

**CONTRIVED REINFORCEMENT**  
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There is nothing new about the modification of behavior. Teachers have always modified the behavior of their students and students the behavior of teachers. Employers have always modified the behavior of employees and employees the behavior of their employers. Therapists modify the behavior of those they help and those who are helped the behavior of their therapists. Governors modify the behavior of the governed and the governed the behavior of the governors. Parents modify the behavior of their children and children the behavior of their parents. As friends, lovers, and acquaintances we modify the behavior of each other. The only thing that is new is a better understanding of how we do so, derived from the experimental analysis of behavior. Those who claim to be changing minds or feelings through persuasion or argument are really changing behavior by changing its consequences. Through behavior modification we are said to intervene in the lives of others and manipulate them, and whether we should do so is said to be an ethical question, but it is a question that can be answered by looking at another kind of consequence.

Sugar is a strong reinforcer for the human species. We put sugar in some of the foods we eat because our behavior in doing so is reinforced by the consequence. At one time the susceptibility to reinforcement by sugar had great survival value because there were only a few sweet food and there were usually nutritious. A high susceptibility to reinforcement by sugar promoted extremely valuable behavior. Whether we should eat sugar now is a question about another consequence. In the world today that susceptibility leads to obesity an illness.

We put sugar on some food we give children because they are then more likely to eat it. If our behavior in doing so has been reinforced by the fact that their health is improved, we shall be commended, but we shall not if the important consequence is getting breakfast out of the way without troubles. When manufactures coat breakfast cereals with sugar and claim that they do so because children then eat a better breakfast, we look for still another consequence.

The systematic use of the operant conditioning "for a purpose" - that is, because the use has reinforcing consequences for the user - has been widely debated. Sometimes the complaint is that consequences are not natural. In *The Shaping of a Behaviorist* I reported a be of behavior modification in our daughter Deborah when she was about nine months old. I was holding her on my lap, and when the room grew dark I turned on a table lamp beside the chair. She smiled brightly, and I decided to test the light as a reinforcer. I turned it off

waited until she lifted her left hand slightly, and then turned it on and off quickly. Almost immediately she lifted her hand again and again I turned the light on and off I waited for bigger movements and she was soon raising her arm in a wide arc "to turn on the light".

Because I had contrived these contingencies, I could be said to have *manipulated* her behavior. But suppose I had simply put a rattle in her hand and she had moved it, heard it rattle, and shaken vigorously. Could it be said that I – or, for a matter, nature – had been guilty of manipulation? In both cases the simple fact was that a movement of the arm was followed by a reinforcing event. But there may be other consequences. Although we do not give babies rattles in order to make them wave their arms, the babies are happier and less likely to fret. Only if Deborah had accidentally come upon something that rattled and had begun to shake it vigorously would there be no charge of intervention or manipulation. But is it an important difference?

Natural consequences can, in fact, be troublesome. Certain inadequacies in the evolution of operant conditioning lead, for example, to superstitious behavior, usually wasteful if not harmful. There are many natural systems which stretch a mean variable - ratio schedule - to the point at which as in the case of the pathological gambler, the behavior is called irrational. Sugar is only one of the reinforcers to which a susceptibility evolved in a very different environment and is now out of date. Indeed, it could be argued that the human species has reached its present position largely because cultures have managed to shield the individual from the reinforcing effects of the natural environment.

Nevertheless, natural reinforcing contingencies have much to be said for them. They are usually much more effectively contingent upon the topography of the behavior (the noise of the rattle was more precisely contingent upon movement than the flashes of light) and the occasion upon which occurs (shaking the rattle was more likely to be evolved by similar occasions than raising the arm). In general, by allowing natural contingencies to take control whenever possible we generate behavior that is more likely to be appropriate to any occasion upon which it may occur again, and in doing so we promote the survival of the individual, the culture and the species.

Education offers good examples. The earliest consequences in education, not to be confused with the education that occurs in daily life, were contrived: schoolboys (there were not schoolgirls) were beaten when they did not study. The connection between studying and avoiding aversive consequences of not studying. A long line of educators, beginning with Rousseau and ending, perhaps with John Dewey and his followers, tried to replace these contrived consequences with natural ones. They also sought to replace aversive consequences with positively reinforcing ones. It was a plausible move: children

learn in real life without the help of contrived aversive contingencies; why should they not do so when being taught? It was only necessary to bring real life into the classroom or make the real world an educational environment. A child should learn to read or write only when the natural consequences were important.

It has taken many decades to discover that there are no natural consequences which can be efficiently used to shape the early stages of reading and writing. The behavior is too much the product of an advanced culture. Special contingencies must be contrived. (Only later will reading and writing have their natural consequences.) A number of learning centers in the United States provide a good example. Following instructions from cassette recorders students respond on worksheets, and their behavior is immediately reported to as a correct or incorrect by a magic ink effect. There is no natural connection between responding correctly to a word or passage and the appearance of a particular mark on a paper, but under these conditions children learn to read quickly and easily. It is only later than the natural reinforcers which writers put into their work come into play.

It is a lesson we might have learned from the rattle. Why is the production of a light or noise reinforcing? We can understand why nature should have given nutritious food reinforcing properties – or to put correctly, why a susceptibility to reinforcement by certain properties of nutritious food should have survival value and hence should have been selected as a characteristic of the species – but what is the survival value of making noise? A similar question has been asked about the survival value of play. The fighting play of young puppies is no doubt a stage in their maturation, but it is also a stage in which rudimentary forms of behavior are modified and made more effective by their consequences. Consequences having no survival value in themselves shape behavior which will be more effective when the consequences begin to contribute to survival. Play is a kind of education for life. As nature prepares the puppy to be a serious fighter by contriving consequences which shape effective play, so the educator contrives contingencies which make it possible for the student to act effectively in uncontrived circumstances later on. Much the same thing may be said for many aspects of therapy. By contriving relatively unambiguous social contingencies, the therapist builds a repertoire which will be naturally effective in the client's daily life.

The contrived contingencies of both education and therapy must eventually be terminated. Teacher or therapist must withdraw from the life of student or client before teaching or therapy can be said to be completed. Rousseau stated a preference for natural reinforcement with a useful phrase: the student must become "dependent on things", where "things" include people who are not acting as teachers or therapists.

There are two fields, however, in which it is usually believed that contrived contingencies must be maintained indefinitely. One is economics: the first "production of goods" must have had natural consequences. Food was immediately contingent on gathering and later on harvesting after planting and cultivating. A useful club or a digging stick was contingent upon the behavior of fashioning it. Contrived economic reinforcers arose with the exchange of goods – when, for example, a person gathered food and exchanged it for a digging stick. The gathering was reinforced by the stick, which was not naturally connected with the behavior. Since better necessarily involves two or more people, it is largely a system of contrived consequences, and money is, of course, the archetypal contrived reinforcer.

Modern industry is all too aware of its faults. Contrived reinforcers are seldom sharply contingent on the topography of the behavior. Craftsmen are more likely to work industriously and skillfully because certain features of what they make are naturally contingent upon the making, whereas the wages paid for production-line work are much less closely related to what the worker does. A supervisor with the power to discharge is needed to offset this weakness. Pay by the day or week is often mistakenly called reinforcement, where its real function is to establish a standard of living from which the worker can be cut off. An authority recently said that production in industry "depends in great part on subordination, discipline, and acceptance of managerial authority". Note that no reference is made to any positively reinforcing consequences, natural or contrived.

The contrived reinforcer called money remains effective only when it has been exchanged with strongly reinforcing goods. In the 19<sup>th</sup> century the problem was solved with a hungry labor force, but today the goods for which wages are exchanged are much less essential. Social security and health insurance have changed the conditions under which money is reinforcing. Industrial managers therefore look for other reinforcers – the good opinion of the worker's associates, a closer contact with the product, and so on, and these are much more likely to be natural consequences.

The second field in which it is generally believed that contrived reinforcement must be maintained is government. The consequences are frankly aversive. The first contingencies were probably natural: people behaved well because of the reactions of those whom they affected. We still often obey people with superior power because by doing so we terminate the conditioned aversive stimulus called a "threat of punishment". The consequence is closely contingent upon the topography of the behavior, but when the power to punish is assigned to a government the contingencies are more likely to be contrived and their shortcomings evident. Courts of law are needed to decide when a law has been violated and when punitive consequences are therefore to be imposed. The

consequences are usually less clearly contingent upon the topography of the behavior, they are delayed. Governmental control move farther and farther away from positive and natural contingencies; we can restore some of the advantages in that control by returning to small groups, such as intentional communities. There are few if any contrived reinforcers in Walden Two, for example. The community has been designed in such a way that it naturally reinforces the behavior needed to maintain it, without the mediation of a government or industrial organization. Unfortunately, it is not easy to see how the world as a whole can dispense with the governments and economic systems in that way.

Another anecdote about my daughter bears on a different use of contrived contingencies. When she was three or four years old I was talking with her at bedtime and rubbing her back. I decided to test rubbing as a reinforcer. I waited until she lifted her foot slightly and then rubbed briefly. Almost immediately she lifted her foot again and again I rubbed. Then she laughed "What are you laughing at?" I said "Every time I raised my foot you rub my back!" She had precisely described the contingencies I had contrived.

Corporate psychologists would say that she had discovered and stated a rule. They would also say that even when she was nine months old she must have discovered the rule in order to raise her arm to turn on the light. Children are said to discover the rules of grammar when they learn to talk. That is one of the mistakes which arise from the concept of knowledge or cognition. A hungry rat presses a lever, receives food, and is then more likely to press again when hungry. That is what we observe. But cognitive psychologists say that the rat has learned, and now *knows* that pressing the lever brings food. A description of the contingencies has somehow been moved into the head of the rat in the form of information or knowledge.

That contention seems more plausible with a human subject because we can apparently impart the same knowledge in a different way – simply by saying: "if you press the lever, you will get food". In other words we can describe the contingencies rather than use them to shape behavior. I could not have told the nine-month-old Deborah to lift her arm because she had not yet learned to respond to that kind of verbal stimulus, but three years later I could have told her to lift her foot. Why should I have bothered to shape the behavior? Why not dispense with contingencies altogether, whether natural or contrived, and impart knowledge in a more efficient way?

The answer concerns a problem which cognitive psychologists have not solved. Contingencies of reinforcement are said to both inform and motivate, but the concept of knowledge only refers to the information. Motivation must be treated separately. We can state a rule, but we must also make sure that it will be

followed and in doing so we find ourselves back again with contingencies of reinforcement.

Contingencies are needed first of all to teach people to follow rules. They must become effective listeners, and that means that they must acquire all the behavior that can be specified in rules if they are to do what the rules describe. Much more important are the contingencies under which they will continue to follow the rules once they have learned them. Early examples of "rule-governed behavior" were presumably the responses people made to orders or commands. A command specifies behavior to be executed and at least implies the aversive consequences of not executing it. The rules of religious organizations are codifications of orders and commands: they identify potentially punishable behavior and identify or imply the punitive consequences of disobedience. The laws of governments are more explicit.

Because the word "rule" repairs something of the coercive nature of contrived aversive contingencies, it does not well describe statements of contingencies involving happier consequences. Advice is an example. To a friend arriving in a large city you say: "If you like good Italian food, go to Luigi's". By following that advice your friend can avoid sampling all the Italian restaurants in town. Taking the advice will have natural rather than contrived consequences, and as a result advice by you and other friends will be more likely to be taken in the future. A warning ("Luigi's is expensive") refers to a different kind of consequence which it is also natural rather than contrived.

The word "rule" also does not well describe the verbal stimuli called directions and instructions. We follow instructions for assembling a piece of equipment if comparable behavior has had reinforcing consequences – namely, possessing properly assembled equipment. We follow instructions in learning how to operate a new piece of equipment if similar instructions have led to effective behavior. We learn to drive a car when someone tells or shows us what to do. (Showing is "verbal" in the sense that it would have no effect if a viewer were not present). Our behavior is at first entirely under the control of the instructions, but the behavior of the car on the road begins to supply natural consequences, and when we have eventually become a skillful driver we forget the instructions.

Proverbs and maxims are generalized advice, accumulated and transmitted by cultures. The maxim "To lose a friend, lend him money" identifies behavior (lending) and a contingent consequence (loss a friend). The consequences of observing the maxim are naturally reinforcing. The "laws" of science allude to natural consequences and are therefore closer to advice, maxims, and instructions, than to the laws of religious and governments.

In general, rules are followed and advice taken only because of consequences experienced in similar arrangements in the past. When there is no relevant personal history a contract is used. A contract describes contingent relations between behavior and consequence: "If you do this, I will do that". Additional aversive consequences of a failure to act are usually implied, if only the loss of the positive consequence specified. The trouble with contracts is that the behavior will not necessarily be more likely to occur again in the absence of a contract. Nevertheless, contract may be useful in instruction if natural contingencies are waiting to take over.

There is no point in advising, instructing, or ordering a person to do something which can not be done. "Don't worry" is seldom, if ever, effective advice because the behavior is respondent rather than operant. Advice like "love your enemies" or "show more affection to your unlovable child" may be heard to follow. Nevertheless, operant behavior associated with no worrying or leaving or being affectionate may have reinforcing consequences. Some effect on the autonomic nervous system may even occur as a by-product.

Advice, rules, laws and other descriptions of contingencies are important to a culture because they enable the individual to profit from the experience of those who have experienced common contingencies and described them in useful ways. But what about contingencies which have never been experienced by anyone? From statements about experienced contingencies, for example, logicians and mathematicians deduce statements about unexperienced contingencies which prove useful. New rules are derived from old. From statements about experienced instances, scientists infer general statements embracing new instances. We respond to those descriptions as we take advice in general, only if responding under similar circumstances has had reinforcing consequences. The "authority" of logicians, mathematicians and scientists and the "trust" we place in them come from our experience in following the rules they derive. Our inclination to respond may also be stronger if a deduction or reference has been "proved" in the sense of being derived in more than one way or confirmed in more than one instance. In general the contingencies involve natural consequences.

Advice involving consequences which have not been experienced but are predicted statistically is hard to take. You are warned that if you continue to smoke you will be much more likely to die of lung cancer or a heart attack, but the warning seldom if ever comes from one who has experienced the contingencies and is now dying. Not are you likely to heed that warning because you have heeded an equally serious one with reinforcing results. If you stop smoking it will not be because the statistics, but because someone has contrived other consequences. A government does so by making illegal to buy cigarettes (as it does in the case of minors), by suppressing advertising which portrays

smoking as admirable and healthful (as it does on television) by making cigarettes more expensive through taxation, by withdrawing financial support of tobacco farmers and (probably less effectively) requiring that a warning be printed on each pack of cigarettes. Educators, therapists and friends censure and complain and reinforce smoking by withdrawing contrived aversive stimuli.

Contrived reinforces are necessary when natural consequences are long deferred. How do we "take the distant future into account?". We can respond fairly well with respect to the immediate future for several reasons. The selective action of operant conditioning (like natural selection) prepare us for a future more or less resembling the past. We also respond to statements about the future made by those who have experienced the contingencies. The statistical predictions just mentioned are based on events which have already taken place, and we observe the laws of logic and mathematics, and science because the past consequences of doing so. But what about events which have never occurred in the experience of anyone?

Certain predictions about the future of the world are of this sort. Something may be happening for the first time. It can be predicted with some accuracy, but the future of the species may depend upon whether there can be any contingencies of reinforcement, contrived or natural, that will induce us to act upon those predictions. We may "know" that certain things are going to happen, but knowing is not enough; action is needed. Why should it occur? That is perhaps the most terrifying question in the history of the human species. It will be answered, if at all, by someone who knows a great deal about contrived reinforcement.