

# Mechanisms of impulsive choice: IV. Individual differences in timing and reward processes

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# Processes underlying impulsive choice

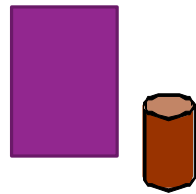
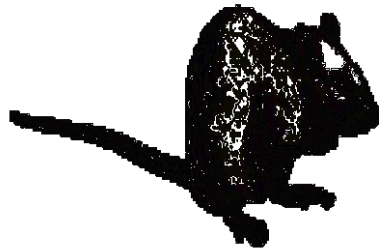
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- 2 main processes: timing processes and reward processes
  - Marshall, Smith, & Kirkpatrick, 2014
- Deficits in timing and reward lead to more impulsive behavior
  - Galtress et al., 2012; Marshall, Smith, & Kirkpatrick, 2014; McGuire & Kable, 2013; Wittman & Paulus, 2008
- Impulsive behavior is associated with several maladaptive behaviors
  - Bickel & Marsch, 2001; Alessi & Petry, 2003; Boomhower, Rasmussen, & Doherty, 2013; Weller et al., 2008
- Current study: determine what factors predict individual differences

# Impulsive choice tasks

## Delay manipulation

SS = 30 → 10 → 3 s, 1 p

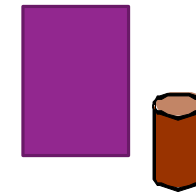
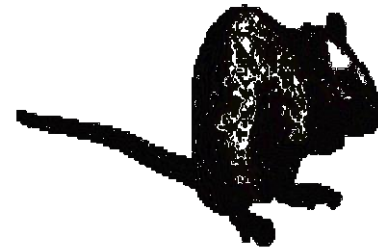


LL = 30 s, 2 p



## Magnitude manipulation

SS = 10 s, 1 p



LL = 30 s, 1 → 2 → 4 p



# Results: Choice behavior

$$\text{LogOdds LL Choices} = \ln\left(\frac{N_{LL} + .5}{N_{SS} + .5}\right)$$

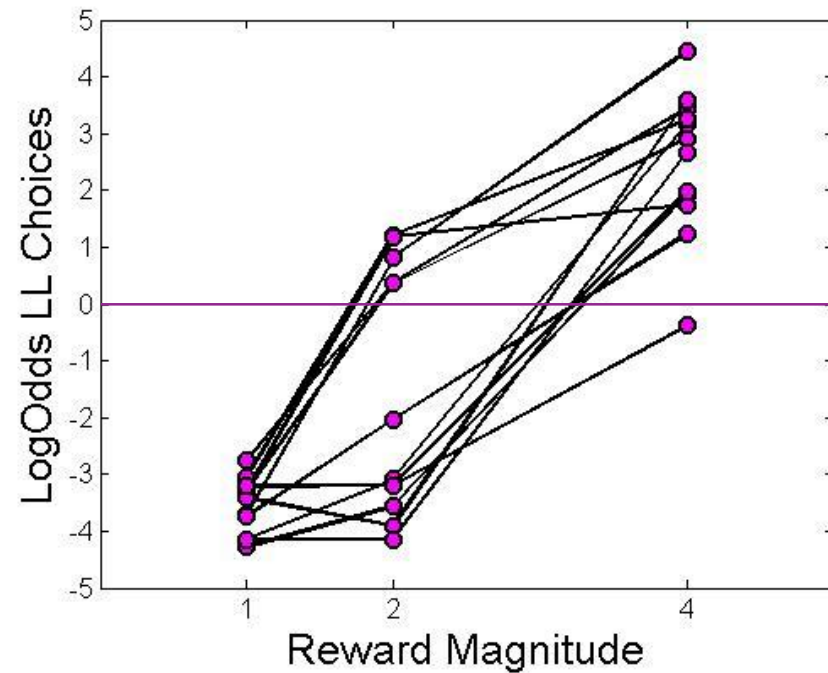
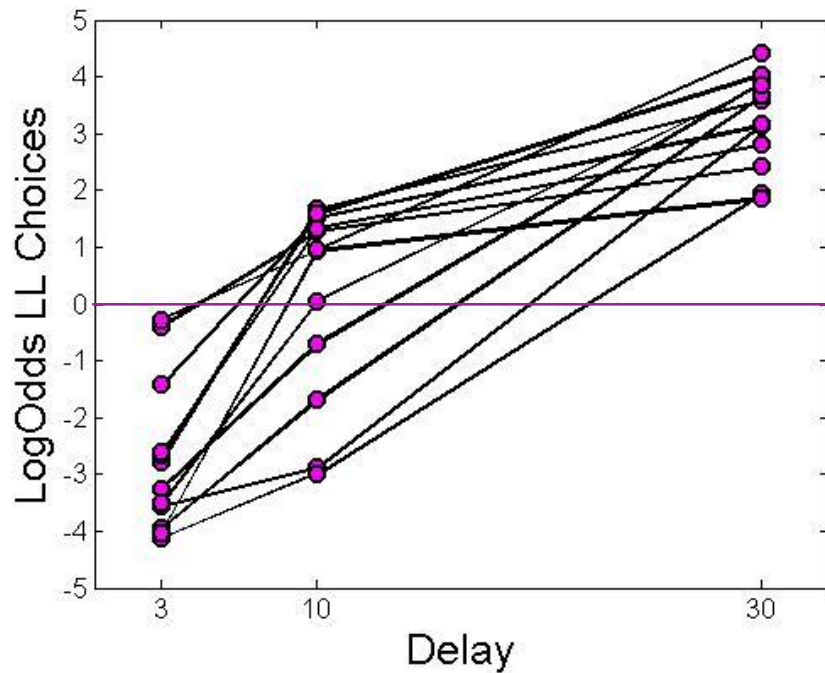
## Delay manipulation

## Magnitude manipulation

Self-controlled



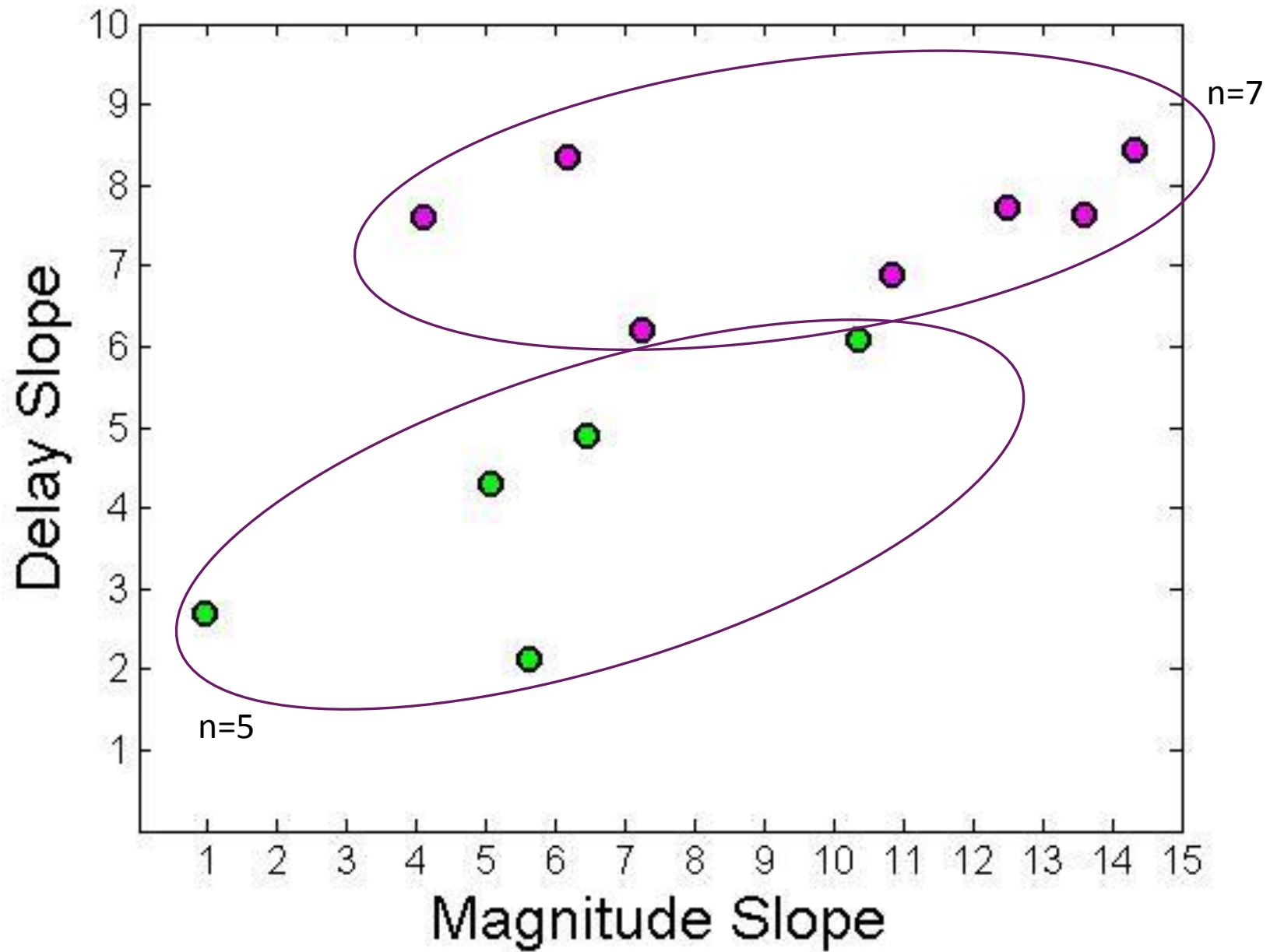
Impulsive



# Data analysis

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- Calculated mean and slope for each individual for each task
- Entered 4 factors into *k*-means cluster analysis in SPSS
- This type of analysis classifies rats into groups based on those factors
- For this experiment, delay slope and magnitude slope had a significant influence on cluster formation

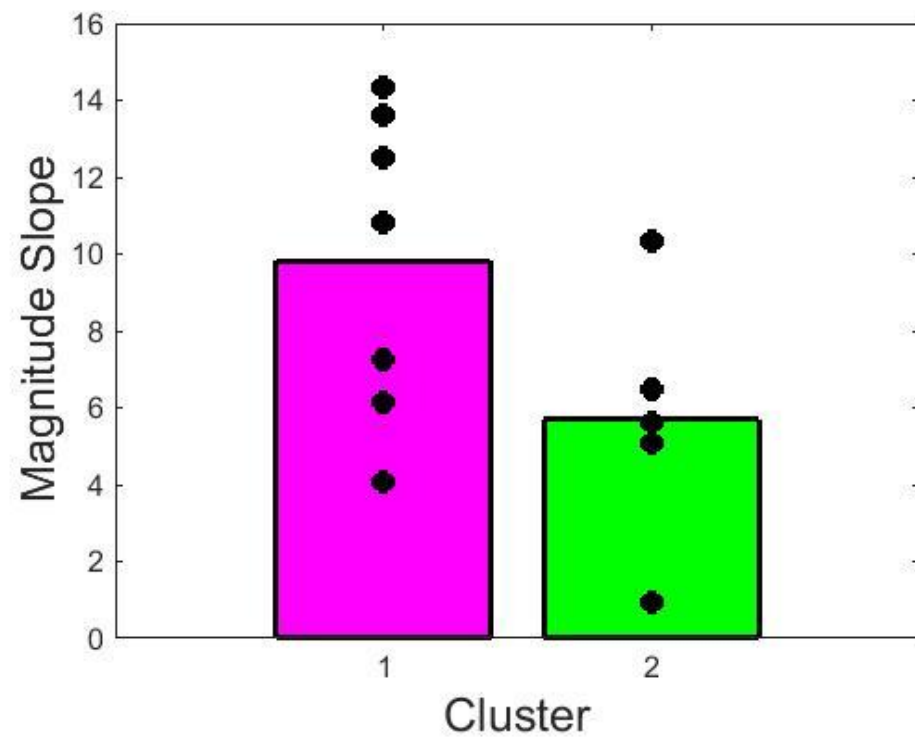
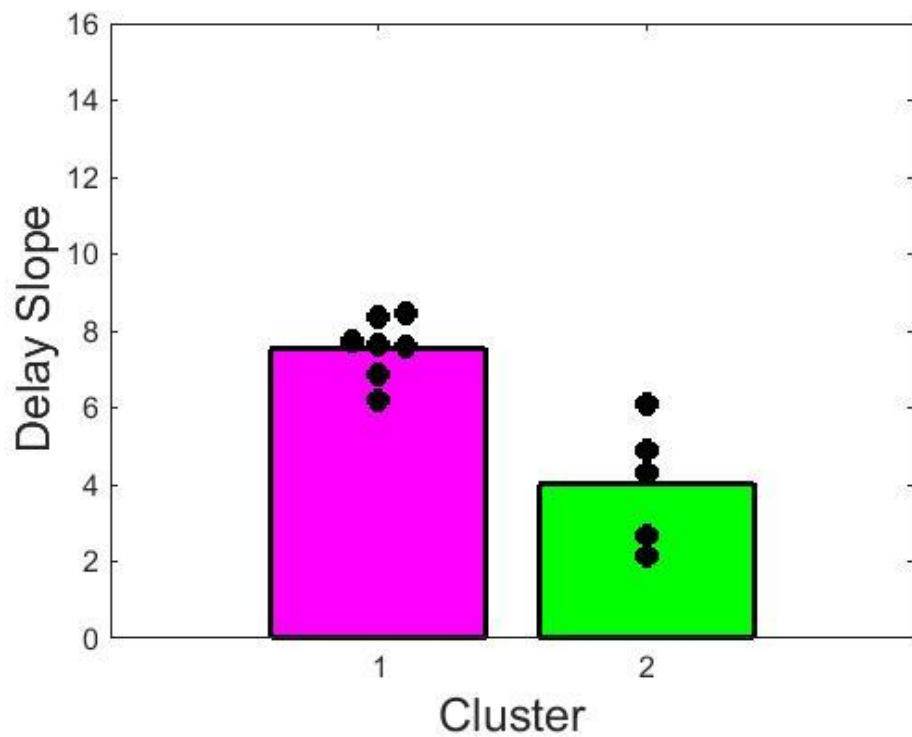


# Results

Adaptable



Inflexible



# Results: Choice behavior

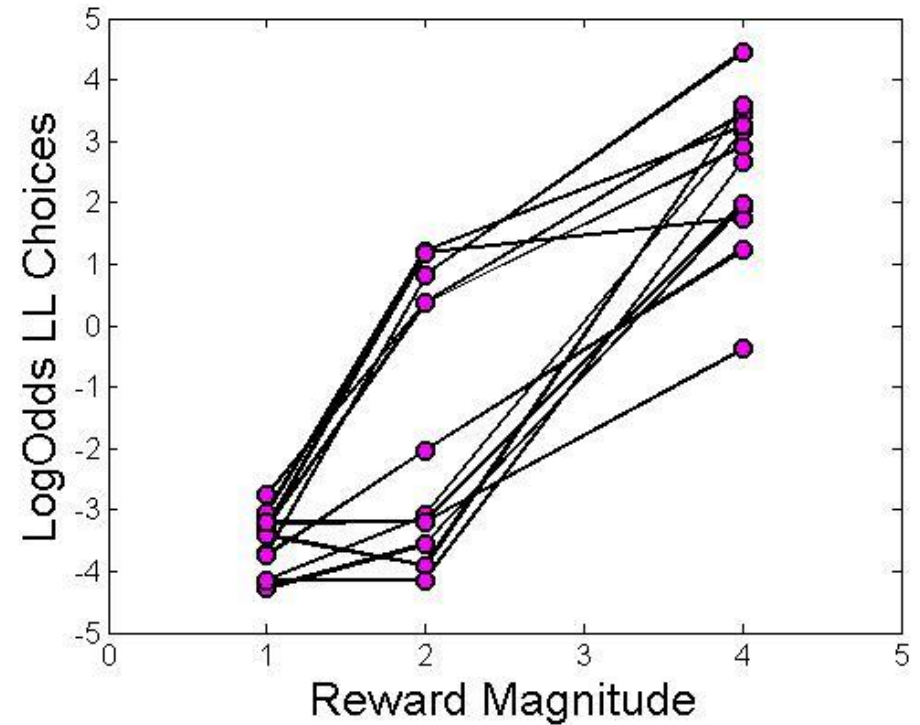
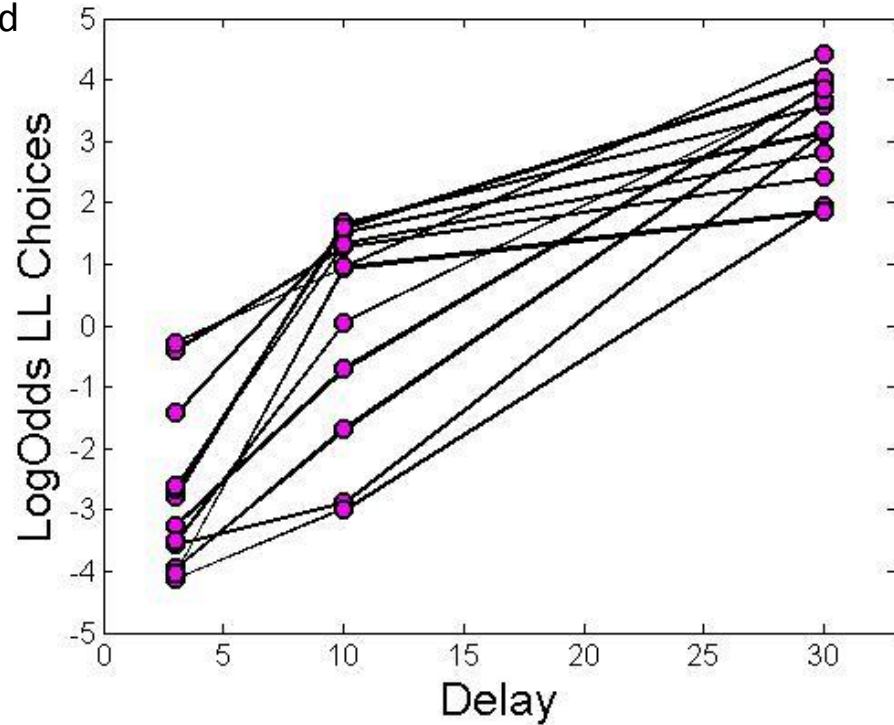
## Delay manipulation

## Magnitude manipulation

Self-controlled



Impulsive





# Conclusions

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- Cluster 1 is more adaptable, while cluster 2 is relatively inflexible
- Adaptability may be a trait
- Less adaptability → more at risk
- At risk for:
  - Drug use (Bickel & Marsch, 2001)
  - Gambling issues (Alessi & Petry, 2003)
  - Obesity (Boomhower, Rasmussen, & Doherty, 2013; Weller et al., 2008)
- Sensitivity to delay and reward are important predictors of individual differences in impulsive choice behavior

# Questions?

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## Acknowledgements

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