operations by which customary self-generated consequences can be disengaged from censurable conduct have only recently received systematic study under controlled conditions (Bandura, Underwood, and Fromson, 1975; Diener, 1974; Zimbardo, 1969). The discriminative disengagement of internal control is achieved by moral justifications of the conduct, by obscuring or distorting the relationship between actions and the effects they cause, by dehumanizing the people toward whom the actions are directed, and by ignoring, or misrepresenting the social consequences of the actions. Because self-control through self-administered consequences can be discriminatively disengaged in these numerous ways, marked changes in people's conduct can occur without altering their moral standards and self-reinforcement systems. The extreme increase in violent conduct in military as compared to peacetime conditions is a notable example of this process.

### **Determinants of self-denial**

In analyzing regulation of behavior through self-reinforcement, it is important to distinguish between two sources of incentives that operate in the process. First, there is the arrangement of self-reward contingent upon designated performances to create incentives for oneself to engage in the activities. Second, there are the incentives for adhering to the contingency. One of the significant, but insufficiently explored, issues in self-reinforcement is why people adhere to contingencies requiring difficult performances, thereby temporarily denying themselves rewards over which they exercise full control.

Adherence to performance standards is partly sustained by periodic environmental influences which take a variety of forms. When standards for self-reinforcing reactions are being acquired or when they are later applied inconsistently, unmerited self-reward often results in negative consequences. Rewarding oneself for inadequate or undeserving performances is more likely than not to evoke critical reactions from others. And lowering one's performance standards is rarely considered praiseworthy.

The role of negative sanctions in the acquisition and maintenance of contingent self-reward has been investigated in several studies with animals. Caplan (1976) found that punishment for noncontingent self-reward during acquisition increased later adherence to performance requirements for self-reward. Prior experiences, in which animals consumed rewards freely without having to work for them, did not affect the rate with

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which they learned to work before rewarding themselves. However, it did reduce their subsequent willingness to withhold rewards contingent upon performance when negative sanctions were no longer in effect.

When environmental supports are removed, animals continue to maintain their behavior by self-reward for some time but eventually discard self-imposed contingencies, especially if they entail onerous performances. However, periodic punishment for unmerited self-reward serves to maintain contingent self-reinforcement. The higher the certainty of negative sanctions for unmerited self-reward, the greater is their sustaining capacity (Bandura and Mahoney, 1974).

Contextual influences, which signify past environmental prescripts that self-reward should be made dependent upon performance, provide additional supports. Animals are thus inclined to adhere to self-imposed contingencies in environmental settings in which performance has been previously required for self-reward, even though negative sanctions for rewarding themselves noncontingently no longer exist (Bandura, Mahoney, and Dirks, 1976).

Findings of the preceding studies suggest that organisms continue to withhold rewards from themselves until performance standards have been met because they fail to discriminate between conditions in which they have been required to do so and subsequent periods wherein rewards are freely available for the taking without negative consequences. In the case of behaviors that are nonproblematic or useless to the organisms, the threat of occasional negative sanctions may indeed be the main restraining influence against noncontingent self-reward. However, there are some findings, even with neutral behaviors, that might not be fully explainable solely in terms of discrimination processes. In one experiment, monkeys were tested for their relative preference for externally- and self-managed systems of reinforcement (Mahoney, Bandura, Dirks, and Wright, 1974). Over a long series of sessions, the animals engaged from time to time in unmerited self-reward without any adverse consequences, but, nevertheless, they continued to self-impose a work requirement for longer periods and at higher levels than one would expect from the usual course of extinction. High transgression sessions were characteristically followed by increased, rather than less, adherence to performance requirements for self-reward. In this study the animals periodically chose the external reward system so that some of their performances were also intermittently reinforced on an external basis. These findings are sufficiently interesting to warrant further investigation of the maintenance of self-imposed performance contingencies under multiple reinforcement conditions containing varying proportions of external and self-regulated reinforcement.

Threat of negative sanctions is not the most reliable basis upon which to rest a system of self-regulation. Fortunately, there are more advantageous reasons for exercising some influence over one's own behavior through self-arranged incentives. In most instances of self-regulation, effects associated with the conditional behavior provide incentives for maintaining the contingency. People are motivated to impose upon themselves requirements for self-reward when the effects of the behavior they seek to change are aversive. To those burdened with excessive weight, for example, the discomforts, maladies, and social costs of obesity create inducements to control overeating. Heavy smokers are motivated to reduce their consumption of cigarettes by physiological dysfunctions and

fear of cancer. Students are prompted to alter avoidant study habits when failures in completing assignments make academic pursuits sufficiently aversive.

By making self-reward conditional upon performance attainments, individuals can reduce the aversive effects of their behavior thereby creating a natural source of reinforcement for their efforts. They lose weight, they curtail or cease smoking, and they improve their course grades by increasing study activities. When people procrastinate about required tasks, thoughts about what they are putting off continuously intrude on, and detract from, enjoyment of their other activities. By setting themselves a given accomplishment for self-reward, they mobilize their efforts to complete what needs to be done and are thus spared intrusive self-reminders.

The benefits of self-regulated change may provide natural incentives for continued self-imposition of contingencies in the case of valued behaviors as well as for aversive ones. People commonly motivate themselves by arranging contingent self-reward to improve their skills in activities they aspire to master and to enhance their competencies in dealing with the demands of everyday life. Here the personal gains accruing from improved proficiency can strengthen self-prescription of contingencies.

As indicated in the foregoing discussion, because self-regulated reinforcement involves brief periods of self-denial it does not necessarily create an adverse state of affairs. Singling out self-privation from the total effects accompanying self-directed change overemphasizes the negative aspects of the process. Let us compare the aggregate rather than only the momentary consequences of behavior with and without the aid of conditional self-reward. Under noncontingent arrangements, rewards are available for the taking but the likelihood of engaging in potentially advantageous behavior is reduced for lack of self-motivation. In contrast, self-directed change provides both the rewards that were temporarily withheld as well as the benefits accruing from increased proficiency. For activities that have some potential value, self-regulated reinforcement can provide the more favorable aggregate consequences. Thus, on closer analysis, the exercise of momentary self-denial becomes less perplexing than it might originally appear. However, there are no particular advantages for self-regulation of behavior that is devoid of any value. It is in the latter instances that continued extraneous supports for adherence to self-reward contingencies assume special importance.

Modeling has been shown to be a powerful means of inducing behavior, but it has rarely been studied as a maintainer. In view of evidence that human behavior is extensively under modeling stimulus control (Bandura, 1976), there is every reason to expect that seeing others successfully regulate their own behavior by holding to contingent self-reward would increase the likelihood of adherence to self-prescribed contingencies in observers.

Upholding high standards is actively promoted by a vast system of rewards including praise, social recognition, and awards, whereas few accolades are bestowed on people for self-rewarding mediocre performances. Praise fosters adherence to high performance standards as does occasional admonishment for undeserved self-reward (Brownell et al., 1976; Drabman, Spitalnik, and O'Leary, 1973). Moreover, seeing others publicly recognized for upholding excellence promotes emulation of high standards (Bandura, Grusec, and Menlove, 1967). Vicarious reinforcement can therefore supplement periodic direct consequences as another source of support for abiding by self-prescribed contingencies.



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In social learning theory, self-regulated reinforcement is conceptualized not as an autonomous regulator of behavior but as a personal source of influence that operates in conjunction with environmental factors. Because self-reinforcing functions are created and occasionally supported by external influences does not negate the fact that exercise of that function partly determines how people behave. In the case of refractory habits, environmental inducements alone often fail to produce change, whereas the same inducements with contingent self-incentives prove successful. Thus, for example social pressures for and future benefits of shedding excess weight usually do not help the obese control their overeating, but exercising self-influence while actually eating effects change.

In other instances, the behavior developed through the aid of self-reward activates environmental influences that would otherwise remain in abeyance. Here the potential benefits cannot occur until self-motivated improvements in performance produce them. In still other instances, the behavior fashioned through contingent self-reward transforms the environment. Formerly passive individuals who facilitate development of assertive behavior through self-reward will alter their social environment by their firm actions.

Because personal and environmental influences affect each other in a reciprocal fashion, it is just as important to analyze the self-reinforcement determinants of environments as it is to study the environmental determinants of self-reinforcement. After all, environmental contingencies have determinants as do behaviors. Searching for the ultimate environmental contingency for activities regulated by self-reward is a regressive exercise that in no way resolves the issue under discussion because, for every ultimate environmental contingency that is invoked, one can find prior actions that created it. Promotion systems for occupational pursuits, grading schemes for academic activities, and reverence of slimness are human creations, not decrees of an autonomous impersonal environment. In the regress of prior causes, for every chicken discovered by a unidirectional environmentalist, a social learning theorist can identify a prior egg.

Operant theorists have always argued against attributing behavior to causes that extend far into the future. However, in explaining increases in self-reinforced behavior, some adherents of this view appeal to ultimate benefits of prospective behavior but neglect self-reactive determinants of behavior that operate in the here and now (Catania, 1975; Rachlin, 1974). Although anticipated benefits of future accomplishment undoubtedly provide some incentive for pursuing self-directed change, the self-regulated incentives serve as continual immediate inducements for change. We will consider later attempts to redefine the phenomenon of self-reinforcement out of existence by relabeling it or by finding some external source of reinforcement for it. In the final analysis, it is not the legitimacy of self-reinforcement but the nature of reinforcement itself that is in question.

The discussion thus far has been concerned mainly with tangible self-rewards. By initially studying operations that are fully observable, investigators were able to confirm different aspects of the phenomenon of self-reinforcement. The more complex and fascinating process concerns the self-regulation of behavior through evaluative self-reinforcement. In the social learning analysis, the process operates in the following manner: The standards people adopt for activities they invest with evaluative significance specify the conditioning requirements for positive self-evaluation. By making self-

satisfactions contingent upon goal attainment, individuals persist in their efforts until their performances match what they are seeking to achieve. Both the anticipated satisfactions of desired accomplishments and the negative appraisals of insufficient performances provide incentives for action. Most successes do not bring lasting satisfaction; having accomplished a given level of performance, individuals ordinarily are no longer satisfied with it and make positive self-evaluation contingent upon higher attainments.

Writing provides a familiar example of behavior that is continuously self-regulated through evaluative self-reactions. Authors do not require someone sitting at their sides selectively reinforcing each written statement until a satisfactory manuscript is produced. Rather, they possess a standard of what constitutes an acceptable piece of work. Ideas are generated and phrased in thought several times before anything is committed to paper. Initial attempts are successively revised until authors are satisfied with what they have written. Self-editing often exceeds what would be acceptable to others.

Although covert evaluative operations are not directly measurable, they can be studied through indirect observational evidence. At this point it might be appropriate to distinguish between theorizing about unobservable events and about indirectly observable ones. Self-evaluative reactions are directly observable to the person generating and experiencing them. Although investigators cannot measure their operation directly, they can elucidate the role of evaluative self-regulation by instating the evaluative standards and testing the verifiable behavioral consequences. This is a different matter from positing unobservable events that have neither any experiential referents nor any explicitly definable effects.

In the social learning view, self-evaluative consequences enhance performance not because self-praise automatically strengthens preceding responses, but because negative discrepancies between performance and standards create dissatisfactions that serve as motivational inducements to do better. Self-satisfaction is withheld until a suitable level of performance is attained. This perspective predicts that the higher the standards upon which self-satisfaction is made conditional, the more frequent are the corrective improvements and the higher are the performance attainments likely to be. There are other performance implications of adherence to self-evaluative contingencies that permit empirical verification of the operation of this covert regulatory process.

In experiments in which children are at liberty to select the performance level they consider deserves self-reward, some impose upon themselves surprisingly difficult performance requirements. For example, in one study (Bandura and Perloff, 1967), although children worked alone and were free to select any goal, not a single child chose the lowest standard, which required the least effort. Many selected the highest level of achievement as the minimal performance deserving self-reward. Still others raised their initial standard to a higher level without commensurate increase in amount of self-reward, thereby demanding of themselves considerably more work for the same recompense. Many children do, of course, select easy performance standards, but those who adhere steadfastly to, and even raise, stringent standards for self-reward on their own provide the more challenging findings.

The social learning analysis of evaluative reinforcement predicts that, under low external constraints, standards necessitating much effort at minimum material recompense, are most likely to be self-imposed in activities invested with self-evaluative

significance. Performing well on such tasks becomes an index of personal merit. Conflicts therefore arise when material gains can be increased by resorting to behavior that elicits negative self-evaluative reactions. Individuals are tempted to maximize rewards for minimum effort by lowering their standards. However, rewarding mediocre performances incurs negative self-evaluative consequences. The behavioral effects will be determined by the relative strength of material and evaluative rewards. When people hold their self-evaluation above material things, they do not act in accordance with utility theories that explain behavior in terms of optimal reward-cost balances, unless such formulations include the self-evaluative costs of rewarding oneself for devalued behavior.

### **Some misconceptions**

In a recent article in this journal, Catania (1975) raises a number of issues concerning self-reinforcement. It deserves comment because the misconceptions contained in the article are a potential source of confusion regarding a phenomenon of some importance. Indeed, in many instances the characterization of theory and research on self-reinforcement bears only a superficial resemblance to what, in fact, is the case.

*Self-Reinforcement of Conditional Responses.* Most of the hypothetical problems posed by Catania in the designation of self-reinforcement arise only because he disregards the multifaceted criteria that define the phenomenon. Consider first the prescript that "one must speak not of reinforcing oneself but of reinforcing one's own responses." This statement conveys the impression that previous designations of self-reinforcement have not specified a conditional response. In point of fact, they always do. As evident from the defining criteria, organisms make the self-administration of rewards conditional upon performance of a selected behavior. The pseudo issue is created by singling out the self-delivery feature but ignoring the performance requirement for self-reinforcement.

*Distinction Between Conditional Responses and Self-Reinforcing Responses.* Catania compounds the confusion by overlooking another critical criterion of self-reinforcement. Continuing with the hypothetical problem, he reasons that "If the reinforced response is not specified, it becomes impossible to distinguish the self-delivery of a reinforcer from the delivery of a reinforcer through some other agency." The hungry rat that produces food by pressing a lever, he argues, could be said to reinforce itself with food. Hence, "All instances of reinforcement then would become instances of self-reinforcement as well." Here again, the alleged problem arises only because no account is taken of the distinguishing feature, that in self-reinforcement the organism has free access to the rewards but withholds them until requisite performances are attained. In externally regulated reinforcement, an external agent sets the performance requirement and controls the reinforcers so they cannot be obtained without working for them. Although the difference in the agency of delivery, itself, is not insignificant, self-reinforcement entails several complex functions that are carried out by external agents in externally monitored forms. To self-reinforce one's own performances contingently requires adoption of a performance standard, evaluation of ongoing performance relative to the standard, and self-privation of freely available reinforcers when performances do not warrant self-reward.

One cannot dismiss the operational differences between externally- and self-regulated reinforcement with the counterexample of a limitless supply of reinforcers that can be gained simply by performing a response. In such a situation the conditional (requisite) response and the self-delivery response become one and the same. By contrast, in self-reinforcement the self-delivery response is different from, and can be performed independently of, the conditional response. Thus, for example, in testing the response maintenance capacity of self-reinforcement, children perform effortful manual responses until they reach their preselected goal, whereupon they reward themselves by pressing a button that delivers tokens exchangeable for valued items (Bandura and Perloff, 1967). The manual activity is the conditional response; the button press that produces the reinforcers is the self-delivery response.

In other investigations, the rewards are presented with equally free access but in full view as well (Bandura and Kupers, 1964; Bandura and Mahoney, 1974; Mahoney and Bandura, 1972). In each case, the conditional response does not produce the rewards because they are already present; rather, it sets the occasion for self-delivery of rewards. Subjects, of course, are at liberty to consume the rewards noncontingently at any time, should they choose to do so.

In the most stringent test of self-regulated reinforcement, animals not only impose performance requirements for self-reward, but they even control how many reinforcers they consume on each appropriate occasion from the continually available supply (Bandura and Mahoney, 1974). Let us return now briefly to the rat at the bar. Pressing a lever to produce reinforcers is not in itself an instance of self-reinforcement, but performing requisite responses and then pressing a lever to secure reinforcers, which are continually and freely available for the taking, does qualify as a self-reinforcement operation.

Catania eventually resolves the problem of his own creation in the example of the lever-pressing rat by recognizing that, "Self-reinforcement, then, cannot involve only one response. An instance of self-reinforcement must include not only a response that is reinforced, but also the same organism's response of reinforcing the first response." These are precisely the conditions that are routinely instituted in analyses of self-reinforcement. No one, to this writer's knowledge, has ever defined self-reinforcement solely in terms of the self-delivery response. Self-administration of consequences is but one of several criteria of self-reinforcement.

*Disembodied Responses and Dispossessed Organisms.* Catania's dichotomization of responses and organisms brings to the fore a fundamental issue that is rarely discussed in the conceptual analysis of reinforcement. Consider a few common examples of reinforcement. An animal presses a lever whereupon food appears after a momentary delay. In the verbal conditioning paradigm, subjects emit verbal responses and, after judging them to fall within a reinforcing class, the experimenter dispenses social rewards. In applications of reinforcement practices using tangible reinforcers, tokens, or preferred activities are presented minutes, hours, or even days after the requisite performances have been completed. As these examples illustrate, reinforcers are almost invariably delivered after the response has ceased to exist. How can something that is no longer in existence be reinforced? In actuality, one can only reinforce an organism for having selected and performed particular classes of responses. Theorists who adopt the position

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that it is responses not organisms that are reinforced are faced with a dilemma that can be resolved only by postulating some kind of enduring residue of the spent response.

One could argue that responses leave either enduring cognitive representations or lasting neural traces that get reinforced by the succeeding consequences. Reinforcement of neural traces of responses has received little study, but there is growing evidence that cognitions can partly determine how consequences affect behavior. It has been shown that behavior is not much influenced by its consequences until the point at which contingencies are discerned (Dawson and Furedy, 1976; Dulany, 1968); misinformation conveyed about the prevailing schedules of reinforcement can outweigh the influence of actual consequences in the regulation of behavior (Kaufman, Baron, and Kopp, 1966); behavior that is positively reinforced does not increase if individuals believe from other information that the same actions will not be rewarded on future occasions (Estes, 1972); and the same reinforcing consequences can increase, reduce, or have no effect on behavior depending upon whether individuals are led to believe that the consequences signify correct responses, incorrect responses, or occur noncontingently (Dulany, 1968). If cognitive determinants are disavowed or simply relegated to an epiphenomenal status, the question remains as to how functional relationships are created through juxtaposition of consequences and nonexistent events.

*Control of Reinforcers.* Conceptualizations of self-reinforcement have always stated explicitly that organisms have free access to reinforcers because they exercise control over them. Catania needlessly raises alleged problems with this criterion as well, by failing to distinguish between availability and free access. There are large sums of money available in local banks, but individuals are not granted free access to the supply. Consider, with this distinction in mind, Catania's example of the shopper surveying shelves of commodities: "The shopper may take the commodity and leave the store with it (perhaps chancing an arrest for shoplifting), or the shopper may leave the store with the commodity only after paying the teller. Because the commodity is available for the taking at all times, is it not appropriate to say that the paying is a response that is self-reinforced by the taking of the commodity?" Certainly not. Store managers make goods continually available, but they control them; shoppers are at liberty to take the commodities whenever, and in whatever quantities, they choose provided they negotiate transfer of control through payment. In many of the material rewards of everyday life, money provides the open access. Thus, for example, individuals do not own theatres but they are free to purchase their way into them anytime they wish.

Once again the predicament posed by Catania arises from equating the multifaceted operation of self-reinforcement solely with the self-delivery response. Shoppers paying to gain commodities constitute the self-delivery responses. In self-reinforcement individuals either already possess the reinforcers or are free to get them when they so choose, but they do not reward themselves until they achieve conditional performances. The shopping activity would qualify as an instance of self-reinforcement if individuals withheld treating themselves to appetizing foods, movies, or prized goods until they completed activities they assigned to themselves.

After citing the shoplifting case and other examples in which rewards are consumed noncontingently, Catania asks rhetorically, "What then is the essence of the concept of

self-reinforcement?" The essence is easily captured by reflecting upon the defining criteria of the phenomenon.

*Distinction between Induction and Testing Conditions.* In analyzing paradigms for investigating self-regulated reinforcement, it is essential to distinguish training from testing conditions. Mahoney and Bandura (1972) devised a self-reward procedure for animals to examine more definitively some of the rudimentary processes in self-reinforcement that cannot be easily elucidated with humans who have undergone years of social learning. In this paradigm, animals are taught to self-reward their own performances by presenting them with food in advance, but if they help themselves to it before performing appropriate responses at a designated level, the food is temporarily withdrawn. Eventually, animals learn to make the food reinforcers contingent upon appropriate behaviors even though the reinforcers are continually present.

After animals learn to adhere to performance requirements for self-reward, punishment by loss of reinforcers for self-feeding without prior working is discontinued. Thus, during this testing phase, animals are free to consume the food reinforcers, which are continually present, without any punishment even if they treat themselves to the food before performing appropriate responses. Measures are obtained of how long animals continue to impose performance requirements for self-reward.

In speculating about the process by which self-administered rewards affect behavior, Catania presents a schematic diagram comparing the temporal relationships among requisite behavior, access to reinforcers, and consummatory responses for externally- and self-regulated reinforcement. The presentation is potentially misleading because it fails to distinguish between training and testing conditions. For example, Catania reports that the relationship between behavior and access to reinforcers is similar in external and self-reinforcement, and that in both instances there is a higher likelihood of reinforcers being present if a response has occurred than if it has not. This statement describes the training conditions, but it does not accurately represent the response-reinforcer dependencies during tests of self-reinforcement. Under testing conditions, reinforcers are continually present, there is free access to them at all times, and they can be consumed independently of responding without loss of rewards, or any other negative consequences for that matter.

### **Process of self-reinforcement**

We turn now to the issue of whether people can exercise some influence over their own behavior by arranging incentives for themselves in response-contingent relationships. In recent years enhancement and maintenance of behavior through contingent self-reward has been studied extensively under both laboratory and natural conditions. These investigations differ considerably in choice of self-rewards, self-reinforced behavior, and experimental methodologies. Among the self-rewards are included such diverse incentives as food, tokens redeemable for valued objects, money, televised material, preferred activities, and self-praise. An equally diverse range of behavior, comprising manual activities, academic performances, social behavior, and refractory personal habits, has been modified through self-reinforcement.

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Results of these numerous studies demonstrate that effortful performances can be effectively increased and maintained over long periods by contingent self-reward. In experiments using intergroup comparisons, subjects who reward their own behavior exhibit significantly higher levels of responding than those who perform the same activities but receive no reinforcement, are rewarded noncontingently, or monitor their own behavior and set goals but do not reinforce their own performances (Bandura and Perloff, 1967; Bellack, 1976; Felixbrod and O'Leary, 1973; Bolstad and Johnson, 1972; Glynn, 1970; Jeffrey, 1974; Johnson, 1970; Litrownik, Franzini, and Skenderian, 1976; Mahoney, 1974; Montgomery and Parton, 1970; Speidel, 1974; Switzky and Haywood, 1974).

Other studies, which measure level of performance under baseline and different reinforcement conditions, reveal substantial increases in self-reinforced behavior when subjects reward their own attainments (Drabman, Spitalnik, and O'Leary, 1973; Glynn, Thomas, and Shee, 1973; Kaufman and O'Leary, 1972; McLaughlin and Malaby, 1974). Findings based on intergroup comparisons are further corroborated by results of intrasubject reversal designs measuring performance across successive baseline and self-reinforcement conditions without any confounding effects of prior external reinforcement. All children enhance their level of performance when they self-reward their own efforts, and they reduce their productivity when they no longer arrange incentives for themselves (Glynn and Thomas, 1974). As the latter findings reveal, self-reinforcement contingencies can be suspended and the behavioral effects measured just as changes in responding can be assessed after external contingencies have been discontinued or after reinforcers are administered independently of performance.

Most of the experiments cited above also compare level of performance under externally- and self-regulated reinforcement. People who engage in contingent self-reward perform as well or better than do their counterparts whose behavior is reinforced by others. Although both procedures alter behavior, the practice of self-reinforcement can have the advantage of developing a generalizable skill in self-regulation that will be continually available. It is perhaps for this reason that self-reinforced behavior is sometimes maintained more effectively than if it has been externally regulated (Jeffrey, 1974).

Researchers favoring intrasubject designs are inclined to discount empirical evidence from intergroup comparisons on the grounds that it is presented in the form of group performances and statistical evaluations of significance (Catania, 1975). In the case of self-reinforcement, facts are not easily discounted when they are replicated by intergroup, intragroup, and intrasubject reversal designs. However, because the methodological issue is often raised in the study of other phenomena as well, the criteria used for making inferences from data deserve some comment. Preference for subjective judgments of variations in individual performance over statistical evaluations of multiple data does not necessarily establish the former approach as the more stringent one for identifying causal relationships. Advocates of intrasubject designs often argue that visual appraisal of individual data yields better evidence concerning functional relationships than does statistical analysis of group data. The claim is debatable.

Interpreting intrasubject changes poses no problems when behavior is highly stable during baseline assessment and when treatments are so powerful that performances during baseline and treatment conditions never overlap. But most factors are not that powerful when manipulated separately because behavior is typically regulated by multiple interacting variables and not every potential determinant can be controlled. Consequently, results are usually not that orderly. When researchers are asked to judge variability in the behavior of an individual across successive conditions, they do not always agree among themselves as to whether or not interventions have produced an appreciable change in level of performance (Jones, Weinrott, and Vaught, 1975). They tend to be better at detecting nonsignificant changes than in detecting significant ones. Eventually statistical analysis may replace visual inspection in the evaluation of intrasubject variability. But gaining consensus on intrasubject change is only part of the interpretative reliability problem.

Eventually researchers must move beyond inspecting individual cases to generalizing about whether a given variable influences behavior. The single-case methodology provides no criteria for determining what generalizations are warranted, given the commonly observed heterogeneous results from different individuals. Typically, procedures are applied only to a few cases; the successes are attributed to the procedures, but when effects do not obtain, the procedures are assumed not to have exercised their usual control in the negative cases. The possibility that the observed changes in behavior resulted from unrecognized factors that happen to covary with the manipulated one is rarely considered. The irreversibility of learning processes and the confounding of successive operations by previous influences hardly justifies sole allegiance to intrasubject replication designs. Without objective criteria for evaluation, investigators are likely to differ in how they interpret the same data on the basis of visual inspection of fluctuating baselines, mixed effects of initial treatments on different individuals, and confounded results from successive reversals of baseline and treatment conditions.

Investigators using intergroup designs not only collect more data for gauging the generality of lawful relationships, but they typically require a higher level of replicability before ascribing causal significance to a variable. For example, in quantitative evaluation by the Sign Test of differences between matched groups of five subjects each, all the treated subjects would have to out-perform the baseline controls before the variable will be said to have influenced the behavior. It is safe to say that, whenever statistical analyses yield significant intergroup differences, one can find more than ample evidence of lawful relationships by inspection of the individual cases.

Statistical evaluation of data from numerous subjects can indicate a causal relationship even though the effects do not occur in every case. Some writers have therefore concluded that group data obscure individual behavioral processes. But the same problem of abstraction from particular instances arises in drawing generalizations on the basis of visual appraisal of variable results from individual cases — here, too, lawful relations are claimed although the effects are not demonstrated in every single case. Hence, disputes about the methodologies for identifying the determinants of behavior ultimately reduce to whether one prefers inspectional or quantitative evaluation of generality.

It should be noted in passing that intrasubject and intergroup designs are not incompatible. One can examine how each individual is affected by experimental proce-



dures during induction or successive phases, and also compare statistically whether the individual demonstrations of the phenomenon occur more frequently among subjects who receive the procedures than among those who do not. Adding baseline comparison groups and quantitative evaluation of data in no way detracts from inspection of individual variability. Rather, it encourages studying more cases and requires a higher proportion of individual demonstrations of effects before causal relationships are claimed. Intrasubject replication combined with intergroup quantitative evaluation provides the most rigorous method for identifying the determinants of behavior.

### **Alternative explanations of the process of self-reinforcement**

Several alternative explanations have been proposed for why contingent self-reward enhances performance. These various interpretations are considered next.

*Self-Awareness.* Catania (1975) attributes the behavioral effects of self-reward to the development of "self-awareness." Self-reinforcement increases behavior because the behavior provides a discriminative stimulus for self-reward. In this view, the process of self-reinforcement becomes a matter of "self-discrimination," "self-awareness," or "self-monitoring." This type of analysis essentially amounts to explanation by description of one of the component processes operating in the phenomenon.

It is true that behavior that matches or exceeds referential standards signifies the occasions for self-reward. However, enhancement of self-reinforced behavior cannot be ascribed simply to awareness of when it is appropriate to reward oneself. An explanation contending that individuals engage in behavior over a period because they later notice that they have met a performance standard, places the cause after the effect. People enhance their behavior by contingent self-reward, not because of self-awareness, but because they withhold from themselves desired incentives until they achieve self-prescribed standards. It is the subjects' *regulation* rather than *awareness* of the response-reinforcer dependency that is the critical factor. In the case of students who increase their study activities by making coffee breaks contingent on completing ten pages of a reading assignment, discriminating when it is appropriate to tap the coffee pot is of secondary interest in explaining how self-reinforcement augments behavior.

Theorists working within the operant framework subscribe to the view that awareness is a by-product rather than a determinant of performance. Being aware of aspects of one's behavior does not cause the behavior of which one is aware. Thus, in positing that self-awareness causes behavioral changes, Catania appears to be abandoning the very theory he is embracing.

The weight of the evidence is heavily against attributing the effects of conditional self-incentives solely to self-monitoring. As a rule, simply observing and recording one's own behavior has no consistent behavioral effects (Kazdin, 1974). When self-monitoring does produce change, it is likely to be under circumstances that activate covert goal-setting and self-evaluative consequences. Moreover, many of the investigations of self-reinforcement explicitly include controls for the effects not only of self-monitoring but of goal-setting as well. Both children and adults who monitor their performances and goal attainments and reward themselves for goal achievement typically surpass their counterparts who also monitor their own performances and goal attainments but never

engage in overt self-reinforcement (Bandura and Perloff, 1967; Bellack, 1975; Flaxman and Solnick, 1975; Mahoney, 1974; Switzky and Haywood, 1974). Those who self-monitor and receive feedback on goal attainments often do not perform any better than do baseline control groups.

*Stimulus Salience.* According to Rachlin (1974), performance is increased by contingent self-rewards, not because of their incentive properties, but because they are distinctive stimuli. Results of studies cited above, that include control conditions in which subjects receive distinctive feedback on goal attainments, also have bearing on this conceptualization. Neither vivid stimuli signaling goal attainments nor contingent self-administration of tokens lacking material value have demonstrable effects on behavior, whereas valued self-rewards augment performance (Bandura and Perloff, 1967; Flaxman and Solnick, 1975). It would be further predicted from social learning theory that the greater the value of the self-reward, the higher the level of performance.

There is a general observation concerning the process of self-reinforcement that should be offered in this context. Because external and self-regulated reinforcement in all probability change behavior through similar mechanisms, whatever interpretations are proposed for self-reinforcement would apply equally to external reinforcement.

*Social Demand.* Another explanation that is routinely invoked, whatever the phenomenon might be, is that of "demand characteristics." This is a descriptive term used as though it were explanatory. To designate changes as demand effects does not explain them. All forms of social influence (e.g., comments, environmental displays, instructions, persuasive appeals, conditioning, modeling, reinforcement) represent demands in the sense that they function as prompts for behavior. Social influences are therefore better analyzed in terms of their explicitness, coerciveness, and whether they change behavior directly or through cognitive processing, rather than whether they involve demand properties.

Characterizing the effects of self-reward as manifestations of social demand receives little support from findings of control conditions. As was previously noted, control subjects perform under identical circumstances except they do not reward themselves. In studies in which social demands and contingent self-rewards are varied factorially, performances that are difficult to maintain are enhanced by self-reward but are unaffected by increasing social pressure to engage in the activities (Flaxman and Solnick, 1975). Evidence that self-reinforcement functions established under specific modeling conditions operate over a long intervening period in dissimilar situations with different persons, and on different tasks (Lepper, Sagotsky, and Mailer, 1975; Sagotsky and Lepper, 1976) is not easily explainable in terms of situational demands.

*Self-motivation.* Reinforcement operations can affect behavior in several different ways. Explanation of reinforcement originally assumed that consequences increase behavior automatically without conscious involvement. This view emphasizes the automatic *strengthening function* of response consequences. Although the empirical issue is not yet fully resolved, evidence that human behavior is not much affected by consequences until the point at which the reinforcement contingencies are discerned, raises serious questions concerning the automaticity of reinforcement. Therefore, if reinforcement is equated with automatic response enhancement, then most external regulation of human behavior through consequences would not qualify as "reinforcement." The

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notion of "response strengthening" is, at best, a metaphor. After responses are acquired the likelihood that they will be used in any given situation can be readily altered by varying the effects they produce, but the responses cannot be strengthened any further. Thus, for example, people will drive automobiles for the resulting benefits, but the benefits do not add increments of strength to the driving responses.

It is fortunate that consequences do not automatically enhance every response they follow. If behavior were reinforced by every momentary effect it produced, people would be overburdened with so many competing response tendencies that they would become immobilized. Limiting behavioral effects to events that are sufficiently salient to gain recognition has adaptive value. However, for lower organisms possessing limited symbolizing capacities there are evolutionary advantages to being biologically structured so that response consequences produce lasting effects mechanically without requiring symbolic processing of ongoing experiences.

Consequences can alter behavior through their *informative function*. By observing the differential outcomes of their actions, individuals eventually discern which responses are appropriate in which settings. Reinforcing consequences thus serve as an unarticulated way of informing performers what they must do to gain beneficial outcomes or to avoid punishing ones. Findings of research cited earlier show that people regulate their performances in accordance with contingency and schedule information even though it may not accurately reflect prevailing conditions of reinforcement.

The informative function of reinforcement is not involved in self-reinforcement because, in setting their own standards and rewarding their own attainments, participants know full well from the outset what performances they require of themselves for self-reward. In studies of self-reinforcement, control subjects, who monitor and set goals for the same activities, are likewise fully informed of the requisite behavior.

In the third mode of operation, consequences enhance behavior through their incentive *motivational function*. If valued rewards can be secured by performing certain activities, then individuals are motivated by the incentives to engage in those activities. A vast amount of evidence lends validity to the view that reinforcement serves principally as a motivational operation rather than as a mechanical response strengthener.

According to social learning theory (Bandura, 1976), self-regulated reinforcement augments performance mainly through its motivational function. By making self-reward conditional upon attaining a certain level of performance, individuals create self-inducements to persist in their efforts until their performances match self-prescribed standards. The level of self-motivation generated by this means will vary as a function of the type and value of the incentives and the nature of the performance standards. In analyzing changes resulting from reinforcement operations, whether they be externally- or self-regulated, the robust motivational functions should be given priority over the elusive strengthening function.

The dubious status of both automaticity and response strengthening, and the vestigial connotations of the term reinforcement make it more fitting to speak of *regulation* than *reinforcement* of behavior by its consequences.

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