



# Individual differences in impulsive choice behavior



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## Introduction

Individual differences in choice behavior have been demonstrated to relate to a variety of behavioral problems including gambling, drug addiction, obesity, and clinical disorders such as ADHD. Although individual differences clearly exist even in normal populations, the degree of variation in impulsive choice has not been examined. The present series of studies sought to measure the degree of variation in impulsive choice in a normal group of rats using variations on standard impulsive choice procedures.

## Method

Rats were trained to choose between a small short delay (SS) and a larger value longer delay (LL). The extent that rats incremented a progressive SS was measured across increasing LL reward in Experiment 1 and decreasing LL reward in Experiment 2.

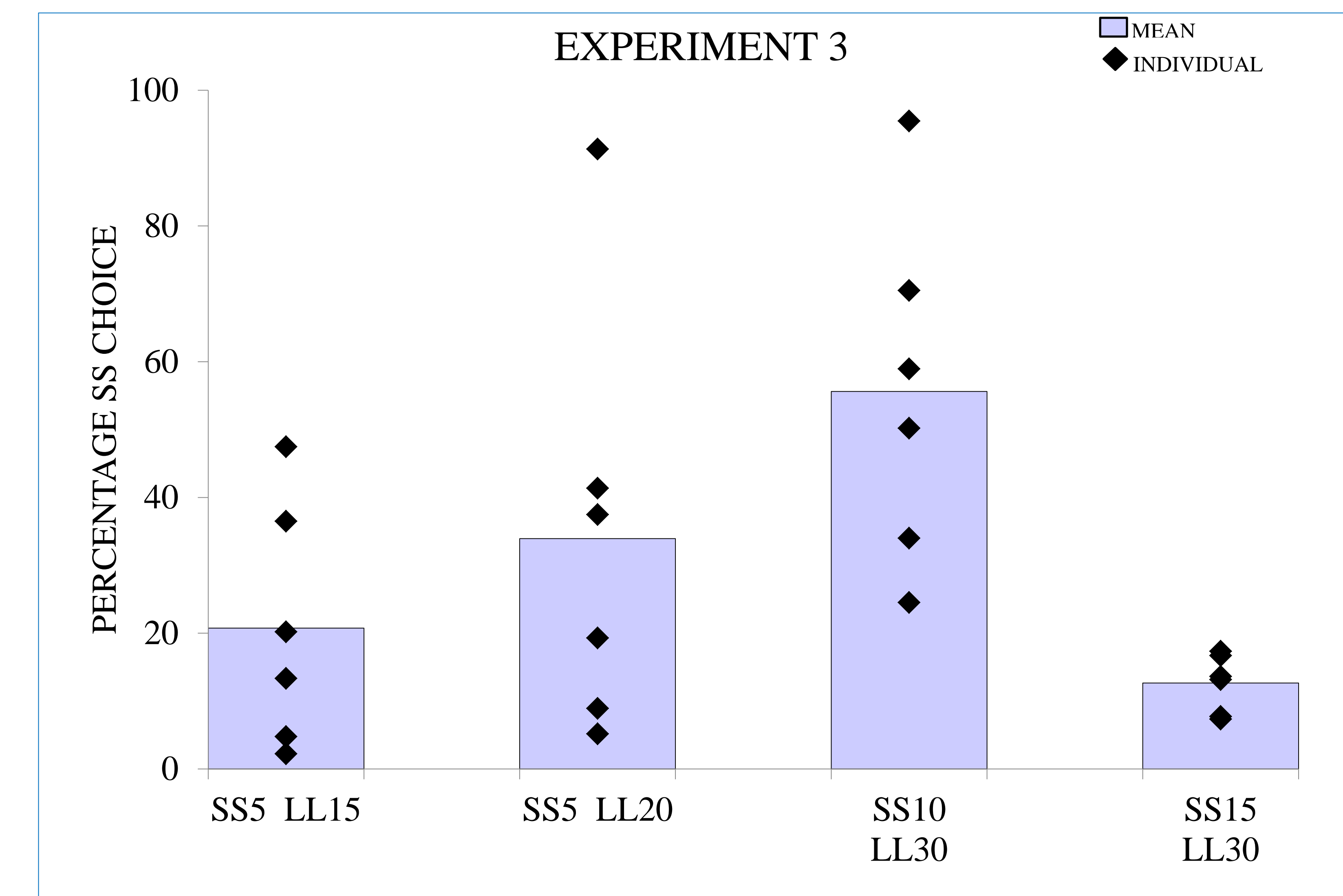
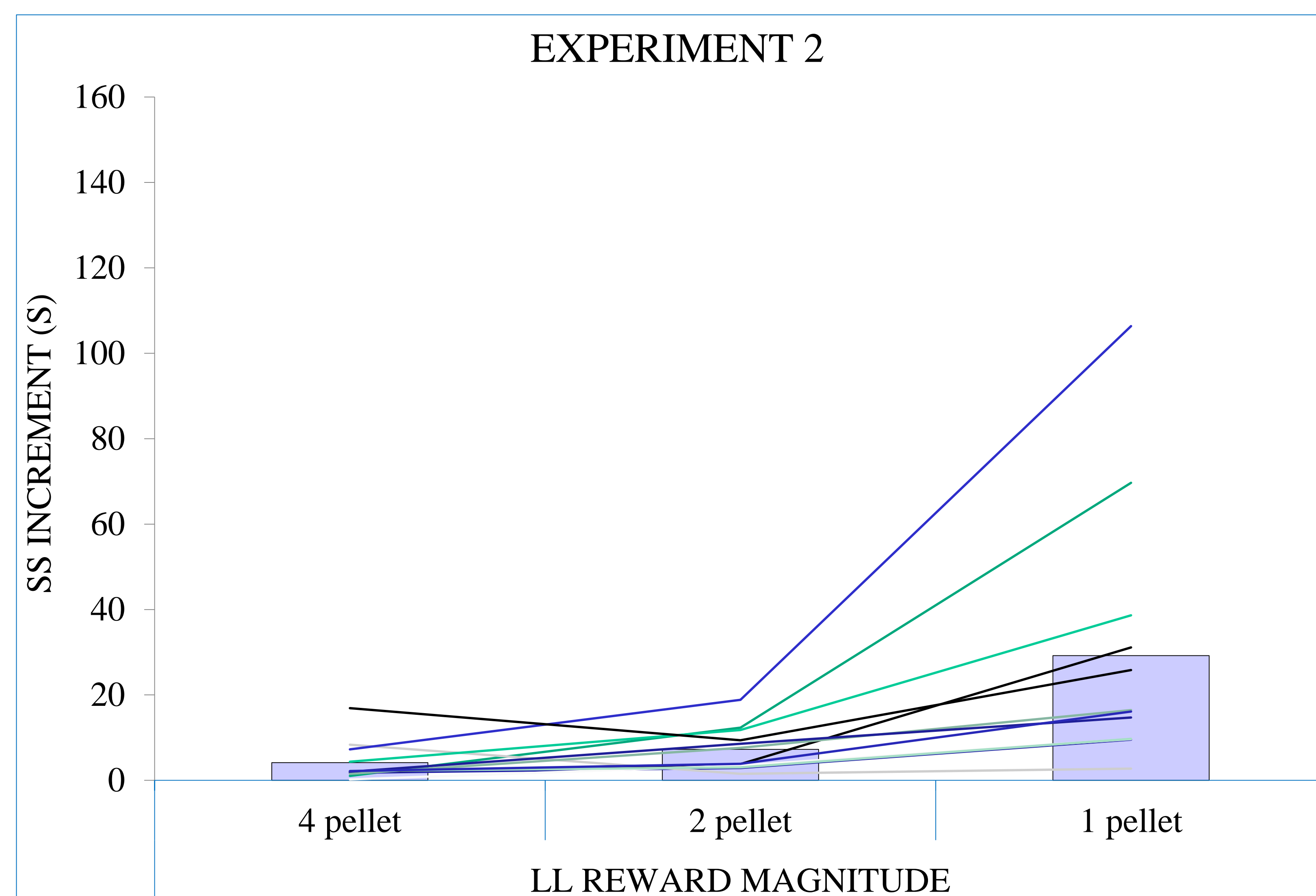
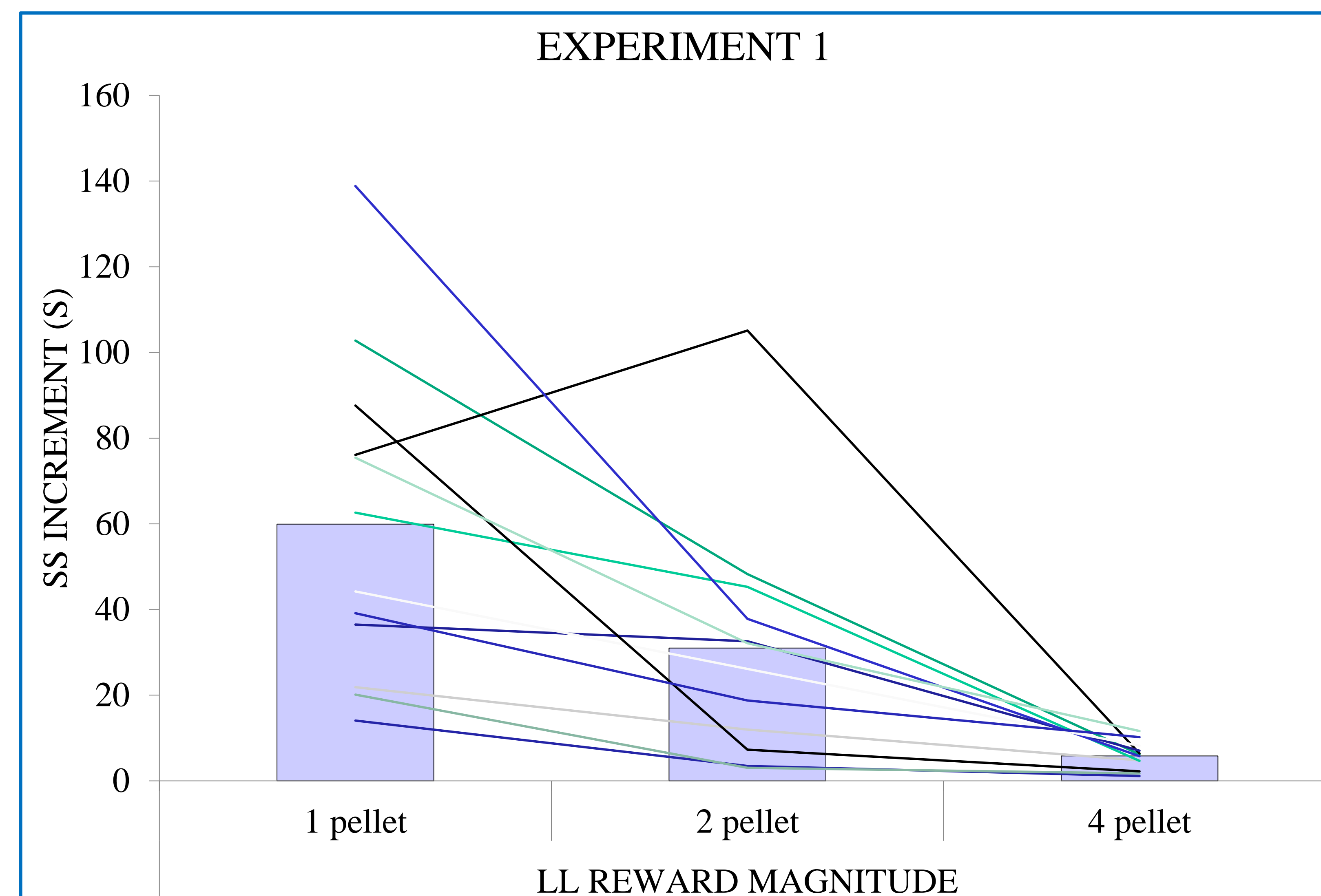
CHOICE	EXPERIMENT 1			EXPERIMENT 2		
	FOOD PELLETT DELIVERY PER PHASE					
PROG 15 s SS	1	1	1	1	1	1
FIXED 60 s LL	1	2	4	4	2	1

In Experiment 3, the choice between a fixed delay 1 pellet SS and 2 pellet LL was measured over different delay conditions.

EXPT 3	FIXED INTERVAL DURATION (S)			
GROUP	SS5 LL15	SS5 LL20	SS10 LL30	SS15 LL30
1 PELLETT SS	5	5	10	15
2 PELLETT LL	15	20	30	30

## Results

In Experiment 1, the rats switched from SS to LL more quickly as the LL reward increased across phases. Individual differences accounted for 22% of the overall variance in choice behavior. In Experiment 2, the rats incremented the SS to a greater degree before switching to LL when the LL reward decreased across phases. Individual differences accounted for 29% of the total variance in the experiment. In both experiments the individual differences were stable across changes in reward magnitude and were most pronounced in the 1-pellet condition. In Experiment 3, rats showed greater preference for the SS choice when the delay was more disparate between the two. Here, individual differences accounted for 55% of the variance between conditions, indicating that the variation in choice between individual rats was a stronger predictor of performance than the SS/LL delays.



## Conclusions

Individual differences accounted for a 22-55% of the variance in choice behavior across the three studies. These individual differences were maintained across different levels of reward magnitude in Experiments 1 and 2, suggesting that individual choice behavior is relatively stable across different choice alternatives. This fits with Kirby's (2009) proposition that impulsive choice behavior is a stable trait variable in humans. Additionally, manipulating reward delay produced different levels of SS choices between groups, but still resulted in large individual differences. Using these procedures to investigate the relationship between individual variance in choice behavior and deficits underlying reward motivation, such as sensitivity to reward value and delay to reward, could be the key to understanding differences in impulsive choice behavior in addictive and impulsive control disorders.

Kirby, K. N. (2009). One-year temporal stability of delay-discount rates. *Psychonomic Bulletin & Review*, 16, 457-462.