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CONTEXTUAL CONTROL OF SLOT-MACHINE GAMBLING: REPLICATION AND EXTENSION

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Participants were trained and tested to select stimuli of differing physical quantities in the presence of 2 color contextual cues for more than and less than. Following more than and less than relational training, participants allocated the majority of their responses to the slot machine that shared formal properties of color with the contextual cue for more than, despite the identical payout probabilities of the slot machines.

DESCRIPTORS: contextual control, gambling, relational training, replication, slot machines

Zlomke and Dixon (2006) demonstrated that recreational slot-machine players' preferences for concurrently available slot machines may be altered using relational training procedures. During a pretest, participants allocated responding equally to two slot machines that produced identical reinforcement but differed only in background color (i.e., yellow, blue). Next, the authors used a relational training and testing procedure to establish the two background colors as contextual cues for more than and less than. For instance, the authors presented a gambling stimulus (e.g., playing cards, U.S. money) to the participant and provided reinforcement (a) in the presence of a yellow background if the participant selected a greater quantity than the sample and (b) in the presence of a blue background if the participant selected a lesser quantity than the sample. At posttest, participants allocated a higher proportion of responses to the slot machine with the yellow background (i.e., the same color as the contextual cue for more than), even though identical concurrent schedules of reinforcement were in effect for both slot machines.

Zlomke and Dixon's (2006) findings demonstrate the use of a behavior-analytic approach to understanding the potential role of contextual cues or situational characteristics (Parke & Griffiths, 2007) in the maintenance of slot-machine gambling; however, Zlomke and Dixon's procedures are worthy of examination for several reasons. First, during relational training, the authors presented one sample stimulus and three comparison stimuli on every trial, which is problematic for two reasons. One is that there were multiple correct choices per trial. For example, when \$5 was the sample in the presence of the more than cue, the comparison stimuli were \$1, \$10 (correct), and \$20 (correct). In addition, the use of three comparisons may have inadvertently established the more than cue as equivalent to an opposite cue, preventing the participant from learning all correct comparisons. For example, a participant might consistently select the \$20 comparison as the largest quantity relative to the sample and fail to learn that the \$10 comparison is also

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correct in the presence of the more than cue. Other research indicates that specifying one unambiguous relational response per trial, removing the sample, and presenting differing comparison quantities across trials can enhance training and prevent opposite contextual control from emerging (e.g., Dymond & Barnes, 1995; Whelan, Barnes-Holmes, & Dymond, 2006). Finally, Zlomke and Dixon did not prescreen their recreational gamblers for potential gambling problems; therefore, it is unclear how gambling history or pathology may have contributed to their findings.

The present study sought to replicate and extend Zlomke and Dixon's (2006) findings with several procedural differences. First, during relational training only two comparison stimuli, but no sample stimuli, were presented. Second, more than and less than trials were interspersed from the outset, instead of the three-stage relational training procedure (i.e., less than, more than, and mixed) used by Zlomke and Dixon. The interspersal procedure is more commonly used in research of this kind (e.g., Dymond & Barnes, 1995; Whelan et al., 2006). Finally, the South Oaks Gambling Screen (SOGS; Lesieur & Blume, 1987), the most commonly used assessment of potential gambling problems, was administered to screen participants.

METHOD

Participants

Six participants (2 men, 4 women) from Swansea University, aged 20 to 23 years (M = 21), were recruited via personal contacts. Participants' SOGS scores ranged from 0 to 1 (M = 0.67; SD = 0.52), indicating that none had a potential pathological gambling problem (i.e., a score of 4 or higher).

Apparatus and Setting

The experiment was conducted in a small room that contained a computer (programmed in Visual Basic 2005) that controlled all stimulus presentations and recorded all responses.

Procedure

Slot-machine task (pretest–posttest). The slot-machine task was identical to that of Zlomke and Dixon (2006). Trials commenced with the presentation of the two slot machines on the screen. The participant selected a slot machine to play by clicking on it with the computer mouse. Clicking on a button entitled "bet one credit" activated another button entitled "spin" that, when clicked, rotated the slot-machine reels for approximately 3 s and resulted in either a winning or losing display. A concurrent random-ratio schedule of reinforcement was in effect, in which the probability of reinforcement was .5, and the magnitude of reinforcement was held constant (i.e., one credit net gain or loss). Each gambling response on the slot machines required one credit to spin the display. All participants ended the task with the same number of credits with which they started. Thus, the slot machines differed only in color (i.e., yellow or blue). This 50-trial phase was conducted immediately before (pretest) and after (posttest) relational training and testing.

Relational training and testing. This phase established the yellow color as a contextual cue for more than and the blue color as a contextual cue for less than. Eight sets of three gambling stimuli were used (least-to-most values in parentheses): U.K. currency notes (£5, £10, £50), dice (1, 4, 6), poker chips (£5, £25, £500), letter grades (D−, C+, A+), coins (1p, 20p, £1), jackpots (£5, £10, £20 million), playing cards (4, 9, king of spades), and places in a competition (10th, 8th, 1st place). Participants were trained on four stimulus sets (notes, dice, poker chips, grades) and were tested on the four remaining novel sets (coins, jackpots, places, cards).

The background screen color (yellow or blue) appeared first followed by the two comparison stimuli (e.g., £5, £10) side by side at the bottom

of the screen. Unlike Zlomke and Dixon (2006), no sample stimulus was presented. During training, feedback (i.e., "correct" or "wrong") was immediately presented in the center of the screen for 1.5 s following a response. All trials were followed by an intertrial interval of 2.5 s. When the more than contextual cue (i.e., yellow) was presented, selecting the greater relative quantity comparison was reinforced with "correct." When the less than contextual cue (i.e., blue) was presented, selecting the lesser relative quantity comparison was reinforced with "correct."

Participants were instructed to "choose the correct stimulus by clicking on it" and had to respond correctly across a minimum of 43 of the 48 consecutive trials to achieve the mastery criterion. Immediately after reaching the criterion, participants were exposed to the relational test in which the four novel stimulus sets were interspersed with the previous four trained sets. The program presented tasks quasirandomly, with the constraint that no more than two consecutive trials of the same type (training or testing) may occur. No feedback was presented after any trial, and participants had to respond correctly across 48 consecutive trials to progress to the next phase. If a participant failed to achieve this criterion, he or she was reexposed to relational training and was tested again until responding on all 48 trials was accurate. This stringent criterion was used to ensure that the relations were clearly established before the slot-machine posttest phase. All participants completed the experiment in one session, which varied in length from 25 to 60 min.

RESULTS AND DISCUSSION

Three participants (P1, P4, and P6) achieved the criterion for the relational test on their first exposure, 2 (P2 and P5) on their second exposure, and 1 (P3) on the third exposure (data available from the second author). Overall, these participants required fewer training and testing trials to achieve a more stringent relational testing criterion than that used by Zlomke and Dixon (2006).

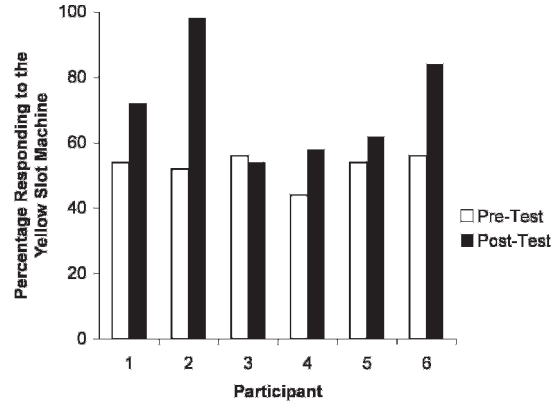

Figure 1. The percentage responding allocated to the yellow (more than) slot machine during pretest and posttest for each participant.

Figure 1 depicts the percentage of responses allocated to the yellow (i.e., more than) slot machine at pretest ($M = 18\%$) and posttest ($M = 71\%$). All participants except P3 allocated the majority of responses to the yellow slot machine at posttest. The mean percentage of responding allocated to yellow at posttest (71%) is slightly lower than the 81% shown by Zlomke and Dixon's (2006) 9 recreational gamblers. A paired samples t test indicated that the differences in response allocation from pretest to posttest were statistically significant, $t(5) = 2.74$; $p < .05$.

The present findings replicate and extend those of Zlomke and Dixon (2006) in several ways. First, the relational training and testing protocol used in the current investigation effectively established contextual functions for yellow and blue for all participants with a maximum of three exposures to the test phase, despite the relatively stringent criterion. The procedure improved on Zlomke and Dixon (2006) by using no sample and two comparison stimuli to avoid potential opposite control by ensuring that there was only one correct response on each trial and by interspersing more than and less than training from the outset. Second, administering the SOGS prior

to participation screened for the presence of potential pathological gambling and ensured that participants who may have produced a high SOGS score did not engage in their pathology during the study. However, participants' low SOGS scores only indicated their likely non-pathological gambling status; prior gambling experience was not assessed. Future studies might consider measuring gambling experience in different groups of pathological and non-pathological gamblers using either simulated or real slot machines, ideally in a natural setting (Weatherly & Phelps, 2006).

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