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REVIEW OF "GAMBLING: BEHAVIOR THEORY, RESEARCH, AND APPLICATION" BY PATRICK M. GHEZZI, CHARLES A. LYONS, MARK R. DIXON, AND GINGER R. WILSON (EDS.)

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Behavior analysis has not devoted much research attention to understanding or treating gambling behavior, yet it clearly has much to offer. Recently, the advent of this journal and other developments has helped to increase the need for, and relevance of, behavior analytic approaches to the study of gambling behavior. The edited volume by Ghezzi, Lyons, Dixon, and Wilson (2006) is testimony to this growing interest. In an effort to further delineate the behavior analysis of gambling behavior, Ghezzi and colleagues have produced a compelling and timely scholarly overview of behavioral research on understanding and treating disorders associated with gambling. The book should serve to stimulate continued research interest in gambling behavior from within the behavioral community.

Key words: behavior analysis, gambling, review.

Gambling on the outcomes of games of chance has been a common feature of human culture for centuries. The available evidence suggests that occasional gambling is not intrinsically harmful. However, the behavior can become problematic when it occurs frequently enough to cause financial and social consequences that adversely impact on daily functioning. Precisely what variables are responsible for this often-abrupt transition from occasional, recreational gambling to pathological gambling are unclear (Petry, 2005).

The prevalence of pathological gambling,

which is a recognized disorder in the *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV TR*; American Psychiatric Association, 2000), varies across countries. In the United States, conservative estimates suggest that between 1% and 3% of the population has a problem with gambling (National Gambling Impact Study Commission, 1999). In the United Kingdom, where recently legislation liberalizing gambling has been enacted, the prevalence rate is approximately 1% when people who exclusively play lottery games are excluded (British Gambling Prevalence Survey, 2007).

It is interesting to note that the prevalence of pathological gambling within the general population is higher than that reported for many other disorders, including autism. However, gambling historically has not generated comparable levels of research or clinical interest within the behavior analytic research community. There are potentially two main reasons why behavior analysts have not

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extensively studied gambling behavior. First, the clinics and outpatient centers where pathological gamblers tend to seek services are not settings that typically employ behavior analysts, at least as front-line staff. It might also be speculated that the high comorbidity between pathological gambling and substance abuse disorders means that gamblers usually seek front-line psychiatric and psychotherapeutic services before they encounter behavior analysts, if at all. Second, behavior analysts have lacked a coherent conceptual and empirical approach to studying gambling behavior, in all of its forms. In much the same way as the behavior-analytic explanation that slot machines operate according to variable ratio schedules of reinforcement was found to be incomplete and technically inaccurate (Crossman, 1983; Madden, Ewan, & Lagorio, 2007), the same can be said for an analysis of the “very complex control” (Skinner, 1953, p. 396) exerted by a gambler’s reinforcement history in initiating and maintaining gambling. The emphasis on direct-contingency explanations of gambling, combined with the absence of an empirical research agenda on verbal behavior, has clearly hampered basic and applied behavioral analyses of the environmental determinants of vulnerability to pathological gambling, and allowed other research and intervention approaches to dominate (Weatherly & Dixon, 2007).

Despite these obstacles, behavior analysis clearly has much to offer the scientific investigation of gambling. The relevance of behavior analytic approaches to the study of this behavior has become increasingly evident over the past few years, with both the publication of empirical studies in behavior analytic outlets (e.g., *Journal of Applied Behavior Analysis*, *The Psychological Record*) and the development of this journal which is devoted to publishing such research. In an effort to further delineate the role of behavior analysis in understanding gambling and potentially treating disorders associated with the beha-

avior, an edited volume by Ghezzi, Lyons, Dixon, and Wilson (2006) has brought together experts from the burgeoning behavioral research literature to review the existing research and to discuss priorities for the future. The behavior-analytic investigation of gambling is important because of the potential it offers to alleviate many of the problems related to disordered gambling. Indeed, behavior analysts routinely improve the lives of individuals with other disorders by a rigorous scientific approach based on demonstrating experimental control over basic behavioral processes and then extrapolating findings to the treatment of problems of social importance. This potential that behavior analysis has for understanding and treating gambling behavior is fast being realized, and the book by Ghezzi and colleagues is testimony to this growing interest. Indeed, the book should serve to stimulate more research interest in this topic from within the behavioral community. The book includes twelve chapters arranged into three parts: *Theory*, *Research* and *Application*.

Theory: In the first chapter, Lyons considers what gambling might reveal about the nature of addiction. In a cogent review of the historical development of the DSM system of syndromal classification, he reviews the similarities and differences shared between substance-abuse addictions and gambling. Lyons concludes with a call for research that integrates the biological, psychological, environmental and historical contexts that contribute to individual vulnerability to problem gambling. In Chapter 2, Porter and Ghezzi review the main theories of pathological gambling, including psychoanalytic, biomedical, psychosocial, and cognitive behavioral approaches. Their discussion sheds further light on the relative dearth of behavior-analytic contributions to the study and treatment of gambling. As the authors aptly note, “how pathological gambling is conceptualized ultimately determines how the problem is treated and pre-

vented" (p. 20). Porter and Ghezzi acknowledge that, from a behavior analytic perspective, a coherent empirical analysis of gambling is currently lacking. More importantly, however, they note that our historical reliance on relatively simple, direct-contingency explanations of the behavior might be at least partially to blame. Specifically, they discuss the "major barrier ... set by Skinner, who took the position that an analysis of the prevailing contingencies of reinforcement is both necessary and sufficient to understanding how gambling is acquired and maintained and how excessive play may be reduced or eliminated (Knapp, 1997)" (p. 35). The authors also note striking similarities between historical behavior-analytic conceptualizations of gambling and those used to study verbal behavior. Specifically, they note that the development of a behavior-analytic approach to gambling behavior has been impeded by the field's prevailing strategic assumptions in much the same way as occurred in the domain of verbal behavior (Dymond, Roche, & Barnes-Holmes, 2003). However, once researchers ventured beyond Skinner's (1957) initial conceptualizations, our understanding of the behavior increased exponentially. Porter and Ghezzi speculate that same will ultimately be true of gambling behavior. In addition, they highlight the importance of the study of verbal behavior for informing research on gambling.

In Chapter 3, Mawhinney describes the use of an Applied Theoretical Cultural Analytic (ACTA) paradigm to analyze legalized gambling in the United States. His molar analysis of the metacontingencies involved in governmental, societal, and individual involvement in gambling is thought provoking and insightful, and, once again, highlights the need for "closer conceptual analysis of the rule-governed response classes associated with gambling" (p. 83). The central role of verbal behavior in initiating and maintaining gambling outcomes that are, ultimately,

measured at the molar level remains an important research objective in behavior analysis. Mawhinney's ACTA paradigm offers a novel means of approaching the study of gambling across a range of cultural contexts.

Research: In Chapter 4, Lyons considers the methodological issues involved in undertaking behavioral research on gambling. He acknowledges that laboratory research might lack ecological validity because of ethical and practical limitations. Quite obviously, these limitations make it difficult if not impossible to allow research participants to win or lose vast amounts of money in the same way as they might in real-world gambling situations. To attenuate some of the threats to the external validity of gambling research, Lyons presents two broad categories of alternative approaches. The first category involves undertaking naturalistic observation and analyzing public gambling (e.g., lottery) data, both of which have proven useful in understanding gambling behavior. The second category involves undertaking hypothetical wagers during a laboratory task, such as a delay-discounting task, or actually simulating gambling, such as using computer simulated slot machines in the laboratory. Lyons' chapter is a cogent account of the defining features of the behavioral approach to gambling and should prove an invaluable resource to new researchers in designing laboratory-based analogues of gambling.

Weatherly and Phelps' Chapter 5 offers a review of the pitfalls of studying gambling behavior in a laboratory situation. The authors address the myriad variables that one finds in a typical gambling situation (e.g., the choice of playing games of differing payout probabilities and magnitude, etc.) and provide some potential strategies for recreating such variables in laboratory settings. Further, they discuss the relative merits of animal models in overcoming some of the limitations that arise when working with humans. The authors then attempt to synthesize these issues in order to

focus future experimental research. The crux of the issue for Weatherly and Phelps, and the challenge for laboratory research to overcome in the future, is exemplified by the following: “because a researcher cannot allow participants to leave an experiment with less money than they arrived with, laboratory research will seemingly always fail to replicate the potential for debt that casino gamblers could face” (p. 114). They conclude with a call for sustained, systematic lab-based research on gambling, in which animal models have an important role to play (see also Madden et al., 2007).

Given the limitations of studying gambling in naturalistic settings, the development of laboratory simulations is essential. However, if one is not trained in the development of such simulations, gambling research may ultimately prove difficult and costly. In Chapter 6, MacLin, Dixon, Robinson, and Daugherty provide detailed, step-by-step instructions for writing a simple slot machine simulation using Visual Basic.NET®. And it works: students from the first author’s lab, who had never programmed before, wrote their first slot machine simulations in a matter of weeks using this chapter, supplemented with another recommended text by Dixon and MacLin (2003). This chapter should prove to be an excellent resource for novice programmers interested in undertaking a program of gambling research. The authors’ efforts undoubtedly will assist in the proliferation of gambling studies by reducing the response effort involved with programming simulations.

The next two chapters in this section move from general issues to issues surrounding specific topics in the study on gambling. In Chapter 7, Ghezzi, Wilson, and Porter provide an excellent review of research conducted on the “near-miss” effect in slot machine gambling. “Near-miss” refers to manipulations of the probability of winning, which usually entail varying the number and positioning of symbols on or around the payout

line. Ghezzi and colleagues outline the findings of several experiments from their lab that have compared the effects of the number of forced choice trials, percentage of near-miss trials, magnitude of reinforcement (i.e., the “big win”), and the form of the near-miss on choice play. Their findings suggest that, despite the near-ubiquity of behavioral explanations of the near-miss effect (e.g., Skinner, 1953), more research is needed to identify the conditions under which near-misses actually sustain extended slot machine gambling.

In Chapter 8, Dixon and Delaney discuss the impact of verbal behavior research on our understanding of gambling. In particular, they provide an analysis of why the importance of verbal behavior historically might have been underestimated within the gambling literature. Consistent with points made earlier in the book by Porter and Ghezzi (Chapter 2), Dixon and Delaney note that the field’s reliance on Skinner’s (1957) definition of verbal behavior potentially could have impeded its incorporation into analyses of gambling behavior. The authors remind us that Skinner’s conceptual analysis sought to extend basic behavioral principles from the nonhuman laboratory to the domain of human verbal behavior where “consequences were delivered by a listener to a speaker, which differed from the programmed consequences delivered in a laboratory by an experimenter. Skinner’s definition of verbal behavior was one where the behavior of a speaker is mediated by the behavior of a listener” (p.172). However, as many scholars have argued, this seemingly straightforward operant definition meant that there was, in fact, no distinction between verbal behavior and other forms of social behavior (e.g., Chase & Danforth, 1991; Hayes, 1994). It is likely that Skinner himself accepted this, since he admitted that a nonhuman responding for food that is delivered or mediated by an experimenter who has been conditioned precisely to do so constitute, “a small but genuine verbal community” (1957,

p. 108). Adopting such a broad definition of an integral feature of human behavior inevitably lead researchers back to explanations of gambling behavior that were based on direct-contingencies. However, this was an explanatory device available prior to Skinner's analysis and on which research was already well underway in the nonhuman laboratory (Dymond et al., 2003; Hayes, 1994). It seems, then, that without a specific, functional definition of verbal behavior, the behavior analysis of gambling was always going to be restricted.

Dixon and Delaney are cognizant of such limitations, however, and their chapter serves as a veritable call-to-arms for behavior analysts to continue undertaking basic research on the impact of verbal behavior on gambling by adopting contemporary definitions of "rules" and other "verbal stimuli" that are based on functional-analytic criteria (e.g., Hayes, Barnes-Holmes, & Roche, 2001). Their account of gambling as "verbally mediated behavior" (p. 185) involving the transformation of stimulus functions is an example of the empirical and conceptual promise offered by contemporary approaches to the behavior analysis of gambling. The authors also make the case for the need to include pathological gamblers in behavior-analytic research, to devise more experimental analogues or simulated gambling tasks, to offer more salient reinforcers (where ethical constraints allow), and to seek out research collaboration with non-behavioral colleagues.

Application: Given the barriers to studying gambling within naturalistic environments and the central role of verbal behavior in understanding the behavior, researchers often must incorporate a range of measures to provide a more comprehensive analysis of the variables influencing gambling. As a result, traditional psychometric measures relying on self-report often are used. Analyzing the usefulness of such measures in measuring gambling behavior is therefore imperative. In

Chapter 9, Wood and Clapham present the findings of research employing the *Drake Beliefs about Chance Inventory* (DBC) and the *Gambling Behavior Questionnaire*. Both instruments have been used to investigate the nature of gambler's erroneous beliefs and to determine whether such beliefs correspond with particular patterns of gambling. Although correlational in nature, the authors' findings support the continued use of self-report scales such as the DBC in measuring gamblers' erroneous beliefs. Nonbehavioral approaches to the study of gambling place considerable emphasis on the role of private events such as erroneous or irrational beliefs in maintaining gambling (Delfabbro, 2004). Supplemental measures of this behavior either through self-report scales or, concurrent "talk-aloud"/protocol analysis (Ericsson & Simon, 1984), is consistent with the book's oft-repeated need to incorporate verbal behavior into the analysis of gambling. A key limitation of purely self-report scales, however, is that they are restricted in the types of information they reveal about gambling behavior. For example, they are unlikely to predict which individuals are at risk for engaging in pathological gambling or what the consequences maintaining gambling actually are. Despite their usefulness in helping researchers discern particular variables associated with gambling, perhaps an equally important contribution is that they illuminate the complexity of gambling and the need for further refinement of measures designed to capture the myriad of factors influencing gambling behavior.

Another important factor in analyzing gambling behavior is understanding the populations in which this behavior is likely to occur. For instance, one of the six known risk factors (or establishing operations, see Weatherly & Dixon, 2007) for pathological gambling is gender, in that the behavior is most prevalent among adult males. In Chapter 10, however, Knapp and Crossman provide a

compelling review of the research on gambling in children and adolescents. According to some estimates, 86% of children in 4th, 5th and 6th grade had bet money before and 61% had bought a lottery ticket (Ladouceur, Dube, & Bujold, 1994). The authors note that gambling during childhood can occasion problems with the behavior in adolescence. For instance, an estimated 34,000 underage gamblers were escorted from New Jersey casinos alone in 2003. Further, Knapp and Crossman reveal that approximately two thirds of 18-20 year olds have gambled on at least one occasion at casinos. Given the extensive evidence for underage gambling problems, the authors propose that intervention programs should be developed on university campuses. Indeed, while the literature on gambling in children and adolescents has grown almost as rapidly as the gambling industry, a satisfactory research-based understanding of the factors that lead these groups to gamble still is lacking. In a call for more research into these issues, the authors claim, "the opportunities for research are nearly as rich as the owners of the casinos" (p. 225).

Research has shown that the incidence of pathological gambling is proportional to the availability of, and access to, gambling (e.g., Orford, Sproston, Erens, White, & Mitchell, 2003; Petry, 2005). In analyzing such trends, it is important not only to determine factors contributing to the rise in the behavior, but also its effects on individuals and societies. In Chapter 11, Dixon and Moore discuss the economic, social and political impact associated with the development of gambling establishments on Native American reservations. As noted by the authors, Native American reservations are sovereign states; therefore, all gambling profits are tax-exempt. As a result, a number of new contingencies have been put in place for American society. Dixon and Moore offer a behavioral analysis of these contingencies in terms of the discounting of delayed consequences from both tribal and

state perspectives. For example, the authors analyze factors that might induce tribal leaders to establish gambling establishments, despite the risks associated with such endeavors. Perhaps most importantly, the authors reveal how these contingencies ultimately lead to an overdependence on gaming revenue, an increase in problem gambling among tribal and community members, and an increase in crime. The authors' analysis paints a compelling picture of how the detrimental effects of gambling extend beyond the individual and affect society as a whole.

In several chapters of the book, various authors describe the problems associated with pathological gambling. Moreover, they emphasize the dire need for more behavior-analytic research aimed at extending our understanding of the behavior, as well as how to intervene when it becomes problematic. It seems fitting, therefore, that the final chapter reviews the extant literature on effective treatment approaches. In Chapter 12, Petry and Roll describe a cognitive-behavioral treatment for pathological gambling, the aim of which is to develop ways to restructure the environment to reinforce non-gambling behaviors. The authors provide a concise analysis of the environmental factors that might contribute to pathological gambling, and show how these factors can be incorporated into the development of an effective treatment. The authors describe a therapeutic treatment package that includes such strategies as self-reinforcement for non-gambling, identification of the environmental triggers for gambling, and working through the positive and negative outcomes associated engaging in gambling behavior. As noted by the authors, early analyses of the effectiveness of this type of cognitive-behavioral treatment suggest positive outcomes both during treatment delivery, and throughout a 12-month follow-up period. Despite these positive outcomes, there is clearly much work to be done. Petry and Roll's chapter no doubt will serve as a

catalyst for occasioning further treatment research within the field of behavior analysis. Overall, the contributors to this edited volume are to be commended for producing a representative, informative, and timely account of research on the behavior analysis of gambling. The absence of a previous volume on this topic makes comparisons or evaluations of progress difficult. Moreover, to do so might actually miss the point. Perhaps what is most important is that this book clearly demonstrates that behavior analysts *can* make meaningful contributions to the analysis and treatment of gambling behavior, and that they already are doing so. This book confirms that there is much to be gained by an incorporation of behavioral methodology for understanding the origin, maintenance and treatment of gambling problems. Only the future will reveal whether or not our research efforts have proven useful.

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