



Timing, reward discrimination and impulsive choice behavior



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Introduction

Impulsive choice tasks involve choosing between a smaller reward available after a shorter delay (SS) and a larger reward available after a longer delay (LL). Increasing reward delay on the SS option and increasing reward magnitude on the LL option both increase the value of the LL (relative to SS) and as a consequence produce increased LL choice, however there are large individual differences in impulsive choice and the degree to which changes in LL value alter choice behavior (Galtress, Garcia and Kirkpatrick, in press). To further understand the nature of these individual differences, rats were trained on an SS vs. LL procedure during which SS delay was manipulated across phases from 2.5 s to 30 s while keeping the LL delay and the SS and LL magnitudes constant. In the LL magnitude manipulation, the LL magnitude was manipulated across phases from 1 to 3 pellets while keeping the SS magnitude and the SS and LL delays constant. Non-reinforced 120-s forced choice peak trials were intermixed with free choice trials to assess timing and response rate to determine if these dependent variables were related to individual differences in choice behavior.

Method

SS vs. LL CHOICE	TASK DESCRIPTION
SS delay manipulation	<u>SS: 1 pellet vs. LL: 2 pellet</u> SS: 2.5 s vs. LL: 30 s SS: 30 s vs. LL: 30 s (intermediate SS delays: 5 s, 10 s and 15 s)
LL magnitude manipulation	<u>SS: 10 s vs. LL : 30 s</u> SS: 1 pellet vs. LL: 1 pellet SS: 1 pellet vs. LL: 3 pellets (intermediate LL magnitude: 2 pellets)

Figure 1: SS delay manipulation

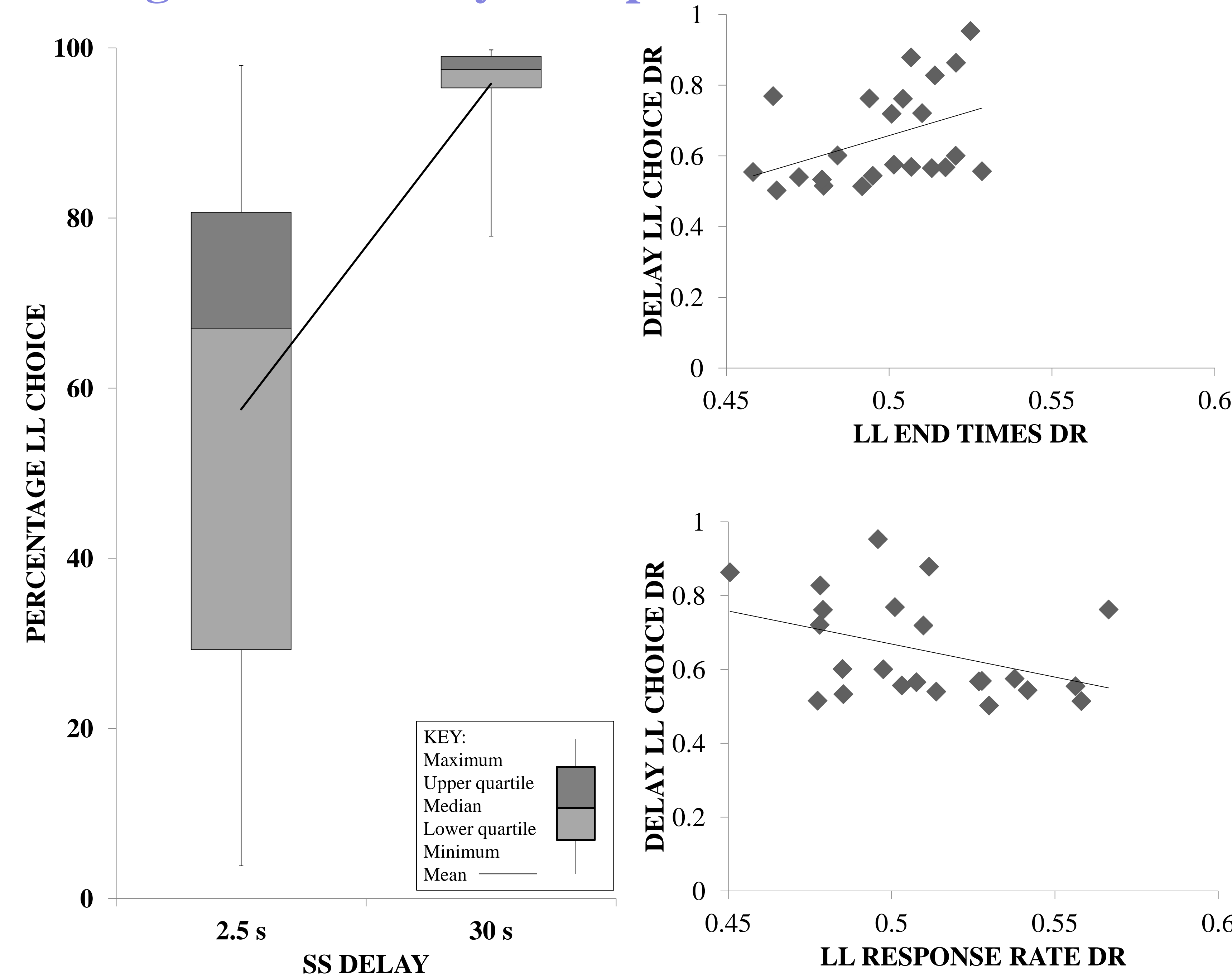
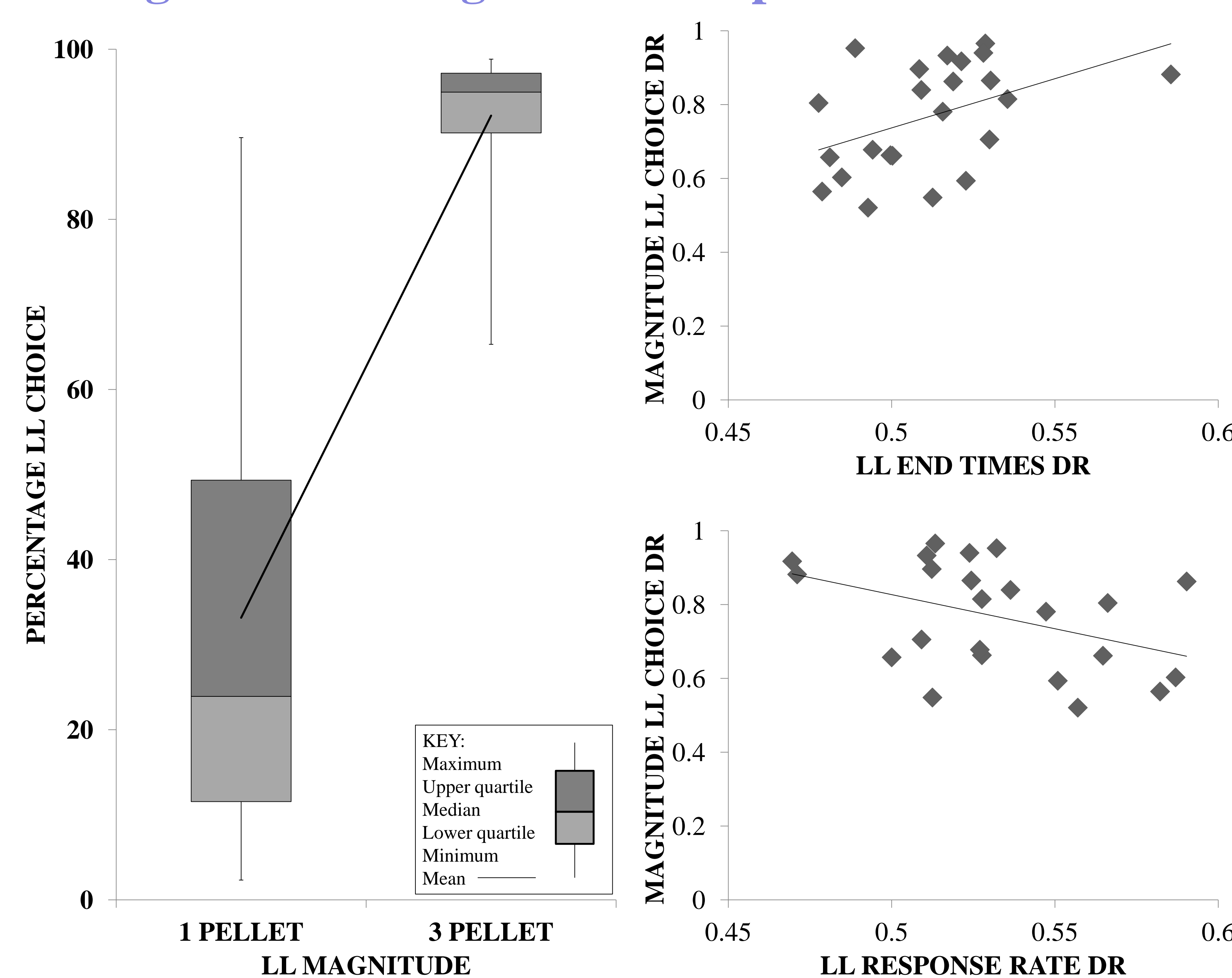


Figure 2: LL magnitude manipulation



Results

Percentage LL choice increased and individual differences in choice behavior decreased as the value of the LL option increased for both the SS delay and the LL magnitude manipulations (Figures 1 and 2, left panels). Also, in both manipulations, rats that produced greater increases in LL end times (response perseveration) as the LL value increased showed a greater increase in LL choice (Figures 1 and 2, top right panels). Additionally, rats that increased responding to a lesser degree on the LL option as the LL value increased showed a greater increase in LL choice (Figures 1 and 2, bottom right panels).

Discussion

Individual differences in choice performance were reduced as the LL value increased, indicating that ambiguous choice parameters led to greater individual differences. Increased end times (response perseveration) and a more moderate response rate on the LL option as the LL value increased was related to a higher degree of increased LL choice. The results indicate that both perseveration in responding and overall response rates may be guided by the same valuation mechanism that is determining choice behavior in impulsive choice tasks. Further research should examine the possible sources of these effects.

Reference

Galtress, T., Garcia, A., & Kirkpatrick, K. (in press). Individual differences in impulsive choice behavior. *Journal of the Experimental Analysis of Behavior*.