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The Effects of Nicotine on Maladaptive Alcohol Drinking

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Introduction

- Impulsivity is defined as choosing a smaller-sooner choice over a more rational larger-later choice.
- Most delay discounting studies only investigate magnitude differences in the same reward.
- Cross-commodity discounting consists of providing the opportunity for subjects to choose between a low quality reward that is available almost immediately and a higher quality reward that is available at a time delay. We will model this in an animal model with rats who have a choice between a relatively small amount of alcohol immediately and a relatively large amount of food at a delay.

Methods

- We started off with a 8-week alcohol acquisition phase in which the rats were exposed to 20% ethanol for a 24-hour period every other day.
- We then started reward training by delivering pellets and alcohol dippers every 60 seconds so the rats knew where the rewards were delivered.
- Next, we started lever training to associate a lever with an individual reward (i.e. Left lever = alcohol, right lever = food pellet).
- Then we mixed the lever training so they could train on both rewards together.
- We then gave them the option to press whichever lever they chose to in order to gain the reward.
- Once their preferences were assessed, we implemented delays on the food pellets and reassessed their preference.
- Once their decisions are stable, we will give pre-session injections of nicotine.
  - There will be 5 doses (0, .1, .3, .56, 1.0) and injections will be administered twice a week for 5 weeks with 2 exposures to each dose.
- The next phase will be a chronic phase in which there is 14 days of nicotine exposure of the same dose.
- We will then revert to the acute drug exposure and again go through the 5 doses, twice a week for 5 weeks.

Results

To date, we have alcohol acquisition data. We also have a baseline of individual preferences for alcohol and food and have just begun to implement delays. 5/6 rats prefer food 100% of the time with 1/6 of the rats prefer food 80% of the time.

Figure 1 - Baseline Preferences of Rats

The line is the day when delays were implemented for the first time. We hope to see a downward trend when delays increase.

Figure 2. This is the group average for our 8-week alcohol acquisition phase

Figure 2. This is the group average for our 8-week alcohol acquisition phase

Conclusions

Rats will choose food over alcohol if given the choice at no delays. With delays, we hope to see this preference shift slightly. With nicotine, we hope to see it shift even more in favor of alcohol over food.