

## Introduction

- Similar to operant chambers, humanoid robots can be programmed to:
  - Record behavioral data
  - Deliver consequences for specific responses
- Thus far, contemporary study of basic operant phenomena with humans has involved the use of computers or tablets, which are two dimensional
- Our purpose was to investigate whether Meebie, a humanoid robot, could be used to gain systematic control over participants' behaviors

## Method

### Design

- ABAB
  - IVs:
    - A = Reinforcement (FR1)
    - B = Extinction
  - DV: Touches to target sensor (one of three)

### Participants & Setting

- 3 participants:
  - Hispanic male, Hispanic female, African-American female
  - Ages 23-25
  - Recruited from undergraduate classroom
  - 2/3 reported having caregiving experience
  - No experience with a robot
- One-way observation room at CSUN

### Training

- 8-minute teaching video:
  - Introduced Meebie
  - Described off-task behaviors
  - Described how to encourage on-task behavior
- Rules:
  - Teach Meebie as much as possible.
  - May use a "life-line"

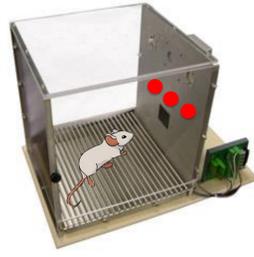
### Reinforcement Phases

- Participants randomly assigned a target sensor
- Began with 1-min of compliance
- Meebie engaged in noncompliance until participant emitted target response
  - 30-s of compliance
- Lasted until 20 reinforcers delivered

### Extinction Phases

- Meebie engaged in noncompliance regardless of participant behavior
- Continued until either:
  - 5-minutes between target responses
  - A "life-line" was used
  - 10 minutes elapsed

▼ Rat deprived of food



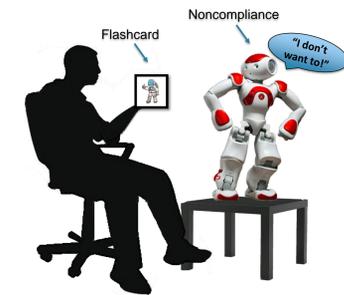
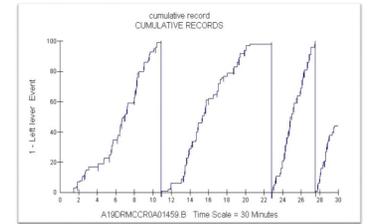
▼ Rat presses target key



▼ Rat accesses food



▼ Computer generates cumulative record of key presses



▲ Participant deprived of compliance

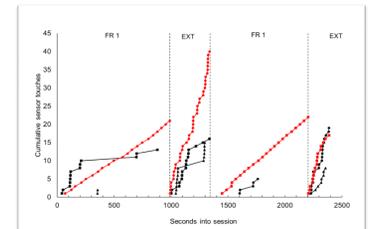


▲ Participant touches target sensor



▲ Participant accesses compliance

▲ Robot sends data to Excel, which generates cumulative graph



## Results



Note. "Red" data paths depict touches to randomly selected target

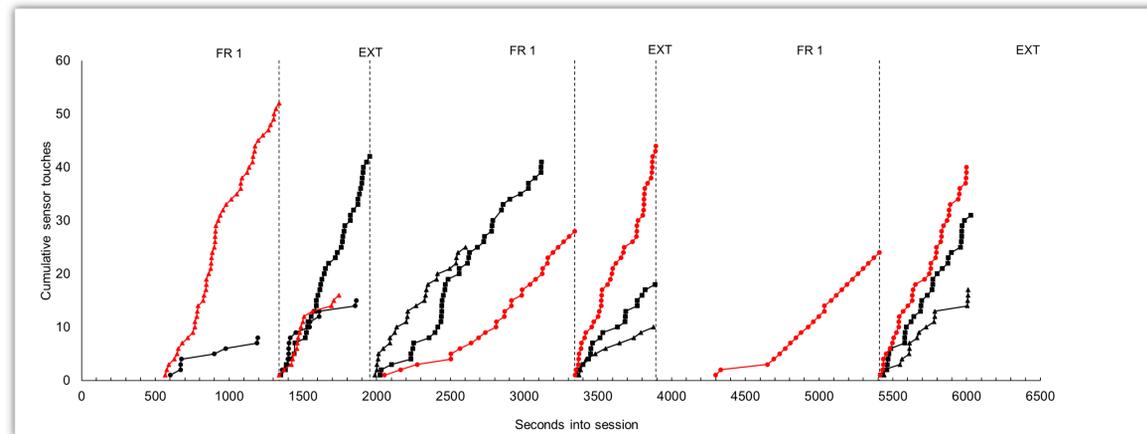


Figure 1. Participant 1

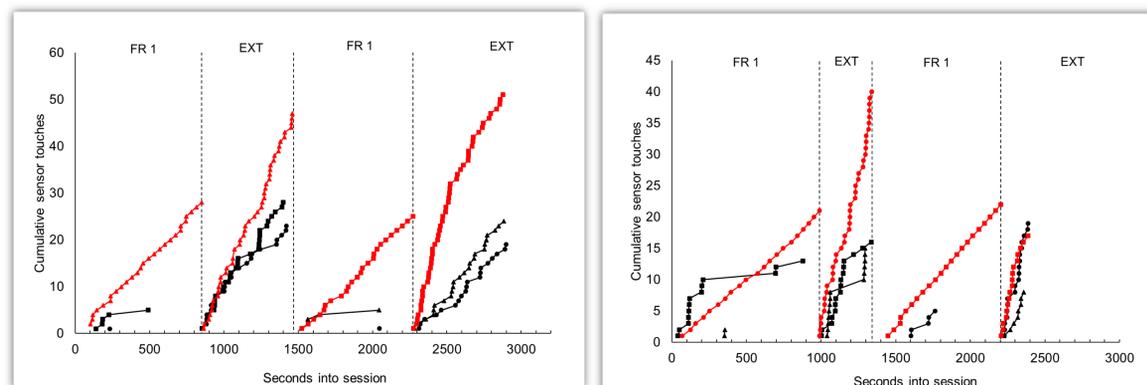


Figure 2. Participant 2

Figure 3. Participant 3

## Discussion & Future Research

- Cumulative touches to target sensor were higher than touches to other sensors in FR phases
- Rate of touches to target sensor increased during extinction, showing evidence of extinction burst
- Extinction induced variability extended to verbal behavior
- Preliminary findings support the use of a humanoid robot as an operandum to study human behavior
- Future researchers should consider:
  - Impact of robot's anthropomorphism
  - Role of observing response
  - Potential inadvertent reinforcement
  - Verbal behavior as a reinforcer
  - Latency between target response and reinforcer
  - Reinforcer quality

## Selected References

- Bruzek, J. L., Thompson, R. H., & Peters, L. C. (2009). Resurgence of infant caregiving responses. *Journal of the Experimental Analysis of Behavior*, 92(3), 327-343.
- Epstein, R. (1983). Resurgence of previously reinforced behavior during extinction. *Behaviour Analysis Letters*, 3(6), 391-397.
- Thompson, R.H., Bruzek, J.L., & Cotnoire-Bichelman, N.M. (2011) The role of negative reinforcement in infant caregiving: An experimental simulation. *Journal of Applied Behavior Analysis*. 44(2). 295-304.