The Role of Timing Processes in Three Different Impulsive Choice Procedures

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INTRODUCTION

• Impulsive behavior is a common symptom in ADHD, gambling, and drug abuse

• Measures of impulsive behavior are often used interchangeably in studies examining choice behavior.
• Impulsive choice procedures assess preferences between smaller-sooner (SS) and larger-later (LL) outcomes, with choices of the SS indicating impulsivity

• Understanding the complexities involved in measuring impulsive choice is paramount to understanding the sources of individual differences and the development of intervention strategies

• A number of different procedures have been developed to study impulsive choice in rats and these vary in their implementation of the manipulations of SS or LL delays and/or magnitudes, and the frequency and contingency of those manipulations

• The current study examined timing and choice behavior using three common measures 1,2,4

METHOD

• Forty-eight male Sprague-Dawley rats were randomly assigned to one of three groups (n = 16)

• The SS outcome was always a 5-s delay for 1 pellet and the LL was always 2 pellets but the delay was altered

• Comparisons of point of subjective equality (PSE) and mean percent LL choice were used to evaluate choice behaviors

• Median response times were calculated as a function of the phase of training and correlations were between the median response times and delay on the LL forced choice as a measure of temporal tracking

Systematic Delay Procedures

Green & Estle (G&E)  
- Free Choice per block
- LL delay incremented systematically across phases, increasing every 5 days

E&Ryan  
- 2 Forced Choice and 2 Free Choice per block
- LL delay incremented systematically across phases, increasing every 5 days

Mazur  
- Same number and type of trials as the systematic procedures
- LL delay increased or decreased by 1 s as a function of the most recent choice in each block

RESULTs

• The general pattern of results is consistent with the notion that the three tasks may be measuring a similar underlying construct.
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• Rats trained with the M task do not appear to track the delays as well as those in the systematic procedures, and the PSE values suggest higher impulsive choice. These findings are consistent with previous findings 1,3,5,6

• The G&E task yielded the most promising pattern of results: (1) good differentiation of the LL delays (2) mean PSE estimates similar to E&R

• The M task underestimated the PSE compared to the other two tasks, suggesting this task may be biased to identify individuals as impulsive

• The E&R task required substantial training to achieve good differentiation of the LL delays, which may be a drawback of this task

• The systematic procedures resulted in better temporal tracking

REFERENCES


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