The Effects of Contingency-Specifying Statements on Impulsive Behavior: Specifying the Dimension of the Reinforcer

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The Effects of Contingency-Specifying Statements on Impulsive Behavior: Specifying the Dimension of the Reinforcer

by

Susan Frances Makdisi

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Submitted to the
Faculty of The Graduate College
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Susan Frances Makdisi
The Effects of Contingency-Specifying Statements on Impulsive Behavior: Specifying the Dimension of the Reinforcer

Susan Frances Makdisi, M.A.
Western Michigan University, 2006

This study replicated and extended research conducted by Douglas J. Navarick (2001) by investigating the effects on impulsive behavior of presenting participants with a contingency-specifying statement (CSS), or a question evoking a CSS. One-hundred two subjects categorized as impulsive, self-controlled, or neutral, based on their number of impulsive responses on a computer program, were divided into three groups: a control group and two experimental groups. Results demonstrated that impulsive behavior decreased when subjects generated accurate and complete CSSs, either with or without the assistance of corrective feedback on verbal or impulsive behavior. Implications for future research on impulsive behavior are discussed.
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Introduction

Impulsive behavior has been defined in behavioral research as the choice of an immediate, smaller reinforcer over a delayed, larger reinforcer (e.g., Critchfield & Kollins, 2001; Dixon, Marley, & Jacobs, 2003; Evenden, 1999; Monterosso & Ainslie, 1999; Navarick, 2001; Sussman, McCuller, & Dent, 2003), and can be interpreted as a greater sensitivity to the relative delay than to the relative magnitude of the reinforcers (Hackenberg & Pietras, 2000). Conversely, self-controlled behavior is defined as choosing a delayed, larger reinforcer over an immediate, smaller reinforcer (e.g., Critchfield & Kollins; Dixon & Holocomb, 2000; Evenden; Sussman, et al.), suggesting a greater sensitivity to the relative magnitude of the reinforcers (Hackenberg & Pietras). Over time, consistent impulsive behavior yields a smaller overall benefit (i.e., total magnitude or quality of reinforcement) for the organism.

A number of maladaptive behavior patterns have been characterized as impulsive. These behaviors include gambling (Dixon, et al., 2003; Navarick, 1998), visiting the dentist infrequently (Critchfield & Kollins, 2001), aggression (Vollmer, Borrero, Lalli, & Daniel, 1999), self-injury, substance abuse (Sussman et al., 2003), and unsafe sexual behavior (Critchfield & Kollins; Monterosso & Ainslie, 1999). The literature on delayed discounting, which refers to a tendency to devalue a reinforcer based on the delay to obtaining that reinforcer (for a review, see Ho, Mobini, Chiang, Bradshaw, & Szabadi, 1999), suggests that those engaging in a variety of risky behaviors, such as drug abuse and gambling, are more likely to discount the delayed reinforcer than others who do not engage in such maladaptive behavior. Such studies primarily focus on the point at which such populations are likely to switch from choosing the delayed, large reinforcer, to
choosing the immediate, small reinforcer. They do not specifically study how to change this phenomenon, although some provide suggestions for possible interventions (e.g., Murphy, Vuchinich, & Simpson, 2001).

Other studies on impulsivity focus on techniques to increase the probability that a client will emit self-controlled behavior, and decrease the probability that a client will emit impulsive behavior. Dixon and Holcomb (2000) successfully increased the frequency of self-controlled behavior in mentally and psychologically disabled adults by implementing a progressive delay procedure: reinforcers of different magnitude were presented immediately, after which the delay to the larger reinforcer was increased gradually while the delay to the smaller reinforcer was held constant. In another study, Vollmer et al. (1999) found that over a number of sessions, two boys with developmental disabilities emitted self-controlled behavior for a higher percentage of trials within a session if the delay to the reinforcer was signaled, i.e., a stimulus was presented after a choice had been made. Both procedures were used with non-verbal or minimally verbal clients.

Verbal stimuli may provide another means of affecting impulsive behavior. Verbal rules have been shown to “serve a role in regulating behavior,” as mentioned by Hayes, Barnes-Holmes, and Roche (2001, p. 16). One way to effectively change behavior through verbal rules is by teaching self-instruction. Jay, Grote, and Baer (1999) found that when four middle-aged subjects with mild developmental disabilities were taught to self-instruct, and then were taught to correspond their behaviors with the self-instructions, they completed a task correctly that was previously taught, but completed incorrectly. Similar results were shown in a study by Grote, Rosales, and Baer (1996).
They found that children who could not previously complete a sorting task were only able to do so after being taught to self-instruct.

In a series of studies, Navarick (1996, 1998, 2001, 2004) examined the effects of vocal verbal instructions on impulsive behavior. The instructions given to participants can be referred to as contingency-specifying statements (CSSs) since the information that was delivered to participants was a statement of the contingencies acting upon particular behavior (Skinner, 1969). Navarick chose to use consumable reinforcers, television programs, in his studies. Use of consumable reinforcers in self-control studies is one way researchers have tried to make reinforcers as close to primary reinforcers as possible (e.g., Hackenberg & Pietras, 2000; Navarick, 1996).

Navarick (1996) exposed subjects to two contingencies: viewing 25 s of video and then waiting 5 s, versus viewing 10 s of video and then waiting 20 s. He found that subjects consistently chose the larger reinforcer over the smaller reinforcer only when instructions were given at the beginning of the session specifying that choice might affect the length of the video clip or the delay time to the video clip. In other words, subjects' behavior was affected by a vocal verbal establishing operation, or more specifically, a statement specifying that choice affects reinforcement, which influences behavior by altering the effects of the reinforcers (Michael, 1982). Navarick (1998) showed that the overall choices a subject made during a pre-test session remained consistent across sessions; although no replication of his procedure has been published.

Navarick (2001) examined the effects of stating the contingency acting upon subjects' behavior. He again presented the subjects with two choices: pressing a left or a right remote control button. The impulsive choice showed 15 s of a cartoon, which was
followed by a 75 s delay before the next choice was presented. The self-control choice started a 55 s delay, followed by 25 s of a cartoon, followed by a 10 s delay. The first session stabilized responses across the baseline (D. J. Navarick, personal communication, May 2, 2005), while the second session assessed whether subjects were more likely to emit impulsive or self-controlled behavior.

During the third session, the group of subjects who pressed the impulsive button more frequently during the second session was divided into three groups. One group was told "the tape will play for a longer period of time if you press the disk on the ___ [side] [the self-controlled choice]." (p. 552). To another group, instructions about the magnitude of the reinforcer were presented, but these instructions specified the number of seconds for which the tape would play. Incidentally, this second group showed a slightly larger decrease in impulsive behavior from the second to the third session than the first group. To a third group of subjects, he gave instructions about the delay of the reinforcer, without specifying the exact number of seconds of delay, as described below.

The subjects who pressed the self-control button more frequently in the second session were also divided into three groups. He told one group "the tape will start sooner if you press the disk on the ___ [side] [the impulsive choice]." (p. 553). To another group he again gave instructions about the delay of the reinforcer, but these instructions specified the number of seconds they would have to wait before the tape played. To the third group, he gave the instructions pertaining to the magnitude of the reinforcer, without specifying the exact number of seconds the tape would play, as described above.

Navarick (2001) found that the delivery of the CSS regarding the magnitude of the reinforcer significantly affected impulsive subjects' behavior, but not self-controlled
subjects' behavior. The delivery of the CSS regarding the delay of the reinforcer did not affect any behavior. These conclusions should be regarded with some skepticism because a significance test was not conducted for the self-control subjects due to the small number of subjects in that group.

Impulsive behavior is sensitive to the delay of the reinforcer. Self-controlled behavior is sensitive to the magnitude of the reinforcer (Hackenberg & Pietras, 2000). Verbal stimuli affect subject behavior. Taking these three statements into account, it follows that a CSS of the magnitude would affect impulsive behavior if magnitude affects behavior more strongly than delay. It also follows that a statement about delay would have no effect on self-control behavior, since self-control behavior is already affected by the stronger dimension of the reinforcer, magnitude.

Navarick's (2004) subsequent study showed that the instructions given in Navarick (2001) did not function as instructions that imply that the student should press either button. This suggests that the subjects were sensitive to the contingency being stated, not to a demand to press the button. Unfortunately, the results of Navarick's studies are limited, as was shown by Navarick (1996) described above: subjects must already be sensitive to a vocal verbal establishing operation since behavior was affected by the contingencies affecting behavior only after subjects were presented with a statement that specified that choice affects reinforcement. Therefore, subject groups for which this experiment (Navarick, 2001) applies are limited; this intervention only applies to those subjects with a previous history of responding to vocal rules. Nevertheless, other interventions using a rule or instruction have been shown to reduce impulsive behaviors,
or to increase self-control behaviors, with verbally-capable clients (e.g., Lucius, Lynne, & Keren, 2004).

The present research attempted to repeat Navarick's (1998) results within this procedural context, showing that behavior will remain constant from one session to the next, and to replicate Navarick's (2001) results on change in impulsive behavior as a function of a CSS about the magnitude of the reinforcer. This study also attempted to answer whether subjects' behaviors were directed by a verbal acknowledgement of the delay, the magnitude, or both of these dimensions of the reinforcer.

The children in the study conducted by Grote et al. (1996), as mentioned previously, were not only able to self-instruct, but were also able to make a verbal instruction which maintained in the absence of their behavior. If a child is capable of making a rule about competing contingencies, a similar rule may then be made about other competing contingencies. Such a self-made rule, or CSS, is more likely to generalize to other environments than a given rule or CSS (Neef et al., 2004). Therefore, asking subjects to describe contingencies affecting behavior may be more effective in changing future behavior than presenting subjects with a CSS about current contingencies. Thus, the main question the present study attempted to answer was which intervention produced the greatest reduction in impulsive behavior: presenting subjects with a CSS (which could also be referred to as feedback in response to prior behavior), evoking a CSS from the subjects via presentation of a question, or delivering feedback (correcting an incorrect CSS or presenting a CSS describing the dimension of the reinforcer the subject failed to mention) in response to an evoked CSS? Due to the characterization of certain risky behaviors, i.e., alcohol consumption, smoking, and
unsafe sexual behavior, with impulsive behavior (Critchfield & Kollins, 2001; Monterosso & Ainslie, 1999), a final question asked was whether this prototype for impulsive behavior suggested results beyond the laboratory.

Method

Subjects

Undergraduate students were recruited via flyers and in-class announcements. Students were told that they could receive extra credit and five dollars for participating in a research project that involved viewing video clips. One hundred eight students completed the first session. Three of those students did not return after session two. One subject was excluded due to a procedural error, and two additional subjects were excluded due to position bias (i.e., they selected only the left button in all four sessions, regardless of the manipulation of the experimental contingencies). One hundred two undergraduate students from Western Michigan University completed the study. All students were between the ages of 18 and 24 and reported that they spoke English fluently and enjoyed watching television. Based on the screening questionnaire (see Appendix E1), all subjects were naïve with respect to participating in choice research and with respect to participating in research where they had to describe contingencies.

Setting, Apparatus, and Materials

All procedures took place in a small lab room equipped with basic office furniture, a Vaio Sony laptop computer, Trinitron 17-inch flat screen monitor, and earphones. The experimental protocol was programmed using LabVIEW 7.0. Video clips lasting a maximum of nine min and 40 s served as reinforcers. See Appendix H for a complete listing of the videos used. Read the abscissa from the bottom up.
General Procedures

During session one, when the subject initially entered the room, the researcher explained the informed consent document and asked the subject to sign the form. The subject then completed a Risky Behavior Questionnaire (see Appendix E2), which was adapted from the Life Experiences Questionnaire (Zuckerman & Kuhlman, 2000). It assessed whether the subject was already engaging in particular risky behaviors also termed impulsive. Next, the General Instructions (GI) were read (see Appendix L). Finally, Basic Assessment Procedures (described below) followed the researcher’s departure. The researcher re-entered the room once the Basic Assessment Procedures had ended, and the subject completed a video questionnaire (see Appendix E3). Session 1 ended with an optional five minute break.

Session 2 immediately followed Session 1. General Instructions preceded the Basic Assessment Procedures. Session 2 ended when the subject completed another video questionnaire.

Basic Assessment Procedures

Basic Assessment Procedures took place on the computer. After filling in his/her file name and selecting a video to watch during the session, the subject was asked to click one of two buttons displayed on the computer screen. (For screen shots, see Appendix C1. All on-screen instructions are located in Appendix C2.) A single mouse click on one button (hereafter referred to as the “impulsive button”) was programmed to produce a 0 s delay, followed by 15 s of the participant’s choice of video, and then a 75 s delay before presentation of the next trial. One button click on the other button (hereafter referred to as the “self-control button”) was programmed to produce a 55 s delay, followed by 25 s
of the participant’s choice of video, and then a 10 s delay before presentation of the next trial.

A total of four forced-choice trials and 20 choice trials were presented each session. The buttons disappeared following a click on one of the buttons to eliminate any extraneous stimuli. During the forced-choice trials, the subjects were asked to select the buttons in the following order: right, left, right, left. Only the specified button was active at this time. This was to expose each subject to the contingency associated with each button. In an effort to prevent position bias, the location of the impulsive and self-control buttons were switched between each session so that the impulsive button was on the right side during the first and third sessions, and on the left side during the second and fourth sessions.

Subject Assignment

Based on each subject’s impulsive responses throughout the 20 choice trials in Session 2, subjects were categorized as Impulsive (I, as defined by selection of the impulsive button for 70% or more of the session), Self Controlled (S, as defined by selection of the impulsive button for 30% or less of the session), or Neutral (N, as defined by selection of the impulsive button between 30-70% of the session). Subjects were then randomly assigned to one of three groups (Control, Experimenter-Generated Statement, and Self-Generated Statement), with the restriction that an equal number of subjects of each type (I, S, or N) were assigned to each of three groups.

Table 1 summarizes the distribution of the experimental conditions across sessions and between groups. This experiment utilized a pre-test/post-test group design comparing three types of subjects (I, N, or S, based on behavior during Session 2) within
three groups: the Control Group, the Experimenter-Generated Statement (EGS) Group, and the Self-Generated Statement (SGS) Group.

<table>
<thead>
<tr>
<th>All Subjects, N = 102</th>
<th>Session 1</th>
<th>Session 2</th>
<th>Session 3</th>
<th>Session 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control I (n=11)</td>
<td>GI BAP</td>
<td>GI BAP</td>
<td>GI BAP</td>
<td>GI BAP</td>
</tr>
<tr>
<td>S (n=14)</td>
<td></td>
<td></td>
<td></td>
<td>Evoked CSS</td>
</tr>
<tr>
<td>N (n = 8)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EGS I (n=12)</td>
<td>GI BAP</td>
<td>GI Given CSS</td>
<td>GI Given CSS</td>
<td>BAP Evoked CSS</td>
</tr>
<tr>
<td>S (n=15)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N (n = 8)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SGS I (n=11)</td>
<td>GI Evoked CSS</td>
<td>BAP</td>
<td>GI Evoked CSS</td>
<td>Feedback Evoked CSS</td>
</tr>
<tr>
<td>S (n=14)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N (n = 9)</td>
<td></td>
<td></td>
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</tbody>
</table>

Table 1. Procedures Implemented for Each Group, Across Sessions.
Note: GI = General Instructions; BAP = Basic Assessment Procedures; CSS = Contingency-Specifying Statement

Subjects were divided into the three groups prior to Session 3. Session 3 examined the differences between the effects of the independent variables on the subjects. (Independent variables are described below.) In the control group, the General Instructions (GI) were followed by the Basic Assessment Procedures (BAP). In the EGS Group, the GI were followed by a Given CSS, which was then followed by the BAP. In the SGS group, the GI were followed by an Evoked CSS, which was then followed by the BAP. Session 3 concluded with the completion of a video questionnaire for all three groups, followed by an optional five minute break.
Session 4 immediately followed Session 3. This session also examined the differences between the effects each independent variable had on the subjects’ choices.

The control and EGS groups followed the same procedures as in Session 3, except that the BAP were followed by an Evoked CSS. The SGS Group procedures were as follows: GI → Evoked CSS → Feedback → BAP → Evoked CSS. The session ended for all three groups when the video questionnaire had been filled out, extra credit and monetary incentives were given, and questions about the study were answered.

Independent Variables

Given Contingency-Specifying Statement

The researcher presented a CSS based on number of impulsive responses during Session 2. Table 2 shows CSSs given to subjects, which were similar to elaborate contrary instructions from Navarick’s (2001) study. Impulsive subjects sensitive to delay of reinforcement were given a statement about the magnitude. Self-control subjects sensitive to the magnitude of reinforcement were given a statement about the delay.

<table>
<thead>
<tr>
<th>Instructions</th>
<th>I</th>
<th>N</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>If you click on the button on the ___ side, the television clip will play for 15 seconds. If you click on the button on the ___ side, the television clip will play for 25 seconds.</td>
<td>If you click on the button on the ___ side, a television clip will play for 15 seconds and then you will wait for 75 seconds. If you click on the button on the ___ side, you will wait for 55 seconds, then a television clip will play for 25 seconds, and then you will wait for 10 seconds.</td>
<td>If you click on the button on the ___ side, you will not wait before you see the video. If you click on the button on the ___ side, you will wait 55 seconds before you see the video.</td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Given Contingency-Specifying Statements.
Neutral subjects, who may have been sensitive to either dimension, were given a statement about both dimensions of the reinforcer.

_Evoked Contingency-Specifying Statement_

The researcher evoked a contingency-specifying statement from the subject by asking: “Please tell me what you remember about what was different between the two buttons. Was there a difference in the way the video played from one button to the next?” The second question was repeated if the subject could not remember the difference between the two buttons. Every subject emitted a CSS after the first or the second question.

_Feedback_

The researcher gave feedback according to the CSS that was evoked from the subject. This feedback was either a correction of an incorrect statement, or the dimension of the reinforcer not stated by the subject. The scoring sheet which designates which feedback was given in the presence of which CSS is located in Appendix F.

_Dependent Variables_

_Impulsive Response_

The primary dependent variable was the number of trials per session in which a subject selected the impulsive button. LabVIEW recorded the number and order of impulsive and self-control button choices within each session. This number was then used to calculate subject type (described above in Subject Assignment) and average number of impulsive responses across subject types and groups.
Contingency-Specifying Statement (CSS)

Contingency-specifying statements, more specifically verbal descriptions of the stimulus presentation parameters, were solicited during the third and/or fourth sessions, as described under General Procedures. These CSSs were scored immediately (see Appendix F) and recorded on a tape recorder for interobserver agreement. Each CSS was scored for the presence of any description of the delay parameters (e.g., "If I click the left button, I will see the cartoon immediately"), or the presence of any description of the duration of the video clip (e.g., "The right button played longer"). Using the above definitions, CSSs were scored as referring to delay (D), magnitude (M), or both contingency parameters (D & M). Furthermore, each CSS was scored as correct (+) or incorrect (-), depending on the accuracy with which the contingencies were described.

Some subjects emitted a CSS that did not pertain to either the delay or magnitude of the reinforcer. These statements pertained to a false contingency controlling the subject's behavior (e.g., "I get the really funny part of the clip if I click the right button"). Such a CSS was considered an incorrect superstitious statement (-S).

CSSs scored by only one researcher were transcribed from the recording. An observer, who was blind to which subject he was scoring, read the transcriptions and scored each CSS. Interobserver agreement (IOA) was calculated between the researcher's score and the observer's score for each subject. CSS scores that had been marked in the same way by both the researcher and the observer were marked yes, and those scored differently were marked no. The following equation was calculated:

\[ IOA = \frac{\text{# of yes's}}{\text{# of yes's} + \text{# of no's}} \times 100\% \]

IOA for all subjects for all CSSs, a measure of scoring integrity, was 90.5%. IOA for the CSS emitted before Session 4 in
the SGS group, a measure of treatment integrity since Feedback was based on this CSS, was 91.2%.

Results

Intra- and Inter-Group Analysis

Results for the control group are depicted in Figure 1. (Results for individual subjects are included in Appendix M.) Several between session changes reached statistical significance using two-tailed one-sample t tests of the mean difference scores, including the decline in the number of impulsive responses made by impulsive subjects in the control group between Sessions 2 and 3 \((p = .02)\), and Sessions 2 and 4 \((p = .04)\), and in neutral subjects from Session 2 to 4 \((p = .001)\). The decline between Sessions 2 and 3

![Figure 1. Average Number of Impulsive Responses by Subject Type in the Control Group](image)

Figure 1. Average Number of Impulsive Responses by Subject Type in the Control Group
approached statistical significance ($p = .051$). No other changes in impulsive responding across sessions reached statistical significance.

Figure 2 shows impulsive responding in the EGS group. When the experimenter presented a verbal statement of the contingent relationship between selection of the button and the duration of the video clip, there was a statistically significant decrease in the number of impulsive responses for impulsive subjects ($p = .00$ for Session 2-3 changes in impulsive responding, and $p = .00$ for Session 2-4 changes). Furthermore, these results were statistically different from results in the control group ($p = .02$ for Session 2-3 changes, as calculated using a two-sample $t$ test of the difference scores). Alternatively, when the experimenter presented to the self-control subjects a verbal statement of the contingent relationship between selection of the button and the delay

![Figure 2. Average Number of Impulsive Responses by Subject Type in the EGS Group](image)

Figure 2. Average Number of Impulsive Responses by Subject Type in the EGS Group
before the video clip, results did not reach significance. Although neutral subjects' impulsive behavior declined significantly between Sessions 2 and 3 ($p = .003$) and Sessions 2 and 4 ($p = .002$), results were not significantly different from the control group ($p = .30$ and .90, respectively).

Results for the SGS group (Figure 3) depict a decline in impulsive responding for the impulsive subjects from Session 2 to Session 3 ($p = .03$) when subjects were asked, “What is the difference between the two buttons?” There was a further decline in impulsive responding from Session 2 to Session 4 ($p = .00$) when subjects were provided with Feedback on their statements of contingencies. It is noteworthy that the magnitude of decline between Sessions 2 and 3 for the impulsive subjects in the SGS group did not

Figure 3. Average Number of Impulsive Responses by Subject Type in the SGS Group
differ from the same decline in the Control group \((p = .64\), calculated from a two sample \(t\) test of the differences between Sessions 2 and 3 for each group\), but that the decline from Sessions 2 to 4 in the SGS group versus the Control group were significantly different \((p = .00)\) (see Figure 1 for comparison). Furthermore, results from Session 2 to 4 for the impulsive subjects in the SGS group were not different from results in the EGS group \((p = .27)\) (see Figure 2 for comparison).

As in the EGS group, the independent variables had no effect on impulsive behavior for the neutral or self-controlled subjects in the SGS group. Results did not reach significance for the self controlled subjects (impulsive responding from Session 2-3, \(p = .64\); impulsive responding from Session 2-4, \(p = .07\)). There was a significant change between Sessions 2 and 3 \((p = .0012)\), and Sessions 2 and 4 \((p = .0003)\) for the neutral subjects’ impulsive behavior. Nonetheless, no results were significantly different from those in the control group (see Figure 1 for comparison).

**Contingency-Specifying Statements**

Figure 4 depicts the accuracy of contingency-specifying statements (without Feedback) made by the impulsive subjects in the SGS group before Session 3, and the average number of impulsive responses emitted in Sessions 2 and 3. Only two of the subjects correctly stated both dimensions of the reinforcer (delay and magnitude), and those subjects showed the largest decrease in impulsive responses between Sessions 2 and 3. Other subjects emitted CSSs that were either incomplete (i.e., specifying the delay dimension but ignoring the magnitude dimension) or inaccurate. None of the subjects emitting inaccurate CSSs showed major declines in impulsive responding.
Figure 4. Average Number of Impulsive Responses Made by Impulsive Subjects in the SGS Group Across Type of CSS Evoked Before Session 3

With the exception of one subject, all impulsive subjects in the SGS group shifted to self-controlled responding during Session 4 after they were given Feedback on their verbal contingency statements (see Figure 5). (See Appendices I through K for figures representing impulsive choice versus verbal behavior in impulsive subjects in the control, EGS, and SGS groups. These CSSs were emitted after the session had ended.)

Reinforcer Effectiveness

To make sure videos were reinforcing, subjects filled out a video questionnaire asking which video they watched, how much they liked that video on a scale ranging from 1 (not very much) to 5 (very much), and what they liked or didn’t like about the video. All videos were viewed at least once. In general, subjects claimed that the videos
were enjoyable (see Appendix H for average rankings of the videos and the number of subjects who saw each video).

*Does Impulsive Behavior Equal Impulsive Clicks?*

The Pearson coefficient was used to calculate correlations between answers on the risky behavior questionnaire (see Appendix E2) and the number of impulsive responses emitted by all subjects in Session 2. No correlations reached significance. See Table 3 for coefficients and $p$-values. (Question seven was excluded from analysis.)
Table 3. Pearson Correlation Coefficients for Correlation Between Risky Behavior Questions and Impulsive Clicks.

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Discussion

This study demonstrated that several different interventions based on verbal descriptions of the existing contingencies (termed contingency-specifying statements, CSSs) could reduce impulsive behavior and increase self-controlled behavior. From results of the impulsive subjects in the EGS condition, we can conclude that experimenter announcements of the contingent relationship between selection of the button and the duration of the video clip decreases impulsive behavior in subjects who previously responded impulsively. Requiring a subject to state the contingencies produced variable changes in impulsive responding. Subjects who accurately stated the contingencies showed more dramatic reductions in impulsive behavior than those who emitted erroneous or incomplete CSSs. When these participants were given corrective feedback on the accuracy of their CSSs, or feedback completing the incomplete CSS, more dramatic reductions in impulsive behavior were observed.

From results comparing the SGS group to the EGS group from Session 2 to 4, we can also conclude that providing feedback based on verbal behavior was neither more nor less effective than providing feedback based on impulsive responses. Since vocal behavior is more readily accessible than impulsive behavior, i.e., vocal behavior requires
a shorter assessment than impulsive behavior, this finding has implications for further research on verbal-based interventions to reduce impulsive behavior.

Although differences in impulsive behavior were observed for a few subjects after mere repeated exposure to the contingencies, the aforementioned interventions reduced impulsive behavior in a greater number of subjects. However, it is interesting to note that, although a CSS emitted covertly may not have been emitted overtly during the session, since a report of behavior after a session is over is not necessarily indicative of that which was at strength while the subject was behaving (Ericsson & Simon, 1993; Skinner, 1957), impulsive subjects in the Control group who changed behavior the most from Session 2 to Session 3 were those who emitted a CSS pertaining to the magnitude of the reinforcer as well as to the delay (see Appendix I).

Several subjects failed to emit a CSS that accurately and completely described the contingencies operating in the BAP in spite of repeated exposures to the contingencies over the first two sessions. Only when Feedback was given did subjects accurately and completely describe the contingencies and show the greatest change in impulsive behavior. This observation suggests that subjects may have difficulty verbally stating even relatively simple contingency arrangements based on exposure to those contingencies. However, note that subjects were not specifically warned ahead of time that they would be asked to describe the contingencies to which they were exposed (although instructions indicated that they would be asked to recall something about the session). Had subjects been so warned, they may have observed the contingency arrangements more carefully, thus increasing the accuracy and completeness of the CSSs. Furthermore, it may be possible to improve contingency observation and description
skills over time with repeated corrective feedback. Whether improving a person’s contingency observation and description skills would cause behavior to be more sensitive to novel or changing contingencies would be worthy of further research.

This research replicated and extended research conducted by Navarick (2001) by increasing the number of self-controlled subjects under examination. In a previous study Navarick (1998) found that the subjects were divided, 40% impulsive, and 40% self-controlled. The present study recruited more subjects who displayed self-control behavior than who displayed impulsive behavior, suggesting a difference in sample variables. Nevertheless, results from the present study are consistent with Navarick’s (2001), who reported that delivering a CSS about the delay of the reinforcer was not effective in changing impulsive behavior. This study also added a control group to assess the impact of repeated exposure to the Basic Assessment Procedures, and examined the effects of the second and third independent variables mentioned above.

If a CSS about the magnitude of the reinforcer affected impulsive behavior because the CSS was not already in the subject’s repertoire, then evoking a CSS from the subject should have no effect on behavior, which is consistent with the results of the present study. If (a) the CSS was already in the subject’s repertoire, but no contingencies were previously established to evoke such a statement, and (b) asking the subject, “What is the difference between the two buttons?” is an effective establishing operation which sets the occasion for emitting a CSS about the magnitude of the reinforcer, then (c) such a CSS should be emitted in response to the question and/or sensitivity to the magnitude of the reinforcer should change, resulting in a change in impulsivity. As shown in Figure 4, the question, “What is the difference between the two buttons?” evoked a statement about
the magnitude of the reinforcer from four subjects, only two of which were correct about
the contingencies affecting responding. Not surprisingly, of all impulsive subjects in the
SGS group, the subjects who made an accurate statement about the magnitude of the
reinforcer showed the largest decrease in behavior from Session 2 to Session 3. This may
suggest that when a CSS about the magnitude of the reinforcer can be evoked from a
subject, impulsive behavior will change.

Subjects who emitted a CSS before Session 3 about the delay of the reinforcer
mimicked behavior seen in the control group, not the EGS group. These results are not
surprising since a decline in impulsive responding in the EGS group only occurred after
subjects were presented with a statement about the magnitude of the reinforcer, thus
sensitizing subjects to not only the delay, but also to a verbal representation of the
magnitude of the reinforcer. These results may suggest that the question utilized to evoke
a CSS from the subjects, as a general establishing operation, is not strong enough to
sensitize subjects to the magnitude of the reinforcer.

It seems as though the mechanism for behavior change in this context is stating or
hearing a complete and accurate statement of the contingencies acting upon behavior. As
indicated in this study, whether the verbal rule is provided by the experimenter, is emitted
by the subject without feedback, or is emitted by the subject after corrective feedback,
seems to make little difference on the impact of the CSS on impulsive behavior;
impulsive behavior will decline whichever way the rule is presented. Further research
should be conducted to find a way to evoke such a complete and accurate statement from
a subject and to determine whether this would be effective in changing impulsive
behavior.
Finally, it is worth noting that there was little correlation between the level of impulsive choices in this experiment and self-reported measures of clinically relevant behavior that is characterized as impulsive. This observation is open to multiple interpretations, including, but not limited to, the possibility that either the operational definition of impulsive behavior used in this study can not define behavior described in the risky behavior questionnaire, or that the questionnaire itself was flawed in capturing impulsive behaviors emitted outside the lab.

Limitations

A major limitation of this study is that covert behavior is impossible to measure with today's technology. Therefore, procedures do not account for a potentially important variable in behavioral change. For example, decline in impulsive behavior in the control group may be accounted for by changes in covert statements from a CSS about the delay to a CSS about the delay and the magnitude of the reinforcer.

With respect to the risky behavior questionnaire, it is possible that correlational data would be different if a more standardized test were used. It is also possible that participants did not engage in risky behaviors to the same extent as those examined in delayed discounting studies. For example, Ohmura, Takahashi, and Kitamura (2005) found that those who smoke less than 20 cigarettes a day (a pack of cigarettes) do not discount delayed reinforcers any more than those who have never smoked cigarettes. Of those participants who smoke in the present study, only three smoked half a pack to a pack of cigarettes a day. Failure to correlate smoking behavior with impulsive behavior would be consistent with those results. Furthermore, competing contingencies surround risky behaviors examined in this study. For example, those who smoke are faced not
only with the choice of immediate pleasure over long term health, but also possibly with the choice of escaping from an aversive social situation or remaining in that situation. Due to the complexity of the competing contingencies surrounding risky behaviors examined in the questionnaire, it is possible that the present definition for impulsive behavior would better define behaviors similar to spending money to buy a cheap item, such as a chocolate bar, versus saving the money to buy a larger item, such as a bike (Ho et al., 1999).

Future Research

As previously stated, future research should focus on whether evoking accurate and complete CSSs (i.e., CSSs that refer to all relevant dimensions of the reinforcement contingencies) would be effective in changing impulsive behavior. Such an intervention would be easy and fast to implement (e.g., an intervention may consist of teaching subjects to emit a statement about the magnitude of the reinforcer). Interventions based on manipulation of verbal behavior should be assessed for generalization to other situations. Future research should also examine whether other impulsive behaviors not addressed in this study, such as gambling or acting out in a classroom, are correlated with behaviors found in the lab.

Critchfield and Kollins (2001) note that differences in delayed discounting could be attributed to differences between laboratory reinforcers or delays, which are relatively small and weak for humans compared to animals, and real life ones, which are larger for humans. It would be interesting to examine whether training accurate and complete CSSs would produce similar decreases in impulsive behavior when applied to choice procedures with different temporal and magnitude parameters.
The present research only examines whether a CSS will affect impulsive behavior with definite immediate consequences, or definite consequences that are delivered after a short delay. Skinner (1969) theorized that contingency-specifying statements will not affect behaviors with natural consequences that are only statistically related, such as cigarette smoking. It would be especially interesting to extrapolate the CSS procedures to situations where the consequences occur with differing probability, a commonly observed characteristic of many real world “self-control” problems.

Summary

This study successfully replicated Navarick’s (2001) study by showing that a change in impulsive behavior occurs when researchers present subjects with a CSS about the magnitude of the reinforcer in response to previously documented impulsive responses. The current study also extended Navarick’s work by demonstrating that impulsive behavior decreased when subjects generated accurate and complete CSSs, either with or without the assistance of feedback. While techniques are limited to verbal organisms, the techniques have the advantage of efficiency over previously documented strategies to increase self-controlled behavior (e.g., Dixon & Holcomb, 2000; Vollmer et al., 1999).
References


Appendix A – Human Subjects Institutional Review Board Approval Letters

Date: August 31, 2005

To: Wayne Fuqua, Principal Investigator
    Susan Makdisi, Student Investigator for thesis

From: Mary Lagerwey, Ph.D., Chair

Re: HSIRB Project Number: 05-07-08

This letter will serve as confirmation that your research project entitled "A Verbal Analysis of Impulsive Behavior" has been approved under the full category of review by the Human Subjects Institutional Review Board. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the application.

Please note that you may only conduct this research exactly in the form it was approved. You must seek specific board approval for any changes in this project. You must also seek reapproval if the project extends beyond the termination date noted below. In addition if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: July 20, 2006
Date: September 12, 2005

To: Wayne Fuqua, Principal Investigator
Susan Makdisi, Student Investigator for thesis

From: Mary Lagerwey, Ph.D., Chair

Re: HSIRB Project Number: 05-07-08

This letter will serve as confirmation that the change to your research project "A Verbal Analysis of Impulsive Behavior" requested in your memo dated 9/9/2005 (contact potential subjects who did not fill out the age blank on the recruitment questionnaire to ask their name) has been approved by the Human Subjects Institutional Review Board.

The board would like to suggest that you revise the form to make the age question more prominent. You could give the question its own line, or devise check boxes associated with age ranges.

The conditions and the duration of this approval are specified in the Policies of Western Michigan University.

Please note that you may only conduct this research exactly in the form it was approved. You must seek specific board approval for any changes in this project. You must also seek reapproval if the project extends beyond the termination date noted below. In addition if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: July 20, 2006
Date: September 29, 2005

To: Wayne Fuqua, Principal Investigator
   Susan Makdisi, Student Investigator for thesis

From: Mary Lagerwey, Ph.D., Chair

Re: Changes to HSIRB Project Number: 05-07-08

This letter will serve as confirmation that the changes to your research project "A Verbal Analysis of Impulsive Behavior" requested in your memo dated 9/26/2005 (addition of student investigators) have been reviewed by the Human Subjects Institutional Review Board. Before final approval can be given the following revisions must be submitted for HSIRB review:

1. Please use the additional investigators form and include each additional investigator’s signature. Also, each individual must complete the CITI training module before they can receive approval as an additional research assistant.

Implementing these modifications without final approval from the HSIRB is a violation of university policy as well as state and federal regulations.

Please submit the above changes in writing to the HSIRB, 251 W Walwood Hall (East Campus).

If you have any questions, please call the research compliance coordinator at 387-8293.
Date: October 4, 2005

To: Wayne Fuqua, Principal Investigator
   Susan Makdisi, Student Investigator for thesis

From: Mary Lagerwey, Ph.D., Chair

Re: HSIRB Project Number: 05-07-08

This letter will serve as confirmation that the change to your research project “A Verbal Analysis of Impulsive Behavior” requested in your memo dated 9/26/2005 and the additional investigators form received on October 4, 2005 (two new student investigators) has been approved by the Human Subjects Institutional Review Board.

The conditions and the duration of this approval are specified in the Policies of Western Michigan University.

Please note that you may only conduct this research exactly in the form it was approved. You must seek specific board approval for any changes in this project. You must also seek reapproval if the project extends beyond the termination date noted below. In addition if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: July 20, 2006
Date: October 13, 2005

To: Wayne Fuqua, Principal Investigator
   Susan Makdisi, Student Investigator for thesis

From: Mary Lagerwey, Ph.D., Chair

Re: HSIRB Project Number: 05-07-08

This letter will serve as confirmation that the change to your research project "A Verbal Analysis of Impulsive Behavior" requested in your memo dated 10/12/2005 (correction to an error on the scoring sheets) has been approved by the Human Subjects Institutional Review Board.

The conditions and the duration of this approval are specified in the Policies of Western Michigan University.

Please note that you may only conduct this research exactly in the form it was approved. You must seek specific board approval for any changes in this project. You must also seek reapproval if the project extends beyond the termination date noted below. In addition, if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: July 20, 2006
Date: November 30, 2005
To: Wayne Fuqua, Principal Investigator
    Susan Makdisi, Student Investigator for thesis
From: Mary Lagerwey, Ph.D., Chair
Re: HSIRB Project Number: 05-07-08

This letter will serve as confirmation that the change to your research project "A Verbal Analysis of Impulsive Behavior" requested in your memo dated 11/29/2005 (increase total subjects to 180) has been approved by the Human Subjects Institutional Review Board.

The conditions and the duration of this approval are specified in the Policies of Western Michigan University.

Please note that you may only conduct this research exactly in the form it was approved. You must seek specific board approval for any changes in this project. You must also seek reapproval if the project extends beyond the termination date noted below. In addition if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: July 20, 2006
Date: January 24, 2006

To: Wayne Fuqua, Principal Investigator  
    Susan Makdisi, Student Investigator for thesis

From: Mary Lagerwey, Ph.D., Chair

Re: HSIRB Project Number: 05-07-08

This letter will serve as confirmation that the change to your research project "A Verbal Analysis of Impulsive Behavior" requested in your memo dated January 23, 2006 (Michelle Morgan and Erica MacGregor added as new student investigators) has been approved by the Human Subjects Institutional Review Board.

The conditions and the duration of this approval are specified in the Policies of Western Michigan University.

Please note that you may only conduct this research exactly in the form it was approved. You must seek specific board approval for any changes in this project. You must also seek reapproval if the project extends beyond the termination date noted below. In addition if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: July 20, 2006
Date: February 2, 2006

To: Wayne Fuqua, Principal Investigator
   Susan Makdisi, Student Investigator for thesis

From: Mary Lagerwey, Ph.D., Chair

Re: HSIRB Project Number: 05-07-08

This letter will serve as confirmation that the change to your research project "A Verbal Analysis of Impulsive Behavior" requested in your memo dated January 23, 2006 (Trista McClelland added as a new student investigator) has been approved by the Human Subjects Institutional Review Board.

The conditions and the duration of this approval are specified in the Policies of Western Michigan University.

Please note that you may only conduct this research exactly in the form it was approved. You must seek specific board approval for any changes in this project. You must also seek reapproval if the project extends beyond the termination date noted below. In addition, if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: July 20, 2006
Date: February 14, 2006

To: Wayne Fuqua, Principal Investigator
   Susan Makdisi, Student Investigator for thesis

From: Mary Lagerwey, Ph.D., Chair

Re: HSIRB Project Number: 05-07-08

This letter will serve as confirmation that the change to your research project "A Verbal Analysis of Impulsive Behavior" requested in your memo received February 14, 2006 (Thomas Erickson added as new student investigator) has been approved by the Human Subjects Institutional Review Board.

The conditions and the duration of this approval are specified in the Policies of Western Michigan University.

Please note that you may only conduct this research exactly in the form it was approved. You must seek specific board approval for any changes in this project. You must also seek reapproval if the project extends beyond the termination date noted below. In addition if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: July 20, 2006
You have been invited to participate in a research project entitled "A Verbal Analysis of Impulsive Behavior." You have been selected to participate in this study based on the answers you provided in the recruitment questionnaire you completed before this session which suggest that you speak English, enjoy watching television, and have never participated in this type of procedure before today. If this is not true, or you are unable to do anything listed on this confidentiality form or listed in the instructions you will be given prior to each session, please tell the researcher, and you will be asked to leave the study. This research is intended to study how verbal behavior relates to choices that people make. This research will go toward completing Susan Makdisi's master's thesis.

If you choose to participate in this study, you will be asked to attend two sessions, each consisting of two parts. Each session will last approximately one and a half hours, and will be separated by no less than 24 hours and no more than one month. You will be asked to come to the Behavior Medicine Lab, Room 2704 of Wood Hall, to complete these sessions. You will be placed into one of three groups, each of which will undergo slightly different procedures. During the first session, you will be asked to fill out a questionnaire asking you about risky behaviors including substance abuse and sexual behaviors that you have engaged in during the past six months. We know that we are asking you to disclose information that many people find quite sensitive. We will take the following precautions to protect your identity: you will not write your name on the questionnaire. The only document that links your name to your identification number
Western Michigan University, Department of Psychology
Principal Investigator: Dr. Wayne Fuqua
Student Investigator: Susan Makdisi
A Verbal Analysis of Impulsive Behavior

will be destroyed once all data from this experiment have been collected. The student investigator will be the only person who will see this document. Furthermore, you will have the right to refuse to answer any question that you find troublesome. You are not required to complete this questionnaire in order to participate in this study.

Each session will take place in front of a computer screen. During the session, you will be asked to type in the file name, which will be given for you. You will then choose which video sequence you would like to watch from a series of icons explaining what each sequence contains. These video sequences contain clips taken from popular television shows, movies, sporting events, bloopers, commercials, and independent clips found on the Internet. Any clips that contain violence or possibly offensive material are labeled as such, and no clips contain nudity of any kind. After this, you will be asked to click on one of two buttons displayed on the computer screen several times throughout the rest of the session. After clicking on a button on the screen, you will watch a portion of that video sequence you selected. You may be required to wait for several seconds before and after the video has played before you are asked to click another button. The computer will record which buttons you will click. When the program has ended, you will exit the room and fill out a short questionnaire pertaining to the video that you saw. You may be asked a question pertaining to the session. Your response may be tape recorded. This tape recording will be transcribed into a word document, and when all the data has been collected for this experiment, and all tapes have been transcribed, these...
Appendix B – Participant Consent Forms

Western Michigan University, Department of Psychology
Principal Investigator: Dr. Wayne Fuqua
Student Investigator: Susan Makdisi
A Verbal Analysis of Impulsive Behavior

WESTERN MICHIGAN UNIVERSITY
H. S. I. R. B.
Approved for use for one year from this date:
JUL 20 2005

Tapes will be destroyed, and the transcriptions will be kept in a locked file with the rest of the collected data.

As in all research, there may be unforeseen risks to the participant. If an accidental injury occurs, appropriate emergency measures will be taken; however, no compensation or additional treatment will be made available to you except as otherwise stated in this consent form. During this study, you may experience discomfort in the form of a headache, eye strain, back strain, buttoc;k pain, wrist pain, or other discomforts associated with staring at a computer monitor, watching a video, sitting in a chair for a lengthy period of time, or clicking a mouse button. If you experience such discomfort and wish to end the session, the door will be unlocked and you are free to leave the room. You may reschedule that session for a later date. If this discomfort is excessive, you may want to contact Sindecuse Health Center here on campus.

The findings of this study will serve to gain further insight into impulsive behavior in humans and the variables associated with this behavior. This information may be helpful in forming interventions for such behavior. The interventions studied in this project will also be assessed for effectiveness. If you choose to participate in this study, you will receive $5.00 and any extra credit that your professor has offered for participating in this study, after you have completed the second session.

No information collected from you during this study can or will be used against you in any way. All of the information collected from you is confidential. That means that your name will not appear on any papers on which the information you provide to us...
Appendix B – Participant Consent Forms

Western Michigan University, Department of Psychology
Principal Investigator: Dr. Wayne Fuqua
Student Investigator: Susan Makdisi
A Verbal Analysis of Impulsive Behavior

is recorded, other than the initial recruitment questionnaire you filled out. The forms will
all be coded, and the student investigator will keep a separate master list with the names
of participants and their corresponding identification numbers. No one else will see this
list. Once the data are collected, the master list will be destroyed. All other forms will be
retained for at least three years in a locked file in the principal investigator's office.

You may refuse to participate, refuse to answer any questions, or quit at any time
during the study without prejudice or penalty. If you have any questions or concerns
about this study, you may contact either Susan Makdisi at (269)873-3691, or Dr. Wayne
Fuqua at (269)387-4474. The participant may also contact the chair of the Human
Subjects Institutional Review Board at (269)387-8293, or the Vice President for Research
at (269)387-8298 if questions or problems arise during the course of the study.

This consent document has been approved for use for one year by the Human
Subjects Institutional Review Board (HSIRB) as indicated by the stamped date and
signature of the board chair in the upper right corner. Do not participate in this study if
the stamped date is older than one year.

Your signature below indicates that you have read and/or had explained to you the
purpose and requirements of the study and that you agree to participate.

Signature ___________________________ Date ____________

Consent Obtained By: ___________________________ Date ____________

Researcher Initials ___________________________ Date ____________
Appendix C-1
Screen Shots

Screen 1 – Participant enters filename. The name is later changed to a number.

Enter the first letter of your name, followed by your last name, followed by the session number, followed by which part of this session you are about to begin. For example, if your name is Susan Makdisi, this is your second session, and you are about to start the first part of the session, you will enter "smakdisi21". If this is your first session, and you are about to start the second part of the session, you will enter "smakdisi12". Then click the "ok" button.

Screen 2 – Participant chooses which movie series he/she would like to watch.

Each icon below represents a series of television clips that will be played throughout this session. You will be able to choose a different icon, or the same icon, at the beginning of each session. Please select an icon below by clicking on it.
Appendix C-1
Screen Shots

Screen 3 – Participant is asked to choose between the two buttons. Instructions vary according to trial.

Please click on the right button.

Final Screen – Participant is asked to leave the room.

Thank you for coming in today! This part of the session has now ended. Please exit the room and tell the experimenter that you have finished this part of the session.
Appendix C-2
On-Screen Instructions

The following instructions were along the top of the name screen:

Enter the first letter of your name, followed by your last name, followed by the session number, followed by which part of this session you are about to begin. For example, if your name is Susan Makdisi, this is your second session, and you are about to start the first part of the session, you will enter “smakdisi21”. If this is your first session, and you are about to start the second part of the session, you will enter “smakdisi12”. Then click the “ok” button.

The following instructions were along the top of the television clip selection screen:

Each icon below represents a series of television clips that will be played throughout this session. You will be able to choose a different icon, or the same icon, at the beginning of each session. Please select an icon below by clicking on it.

After the subject had clicked on one of the icons, the next screen contained the following instructions for the first forced-choice trial: “Please click on the right button.” After the button was clicked, and the video/blank screen sequence was presented, the same instructions, only now specifying the left button, were presented. This sequence repeated once, and then the following instructions were presented for each of the choice trials: “Please click on a button.” The video/blank screen sequence for the button selected was presented. Following 20 choices and 20 sequences, the following instructions appeared: “Thank you for coming in today! This part of the session has now ended. Please exit the room and tell the researcher that you have finished this part of the session.”
Appendix D-1
Researcher Training Checklist

1. Remind assistant that this will be the first part of training and the next part of training will occur the next time they meet.

2. Show the assistant where the forms are kept and where they will be placed after each session is run. Explain that it is crucially important that they place the forms back in the folder directly behind the last form since the forms will not be labeled until later.

3. Hand assistant a sheet of each set of directions and discuss how the sessions are run, including the LabVIEW program, and the differences between sessions. They will be told which session is being run before each contact with each subject.

4. Ask for questions.

5. Hand assistant definition sheet and discuss sheet.

6. Ask for questions and ask if assistant would like to practice anything in the directions.

7. Hand assistant scoring sheets and scoring cheat sheet, and tell assistant to look at SGS sheet for session 2, part 2. Encourage assistant to look over instructions before each session, as well as the scoring sheets and scoring cheat sheet if they apply. Tell assistant to act as if they were in a session with a subject just after the subject reemerged from the room.

8. Respond to assistant's directions, read a contingency statement and wait for feedback.

9. Reinforce and correct assistant's behavior accordingly.

10. Tell assistant that the next time he/she comes in, he/she will be asked to do the same thing with 100% accuracy.

11. Repeat 7-9 until assistant feels comfortable.

12. Thank assistant and ask him/her to return the next time.

13. Ask for any questions or if the assistant would like to practice anything on the sheet other than the question and feedback part of the form.

14. Tell assistant that feedback will be given immediately.

15. Repeat 7-9 above with all prepared contingency statements. If assistant is 100% accurate, thank and congratulate assistant. If assistant is less than 100% accurate, thank assistant and ask when he/she would like to come back.
Appendix D-2
Observer Training Checklist

1. Tell observer that he/she will be reading a transcription taken from the session and will be scoring what the subject says on that transcription.
2. Hand observer scoring sheet for observers, definition sheet, and example transcription and go over them in the following order:
   a. Definition of contingency statement.
   b. Example transcription, pointing out what to pay attention to and examples of non-contingency statements.
   c. Rest of the definitions while pointing to the proper places on the scoring sheet and the example transcription.
3. Ask for questions.
4. Tell observer that he/she will now be given a series of contingency statements. Ask him/her to score these statements.
5. Give immediate feedback for scored statements.
6. Hand observer another sheet to score and give immediate feedback.
7. Repeat step 6.
8. Calculate whether at least 80% have been scored correctly.
   a. If so, congratulate observer and say that he/she may now observe for the study.
   b. If not, repeat step 6 until at least 80% have been scored correctly for three consecutive sheets in a row.
Appendix D-3  
Training Definitions

**Contingency Statement** = in this study, a statement pertaining to the contingency acting on clicking either the right or the left button; a statement about what happens when one of the buttons is pressed. These statements will either pertain to the delay experienced before or after seeing the video (e.g., “If I click the left button, I will see the cartoon immediately,” “I’m clicking on the left button to see the cartoon,” or “I have to wait longer after I see the video if I click on the left button.”), or to the duration of the viewing time (e.g., “If I click on the right button, I can see more cartoon,” or “This button shows me less cartoon.”). The statements might also include both kinds of contingency statements (e.g., “the right button shows me the cartoon right away, but for a shorter period of time”). In other words, a contingency statement refers to the outcome of emitting some behavior, in this case, “because I pressed this button, this happened”.

**Correct Statement:** + = A statement made by the subject pertaining to the correct contingency for the right or the left button. See cheat sheet. If, for example, you are running Session 2-1 for a subject in the SGS group, and that subject is appropriately referring to Session 1-2, a correct statement would either refer to the short amount of time that the video plays when the left button is clicked, the longer amount of time that the video plays when the right button is clicked, the lack of a delay before the video plays when the left button is clicked, etc. An actual statement from this same subject may be, “Well, it seems that when I clicked on the right button, I had to wait, but if I clicked on the left button, there wasn’t any wait.”
Appendix D-3
Training Definitions

Incorrect Statement: = A statement made by the subject pertaining to the incorrect contingency for the right or the left button. See cheat sheet. If, for example, you are running Session 2-1 for a subject in the SGS group, and that subject is appropriately referring to Session 1-2, an incorrect statement would either refer to the longer amount of time that the video plays when the left button is clicked, a short amount of time that the video plays when the right button is clicked, a delay before the video plays when the left button is clicked, etc. An actual statement from this same subject may be “Well, it seems that when I clicked on the right button, the video played for a shorter period of time than if I clicked on the left button.”

D = Statement made pertaining to the delay of the reinforcer/ the video clip. Some examples may be: “If I click the left button, I will see the cartoon immediately,” “I clicked on the left button to see the trucks,” or “I have to wait longer after I see the video if I click on the left button.”

M = Statement made pertaining to the magnitude of the reinforcer, which is how long the video plays/ the duration of the video clip. Some examples may be: “If I click on the right button, I can see more of Ice Age,” or “This button shows me less clips.”
D and M = If both a D and an M statement is made in any one answer, this would be scored. An example of this would be if the subject says, “The right button played Chappelle right away, but the left button played Chappelle for a longer period of time.” Note: if the subject says something to the effect of, “The right button played Chappelle right away, and the left button played Chappelle for a shorter period of time,” you would score both – and D and M since a longer video clip is always the button opposite the immediate video clip.

S = Superstitious statements; statements made pertaining to neither the magnitude nor the delay of the reinforcer. These statements refer to some contingency that the subject believes is acting on the button that neither addresses the length of the video nor the delay before or after that video is played. An example may be: “I get the really funny part of the cartoon every other time I click on the right button and I get the boring part if I switch from button to button or press really hard on the button.” If the subject claims that the contingencies changed over the course of that part of the session (e.g., “for the first half of this part of the session, the video played longer when I pressed on the right button, but for the second half of this part of the session, the video played longer when I pressed on the left button,”), these are also superstitious statements.
Appendix D-4
Scoring Cheat Sheet

Part 1

55 seconds of delay
25 seconds of video
10 seconds of delay following video

Part 2

0 second delay
15 seconds of video
75 seconds of delay following video

0 second delay
15 seconds of video
75 seconds of delay after video

55 seconds of delay
25 seconds of video
10 seconds of delay following video
Appendix E-1
Recruitment Questionnaire

This questionnaire was e-mailed to participants. Questionnaires passed around classrooms contained these questions, but were formatted to fit onto one fourth of a page.

Name_________________  Age_____  Phone and/or E-mail________________________

Preferred method of contact:  Phone  E-mail

May I leave a message on your machine?  Yes  No

1. Do you speak English fluently?
   □ Yes  □ No

2. Do you enjoy watching T.V.?
   □ Yes  □ No

3. Have you ever participated in a study in which you were asked to either explain what you were doing, or to explain what you were thinking, either to an experimenter or to yourself?
   □ Yes  □ No

4. Have you ever participated in a study in which you were asked to make a choice between one of two buttons, after which you were able to see a video segment, were given food, money, or something else?
   □ Yes  □ No
Appendix E-2
Risky Behavior Questionnaire

Please Note: You should NOT put your name on this questionnaire. Your subject number will be filled in for you by the student investigator. After completion of this study, we will destroy any document that links your name to your subject number so that it will be impossible to connect a questionnaire to a specific individual.

Please answer the following questions honestly. If you would prefer to not answer a specific question, please leave that question blank. Thank you for your honesty.

Subject Number __________

1. How many alcoholic beverages do you drink in a typical week? Please account for the past 6 months. (1 drink = 1 can/bottle beer or 1 shot or 1 cocktail)
   None     1-3     4-6     7 or more

2. What is the largest number of alcoholic beverages that you have had in any one day in the past 6 months?
   None     1-2     3-5     6 or more

3. How often have you drunk alcohol instead of studying in the past 6 months, when you knew you should have been studying?
   Never     Sometimes     Often or Always

4. Please put a check in one or more of the boxes below which represents your current level of cigarette smoking:
   ☐ I have never smoked. Please skip to question 7.
   ☐ I used to smoke, but quit.
   ☐ I tried to quit smoking and failed.
   ☐ I currently smoke, but intend to quit.
   ☐ I currently smoke, and intend to continue.

5. How many cigarettes do you smoke on a typical day? Please account for the past 6 months.
   None     1 cigarette-half a pack     half a pack-1 pack     More than 1 pack

6. How often do you inhale the smoke? Please account for the past 6 months.
   Not applicable     Never     Sometimes     Most or all of the time
Appendix E-2
Risky Behavior Questionnaire

7. Please mark the box or boxes that most nearly define(s) your illegal drug use, not including alcohol consumption. Please account for the past 6 months.

☐ I have not used illegal drugs in the past 6 months.
☐ The only illegal drug(s) I have used was/were without my prior knowledge of using them.
☐ I have smoked marijuana or hashish for non-medical purposes.
☐ I smoke marijuana or hashish on a regular basis for non-medical purposes.
☐ I have used a needle to inject illegal drugs.
☐ I use a needle on a regular basis to inject illegal drugs.
☐ I have shared a needle with someone I know inject illegal drugs.
☐ I share a needle with someone I know to inject illegal drugs on a regular basis.
☐ I have shared a needle with someone I don’t know to inject illegal drugs.
☐ I share a needle with someone I don’t know to inject illegal drugs on a regular basis.
☐ I have used drugs other than marijuana and hashish by means other than through a needle.
☐ I use drugs other than marijuana and hashish by means other than through a needle on a regular basis.
☐ I try as many different illegal drugs as possible.
☐ I have tried illegal drugs when I did not know the effect of that drug and/or I did not know the name of the drug.

8. How many different people have you engaged in sexual behavior with during the past 6 months?

None, skip questions 9 and 10  1  2-3  4 or more

9. How often have you or your partner used a condom while engaging in sexual behavior in the past 6 months?

N/A  Never  Sometimes  Usually  Always

10. How often have you or your partner used some form of birth control during sexual intercourse in the past 6 months?

N/A  Never  Sometimes  Usually  Always
Appendix E-3
Video Questionnaire

Subject Number _______  Session Number _______  Part Number _______

1. Which video did you watch? 

2. On a scale from 1 to 5 (1=not very much and 5=very much), how much did you enjoy the video you just watched? (Please circle your answer below.)

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
</table>

Was there anything that you did or did not like about the video clip you just saw?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Appendix F - Researcher Scoring Sheet

Subject Number ___________  Session Number _____  Part Number _____

Was a prompt given? (yes or no)

Circle which kind of statement was made, and which feedback was given.

+  
D  M  D and M

-  
D  M  D and M  S

If the following contingency statements are made, give the subsequent feedback:

+ D = “During this part of the session, if you click on the button on the left side, the television clip will play for 15 seconds. If you click on the button on the right side, the television clip will play for 25 seconds.”

+ M = “During this part of the session, if you click on the button on the left side, you will not wait before you see the video. If you click on the button on the right side, you will wait 55 seconds before you see the video.”

+ D and M = “During this part of the session, if you click on the button on the left side, a television clip will play for 15 seconds and then you will wait for 75 seconds. If you click on the button on the right side, you will wait for 55 seconds, then a television clip will play for 25 seconds, and then you will wait for 10 seconds.”

- D = “During this part of the session, if you click on the button on the left side, you will not wait before you see the video. If you click on the button on the right side, you will wait 55 seconds before you see the video.”

- M = “During this part of the session, if you click on the button on the left side, the television clip will play for 15 seconds. If you click on the button on the right side, the television clip will play for 25 seconds.”

- D and M = “During this part of the session, if you click on the button on the left side, a television clip will play for 15 seconds and then you will wait for 75 seconds. If you click on the button on the right side, you will wait for 55 seconds, then a television clip will play for 25 seconds, and then you will wait for 10 seconds.”

- S = “During this part of the session, if you click on the button on the left side, a television clip will play for 15 seconds and then you will wait for 75 seconds. If you click on the button on the right side, you will wait for 55 seconds, then a television clip will play for 25 seconds, and then you will wait for 10 seconds.”

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Appendix G – Debriefing Statement

This statement was loosely followed if the participant asked about the study.

Impulsive behavior is defined in the behavioral literature as the choice of a small, immediate reinforcer over a large, delayed reinforcer. In this study, the video clips you saw acted as the reinforcer for clicking the button. Choosing the “impulsive” or the “self-controlled” button does not necessarily say anything about you being an impulsive or a self-controlled person.

During this study, I was looking to see, first, which buttons you clicked. There were three groups. In the control group, I was looking to see if you continued to click the same button. There was also an experimenter-generated statement group. In that group, I told participants which contingencies were acting on which buttons; if you clicked on this button you would see this many seconds of video, if you clicked on this button, you would have to wait this long. That group was designed to replicate a prior study that showed that if participants who had clicked the impulsive button were told about how long they would see the video, they would then choose the other button, but participants who had clicked the self-controlled button would not change the button they clicked if they were told about either the length of the video or the delay to see the video. The statement of the contingency influenced behavior only for so-called impulsive participants. I wanted to see if I could get the same results.

There was also a self-generated statement group. In that group, during the second session, before they clicked on the buttons, I asked participants the same question I just asked you: was there a difference between the two buttons. I wanted to see if not only telling the contingencies, but if asking about the contingencies acting upon clicking the
Appendix G – Debriefing Statement

buttons would change behavior. Normally, if you ask a question about the contingencies, this kind of behavior can generalize to other situations more easily where the person would then again ask themselves the same question, than if you simply told the person about the contingencies. In another situation the person may not be able to figure out the new contingencies of the new situation, if they had only been told the contingencies before, and had not learned how to ask about them.

The behaviors I asked you about in that risky behavior questionnaire you filled out are considered impulsive behaviors in the literature. Another part of this study was to see if engaging in those behaviors is related to clicking a particular button in this study. I did that to see if this kind of study and the so-called treatments used for impulsive behavior could be used for other impulsive behaviors as well, or if they would only relate to this study.

Do you have any other questions?
### Appendix H - Mean Likeness Rankings per Video

<table>
<thead>
<tr>
<th>Videos</th>
<th>Rankings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valentine's Day</td>
<td>N=3 N=1</td>
</tr>
<tr>
<td>The Paper</td>
<td>N=3</td>
</tr>
<tr>
<td>Tea at the Treedome</td>
<td>N=9 N=4</td>
</tr>
<tr>
<td>Mermaidman &amp; Just One Bite</td>
<td>N=23</td>
</tr>
<tr>
<td>I Had an Accident</td>
<td>N=15</td>
</tr>
<tr>
<td>Hall Monitor</td>
<td>N=8</td>
</tr>
<tr>
<td>Born Again Krabs</td>
<td>N=20</td>
</tr>
<tr>
<td>SpongeBob SquarePants</td>
<td>N=1</td>
</tr>
<tr>
<td>AGD &amp; BF3</td>
<td>N=1</td>
</tr>
<tr>
<td>BF &amp; AGD2</td>
<td>N=1</td>
</tr>
<tr>
<td>BF &amp; AGD1</td>
<td>N=1</td>
</tr>
<tr>
<td>Saturday Night Live</td>
<td>N=1</td>
</tr>
<tr>
<td>Random &amp; Strange Clips</td>
<td>N=1</td>
</tr>
<tr>
<td>Other</td>
<td>N=1</td>
</tr>
<tr>
<td>Extreme Sports &amp; Monster</td>
<td>N=1</td>
</tr>
<tr>
<td>Monster &amp; Other Cars</td>
<td>N=1</td>
</tr>
<tr>
<td>Sports Clips</td>
<td>N=1</td>
</tr>
<tr>
<td>Cobweb Hotel+</td>
<td>N=1</td>
</tr>
<tr>
<td>Felix and the Goose+</td>
<td>N=1</td>
</tr>
<tr>
<td>Felix the Cat</td>
<td>N=1</td>
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<tr>
<td>Clips of Sid</td>
<td>N=1</td>
</tr>
<tr>
<td>Scrat &amp; Do Do's</td>
<td>N=1</td>
</tr>
<tr>
<td>Fight at End of Movie</td>
<td>N=1</td>
</tr>
<tr>
<td>The Cave Scene</td>
<td>N=1</td>
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<tr>
<td>Ice Age</td>
<td>N=1</td>
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<tr>
<td>Triumph</td>
<td>N=1</td>
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<tr>
<td>Interview w/ SMG+</td>
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<tr>
<td>Connan O'Brien</td>
<td>N=1</td>
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<tr>
<td>Charlie Murphy+</td>
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<tr>
<td>Slow Motion+</td>
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<tr>
<td>Rick James</td>
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<tr>
<td>Satire of Fear Factor+</td>
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<td>Chappelle's Show</td>
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<td>The Argument Clinic+</td>
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<tr>
<td>Other Comedy/Cartoons</td>
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<tr>
<td>The Impractical Joker+</td>
<td>N=1</td>
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<td>Betty Boop &amp; Little Jimmy+</td>
<td>N=1</td>
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<tr>
<td>Baby Be Good+</td>
<td>N=1</td>
</tr>
<tr>
<td>Betty Boop</td>
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</table>
Appendix I – Average Number of Impulsive Clicks Made by Impulsive Subjects in the Control Group Across Type of CSS Evoked After Session 4

![Bar chart showing average number of impulsive clicks across type of CSS and session.](chart.png)
Appendix J – Average Number of Impulsive Clicks Made by Impulsive Subjects in the EGS Group Across Type of CSS Evoked After Session 4

![Bar chart showing average number of impulsive clicks across different conditions.]

- Correct Delay CSS (N=2)
- Incorrect Magnitude CSS (N=1)
- Correct Delay & Magnitude CSS, Incorrect Delay & Magnitude CSS (N=1)
- Correct Delay & Magnitude CSS (N=8)

Legend:
- Session 2
- Session 3 - Other Dimension CSS based on Clicking Behavior
- Session 4 - Other Dimension CSS based on Clicking Behavior
Appendix K – Average Number of Impulsive Clicks Made by Impulsive Subjects in the SGS Group Across Type of CSS Evoked After Session 4: Feedback had Previously Been Given.

<table>
<thead>
<tr>
<th>Feedback had Previously Been Given</th>
<th>Number of Impulsive Clicks</th>
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<tbody>
<tr>
<td>Session 2</td>
<td>N=2</td>
</tr>
<tr>
<td>After Session 3, After Question</td>
<td>N=7</td>
</tr>
<tr>
<td>After Session 4, After Question and Feedback</td>
<td>N=2</td>
</tr>
</tbody>
</table>

The chart above shows the average number of impulsive clicks made by impulsive subjects in the SGS group across different types of CSS evoked after different sessions. The data is presented for three conditions: Correct Delay CSS, Correct Magnitude CSS, and Correct Delay and Magnitude CSS. The number of subjects in each condition is indicated (N=2, N=7).
Appendix L – General Instructions

The following instructions were read to all participants:

This session will be divided into two parts, each lasting about 45 minutes. When
I leave the room, please put on the earphones and face the computer screen. You
will first be asked to type in your name and session number. Please type your
name as is specified in the on-screen instructions, immediately followed by a(n)
(11, 12, 21, or 22 depending on the session and part of the session). You will
then be given the opportunity to select which television show you would like to
see. Please click on the icon of your choice. You will then see two buttons on the
screen. To see the television clips, you must click on one of the buttons. At the
beginning of this part of the session, the first four selections will be specified for
you in the on-screen instructions. You will not be able to select the button that is
not specified. After those four selections have been made, you may choose which
button you would like to click. The selection you make may affect how long you
will wait before the television clip starts, or how long the clip will play before it
stops. There may be periods of time when you see nothing on the screen. When
this part of the session is over, you will be asked to leave the room. Do you have
any questions? (Partly adapted from Navarick, 2001)

The following was stated after questions were answered: “Don’t forget, the selection you
make may affect how long you will wait before the television clip starts, or how long the
clip will play before it stops.”

1 Sessions 1 and 2 were run on the same day and were originally referred to as Session 1 parts 1 and 2, also
known as Session 1-1 or 11, and Session 1-2 or 12. Sessions 3 and 4 were run on another day and were
originally referred to as Session 2 parts 1 and 2, also known as Session 2-1 or 21, and Session 2-2 or 22.
Appendix M – Number of Impulsive Clicks and Corresponding Classifications per Subject, Across Session

<table>
<thead>
<tr>
<th>Subject Number in Groups</th>
<th>Number of Impulsive Clicks per Session</th>
<th>Classification per Session</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>
### Appendix M - Number of Impulsive Clicks and Corresponding Classifications per Subject, Across Session

<table>
<thead>
<tr>
<th>Subject Number in Groups</th>
<th>Number of Impulsive Clicks per Session</th>
<th>Classification per Session</th>
</tr>
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<tbody>
<tr>
<td></td>
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### Appendix M – Number of Impulsive Clicks and Corresponding Classifications per Subject, Across Session

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