Social Implications of the Variable Ratio Schedule

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[This is an excerpt from "Schedules of Reinforcement," Chapter 17 of the author's book, *General Behaviorology: The Natural Science of Human Behavior* (Fraley, 2008, Canton, NY, ABCs). This part extends the technical details of that chapter to improvements in ongoing cultural concerns.—Ed.]

Games and sports events are often described as being intensely interesting to people, but questions arise about how contrived contests with trivial outcomes could command such attention. Why, it has often been asked, would a contest to toss a ball though a hoop, or to advance a ball to a certain line drawn on the ground, matter that much to people? Why would anyone care? Or, why would a person work for long periods of time to solve trivial puzzles when the outcomes are so inconsequential?

The answer to such riddles is based on schedule effects. It is not the trivial outcome that accounts for the strong control of behavior, but rather the schedule of acquiring those conditioned reinforcers through whatever behavior produces that kind of unimportant outcome. Two points (of the kind scored in a basketball game), considered apart from the game, are worthless, but in relation to the game, they seem important.

We can ask two analytical questions: Why is it fun to win the game, and why is it fun to play the game? Many kinds of reinforcers may be attached to winning the game, so regardless of how points may be earned, it becomes important to earn more points than the opponents. Even if a task is aversive to perform, we may strive to excel in doing it if a worthwhile cache of reinforcers is delivered contingent on posting the best performance.

However, that consideration pertains to the reinforcers that are contingent on winning. Whether or not one finds the game itself interesting to play is another matter, and that is determined by the schedule of reinforcement according to which progress in the game is measured (perhaps by the awarding of points).

If it is arranged that those points are acquired only according to a related set of variable ratio schedules of reinforcement (which is exactly what is accomplished by playing according to the rules for a game such as basketball), then behaving so as to acquire two points will seem important. Like those who actually play the game, the thousands of fanatical sports fans who jam a sports arena exhibit an intensity of spectator behavior that is generated, not by the trivial outcome of scoring points but rather by the *schedule* according to which those conditioned reinforcers are being encountered.

Under a ratio schedule (FR or VR) the reinforcer is encountered sooner if the responses occur in more rapid succession, so that is what tends to occur. The variable ratio schedule insures that those responses are more evenly distributed than under a fixed ratio schedule. That is why any game that is designed to provide reinforcers on a variable ratio schedule (or a related set of variable ratio schedules)[1] will tend to produce a high rate of behavior, seemingly important and often exhibited with emotionally intensified behavioral characteristics.

The circumstantial characteristics of such games are typically constructed to include as many previously conditioned reinforcers as possible. That is done to strengthen the person's involvement and especially to evoke the player's initial participation. Those familiar kinds of reinforcers are used to develop the theme of the game and to determine its topographical features. However, the holding power of the game inheres in its management (through the rules of the game) of the variable ratio schedules of reinforcement by which success in playing the game is defined and attained.

To better appreciate the importance of the variable ratio schedule in producing intense activity (by both players and spectators), imagine a change in the rules of the game that insured a schedule of continuous reinforcement (CR). Suppose, for example, in basketball, a player would be awarded a score merely for shooting the ball, regardless of whether it passed through the hoop. Merely tossing the ball upward would be to score, so every shot would result in a score (a continuous reinforcement schedule). If the other team was given control of the ball after each score and the ball could be shot every time a player got the ball in hand, teams would score an enormous number of points.

Such a game would seem dull and boring if points were thus obtained on a CR schedule. Play would lose its intensity, and few people would watch such games. Clearly, the important aspect in controlling behavior resides with the particular schedule of reinforcement by which the points are acquired, and certainly not with the intrinsic qualities of points per se.

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[1] The phrase *related set of variable ratio schedules* alludes to the fact that most games involve a wide variety of behaviors, each of which occurs under its own variable ratio schedule of reinforcement. The occasionally successful outcomes of those constituent behaviors enable the final kind of behavior that is said to "count" in the sense that it scores points or results in other increments of recorded progress in the game.

Lotteries also operate successfully, because winning occurs according to a variable ratio schedule (VR) that applies to the behavior of buying a lottery ticket. Like all forms of gambling, lotteries generate long and persistent playing behavior because of their intrinsic VR schedules. Governments can raise large amounts of revenue from ticket sales, because the powerful schedule effect of the VR schedule produces far more ticket buying behavior than could be sustained by the reinforcing capacity of the money actually won. After all, most lottery ticket buyers win little or nothing, and people who play regularly over long periods of time necessarily tend to lose more than they win, because the odds favor the sponsoring agency, usually quite strongly.

By further reducing the chances of an individual winning, the state can afford to pay the winner a conspicuously large amount, which draws attention to the lottery and promotes play. People who otherwise would not have purchased a ticket, do so in response to such advertising.

In terms of previously introduced forms of notation, with respect to those people on whom that ploy succeeds, we could describe the public notice of such a large prize as a function–altering stimulus (S^{FA}) that changes a lottery ticket from a neutral stimulus to an S^{D} for one's ticket–buying behavior. For newcomers to the lottery, the initially neutral stimulus (ticket for sale) would be classed as an S^{N}, while for old customers who had previously quit playing under the weight of their losses, the initially neutral stimulus (ticket for sale) would be classed as an S^{Δ}. However, whether an S^{Δ} or a general S^{N}, the notice of the inordinately huge prize would convert it to an S^{Ev} (or S^{D}) for a ticket–buying response.

The VR schedule is behaviorally addictive in the sense that it produces more (often *much* more) behavior than the reinforcer could sustain under other circumstances by which it may be contacted. Lotteries have been criticized as taxes on ignorance through which a shrewd elite class contrives to have the unsophisticated masses pay a disproportionate share of the expenses of government programs and operations. However, excessive schedule–induced gambling behavior (often attributed to an *addiction* to gambling) equally affects persons of differing intelligence[2] and accumulated wealth.

The exhibited pattern of excessive behavior has often been treated as a symptom of disease, but it rarely has anything to do with pathogens or physiological malfunctions. The excessive gambling is of behavioral, not biological origin, although normal physiological differences among individuals leave them differentially susceptible to the effect. The fundamental source of an arguably incorrectly termed gambling addiction resides with those who have arranged to put peoples' behavior under those particular varieties of the variable ratio schedule. (Whether to call a behaviorally induced pattern of intense and high–rate behavior an *addiction* continues to be debated, often in the absence of technical detail about schedules of reinforcement and VR schedules in particular.)

Importantly, understanding the appeal of gambling as a schedule effect does not render one immune to it. Nevertheless, a technical understanding of what is occurring does support the construction of some countercontrols.

Governments publicly justify lotteries in part by emphasizing the benefits realized from the money that they generate, but in deflecting criticisms, governments also seize upon the false but widespread assumptions about human behavior that prevail among the populace. For example, the myth of free will is typically promoted as part of the deception. That is, although the variable ratio schedule of reinforcement controls behavior in a very powerful way (recall, for example, how it is responsible for making people behave as though the trivial behaviors in sports are important), people are assured that they gamble only because they "want to gamble" or "choose to gamble." In general, people are quick to explain their gambling behavior in terms of such fictional causes (i.e., wants, decisions, preferences, desires, choices, etc.).

The traditional social science disciplines, in tolerating and often promoting concepts of free will, have helped prepare the general population to be exploited in that manner. The fallacy is promoted or at least implicitly accepted that within a person a responsible agent called *"self"* exercises its personal autonomy by *choosing* the behavior to be exhibited by the body, including gambling. The special control of behavior that is exerted by reinforcers that are contacted on a VR schedule is downplayed, or more typically, is simply ignored. Instead, appealing to a fictional construct, it may be proclaimed that people play "because of their *desire* to play." Or, appealing to the mythical body–driving agent, it is said that they only play if they rationally "*decide* to play." That implicit self–agent can then be held responsible, as they say, which justifies punishment of the resulting behavior should it be deemed injurious.

The pure power of the schedule, apart even from any private verbal behavior (thinking) about it, has long been demonstrated. For instance, these schedules work equally well in controlling the behavior of laboratory animals that have little or *no* capacity for verbal behavior and cannot exhibit the kind of verbal behavior that people call *deciding*. Schedules of reinforcement describe, and in a sense account for, many behavior patterns that tradi-

[2] Intelligence has been defined behaviorologically as a relatively greater susceptibility to operant conditioning (a.k.a. a greater capacity for rapid learning). That is, a person whose behavior changes more quickly under an operant conditioning procedure (or its natural equivalent) is described as being more intelligent than persons whose comparable behavior change occurs more slowly under similar circumstances.

tionally have been ascribed either to an errant self–agent or to a responsible one.

Those who rely heavily on such a mystical *self* to explain exhibited behavior have been slow to pay attention to the science of schedules of reinforcement and to the implications of such schedules, because the scientific principles of schedules of reinforcement render redundant another large chunk of the putative autonomous will—a mystical capacity (of an equally mystical agent) that can seem important for reasons having nothing to do with science.

An important kind of countercontrol available to an individual at the personal level is through one's verbal behavior about gambling. That is, one's capacity for countercontrol depends on one's own descriptions of (a) the chances of winning, (b) schedule effects, and (c) the social and economic implications of gambling for self and others. Note again, however, that describing to oneself the schedules that are in operation does not render one immune to their effects. Schedule effects, like the effects of contingencies of reinforcement, do not have to be understood by the person in whose behavior they manifest. Nor is immunity to be gained merely through enlightenment (i.e., a football game can be just as compelling to a person who knows all about schedules of reinforcement). However, to put it agentially, at least the person who thinks about the relevant factors may be better postured to arrange some effective countercontrols insofar as that person can logically assess the lasting worth of the experience in relation to its felt worth.[3] After all, the quality of any given class of reinforcers inheres in the implications of whatever kind of behavior that it strengthens.

As a first step in arranging some countercontrols, one can describe in a technical sense what is happening to oneself under such a schedule. The subsequently designed countercontrols may take such forms as prevention or preclusion, perhaps through arranging that some incompatible behavior be evoked. While this can occur intuitively, a more educated person (a more comprehensively conditioned body) may be better prepared to engage in the necessary analyses and to construct the most effective self–management practices—especially persons who have some training in schedules of reinforcement.

The lottery, with its VR schedule, will produce high rates of play by both rich and poor people indiscriminately. Many poor people, who cannot afford to play, do so anyhow, often to an extreme. When such cases are revealed, governments can be embarrassed, and attempts are made to conceal the facts, to change the story, or to prevent revelations about what is really controlling the behavior.

For example, advertisements for lotteries must necessarily expose the public to the behavior–controlling capacity of the VR schedule insofar as that advertising is intended to promote ticket buying. Such advertisements will commonly include admonitions to "play responsibly"—an appeal to the nonexistent self–agent for the exercise of good judgment in deciding the fraction of one's resources that are to be expended on gambling. However, it is the VR schedule, not a fictitious willful self, that actually fosters the excess play that often characterizes gambling behavior. In spite of included admonitions to exercise appropriate self–control, the composition of those advertisements insures the display of strongly evocative and saliently presented stimuli, cloaked in a package of appealing features, that tend to evoke whatever behavior will bring a viewer under control of the VR schedule of the advertised game.

Governments, desperate for revenue and confronted with resistance to tax increases, often turn to the easy exploitation of addicts of both the physiological and behavioral kinds. It may be argued that the citizens, in general, are too ignorant and unsophisticated to tax themselves sufficiently to support the kind of abstract social infrastructure that a complex culture requires for the provision of expected services to its members. In the absence of an authoritarian government that can forcefully impose the necessary level of taxation, a democratic government is often left to devices of seduction.

People may be encouraged to become addicts who are then relatively helpless to resist exploitation. A familiar example is the widespread addiction to nicotine nearly all aspects of which are kept legal. Once a person is addicted to nicotine, governments can successfully raise taxes on tobacco products to extremes that would not be possible for taxes on other commodities, while the myth of personal responsibility by self–agents allows the pathetic victim to be held responsible and treated with contempt that distracts attention from a more astute analysis.

Another important example features the behaviorally induced addiction of people to the effects of the VR schedule in the form of lotteries. It has the intrinsic advantage of appearing not to be a tax, which remains a problem with taxes on tobacco products, because nicotine addicts in democratic cultures can still vote. With a government sponsored lottery, a government can exploit behaviorally addicted people who fall victim to the VR schedule thereby making up the shortfall from publicly supported schemes of outright taxation. Members of the exploited class, indoctrinated with the myth of free will, are taught

[3] Regardless of the implications of this common way of writing, the verbal behavior to which this sentence alludes does not really represent the proactive behavior of an internal behavior–managing agent whose specialty is cognition. That verbal behavior, like all other behavior, is evoked by environmental events. Once it occurs, it too thereby becomes a real environmental event that can share in the antecedent control of the individual's further behaviors, and that is how verbal behavior has its most important kind of effect (see Chapter 26).

to accept personal responsibility for any adverse consequences of their gambling losses. (See the following newspaper article.)☘

FROM: The Daily Athenaeum—West Virginia University, Friday, Oct. 17, 1986, Vol. 99, No. 38, p. 1.

Disabled Miner Strikes it Rich

CHARLESTON (AP) – A disabled coal miner who didn't even have a bank account captured the West Virginia Lottery's biggest payday by winning $5.6 million yesterday in the weekly jackpot contest.

Glen Stanley, 51 of Point Pleasant, was the last of eight contestants to spin the jackpot wheel yesterday morning. He is the first jackpot winner since May and the biggest winner since the lottery started 11 months ago.

Stanley worked for Southern Ohio Coal Co. until three years ago, when he hurt his back. The Mason County man said he has been supporting his family with $1,400 a month in disability checks.

"About all my life I've worked hard labor." he said. "The first thing I'm going to do is take care of my family. Then I'd like to set up some sort of fund to feed the hungry children." Stanley is married and has six children ranging from 28 to 11.

He also said he would buy a new house—"I don't like where I live now"—and eventually would like to open a family business, although he said he did not know what it would be.

"I haven't made me no plans," he told reporters at a news conference following the jackpot spin. "I think I'll just rest a while."

Lottery Director Ralph Peters said Stanley will receive a $224,000 check from the state every year for 20 years. The federal government is withholding 20 percent of Stanley's winnings for taxes.

Eight jackpot contestants each week earn a chance to spin a wheel for prizes from $2,500 and up by being chosen in a weekly drawing of winners in the instant lottery game.

After spinning the wheel yesterday, Stanley was taken aside by Peters, who advised him to take his check to the bank immediately. When Stanley said he didn't have a bank account, Peters said. "I'm sure any bank would be glad to help you."

At the news conference, Stanley said he went from buying a few of the lottery tickets a month to "about three tickets a day, lately." He said the $1–a–shot gambling chances ate into his limited budget, "but I just thought I might hit something someday."

Lottery show hostess Nancy Hill—also standing at the podium—interrupted Stanley to say that surely he didn't buy "that many" tickets.

"Overall, you only bought a few tickets a month, isn't that right?" she said. "We find that most people who can't afford the tickets don't buy them."

"Oh, we never bought them when we couldn't afford them," said Stanley's wife, Helen. "We had bills to pay first."

State lottery officials maintain that the game doesn't entice the poor to use their limited budgets on lottery tickets.☙

Quoted

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[This quote originated as the third footnote, and its source paragraph, from p. 593 in Chapter 18 ("Adjunctive Behavior") of the author's 30–chapter book, *General Behaviorology: The Natural Science of Human Behavior,* (2008), Canton, NY: ABCs. This quote relates a consideration that has applications in contexts far wider than just the topic of its source chapter; for this reason the footnote and its source paragraph are presented here.—Ed.]

… During analyses of operant behavior, the conceptual scheme afforded by the sciences of probability and chaos serve as conceptual devices for managing our ignorance about some of the controlling relations that share in determining the observed behavior. Contrary to fashionable rhetoric, those sciences do not impugn the basic assumption of determinism. They are simply ways of generating the somewhat imprecise descriptive statements that the limited available data will support when no means are available to contact data that would lend more specificity to those statements.[3] …

[3] The bases of recourse to the mathematics of uncertainty are inadequacies in the analyses of the behavior–controlling functional relations between the thematic environmental phenomena and the body of the organism that is reacting to them. Note that a descriptive deficiency in the control that a natural phenomenon can exert over the behavior of an organism is not an occasion to declare that natural events occur spontaneously. Put another way, the laws of physics that govern a set of events are not contingent on those laws and events being understood by some observer. Another expression of this idea posits that the functional events that define a natural phenomenon are independent of any neural behavioral reactions of organisms to those events.☙