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An Examination of Infant Behaviors at the End of a Food Reinforcement Task

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Background

- Reinforcing value is how hard one will work to obtain a stimulus. A higher reinforcing value of food has been linked to obesity in children and adolescents, and recently in infants[1].
- When measuring reinforcing value in infants, the infant presses a computer mouse button to earn a reward (e.g., a piece of their favorite food). First, one button press is required to earn the reward; this increases linearly up to a maximum of 15 presses.
- Food reinforcement ratio (FRR) relates reinforcing value of a food stimulus to the number of button presses an infant will make to access a non-food stimulus, such as music.

➢ Calculation of FRR:

$$\frac{\text{Max. \# of food responses}}{\text{Sum of max. food \& non-food responses}}$$

- A ratio >0.5 means the infant is willing to do more work when the stimulus is food. In the present study, infants with FRR >0.5 were studied.
- Temperament consists of biologically-based individual differences in reactivity (arousability of responses) and self-regulation (modulation of reactivity)[2].
- Aspects of temperament can be clustered into 3 superfactors: surgency (includes extraversion and high activity level), negativity (includes sadness, fear, and distress), and regulation (includes cuddliness and soothability).

Objectives

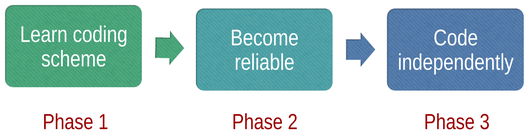
1. Describe behaviors shown by infants at the end of the food reinforcement task
   - Identifying which behavior(s) are used most often.
2. Identify whether infants' behaviors at the end of the task are associated with their temperaments
   - Using superfactors of surgency, negativity, and regulation.

Participants

- Participants were 23 infants from Buffalo, NY
- 61% were male and 83% were Caucasian
- Average infant age was 12.66 months (range 9.27—16.35)
- Mothers were 31 years old on average

Methods

- Two coders coded videos of the last two trials of the food reinforcement task: i.e. the last two times in which the infant earned the food reward before he/she stopped playing. Coders looked for behaviors indicating the infant was "all done" engaging in the task, coding them in 5-second intervals.
- The coding process consisted of:



- Reliability criteria: 75% agreement for each behavior of interest.
- The behaviors coded were:

Fussing/Crying | Communication | Distraction | Avoidance

- If the child was actively playing the task or not exhibiting the above behaviors, the code "None" was selected.
- Parents also filled out survey questions including demographics and the Infant Behavior Questionnaire-Revised, a reliable, valid parent-measure of infant temperament.

Data Analysis

- Proportion scores were calculated for coded behaviors, showing the percent of intervals in which the infant engaged in each behavior. Fussing was low-occurring and thus excluded from analyses.
- Frequencies were calculated to represent the percent of time infants demonstrated each behavior as well as the percent of infants exhibiting each behavior at least once.
- Descriptive statistics were calculated on infant temperament superfactors (Table 2), and logistic regression models were conducted to test whether aspects of infant temperament predicted the likelihood of showing behaviors of interest at the end of the food reinforcement task.

1. Kong, K.L., Feda, D.M., Eiden, R.D., Epstein, L.H. (2015). Origins of food reinforcement in infants. *American Journal of Clinical Nutrition*, 101(3), 515-522.
2. Gartstein, M.A., & Rothbart, M.K. (2003). Studying infant temperament via the Revised Infant Behavior Questionnaire. *Infant Behavior and Development*, 26, 64-86.

Results

Figure 1. % of Intervals with Each Behavior Across All Infants

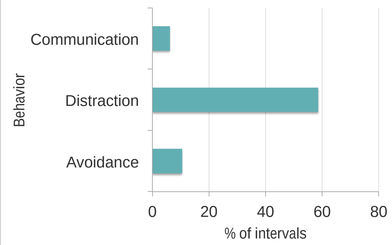


Table 1. % of Infants Exhibiting Behavior At Least Once

Communication	Distraction	Avoidance
60.9	100	69.6

- Distraction was the most common behavior at the end of the FRR task (Figure 1); 100% of infants displayed distraction at least once (Table 1)

Table 2. Infant Temperament: Descriptive Statistics

Variable	Label	N	Mean	Std. dev.	Min.	Max.
SUR	Surgency	23	5.11	0.52	4.11	5.96
NEG	Negativity	23	3.06	0.59	2.15	4.30
REG	Regulation	23	4.73	0.65	3.49	5.90

- Infants' scores on the temperament superfactors were fairly similar to previous research in 9-to-12-month-old infants[2], with the present sample being slightly higher on average Surgency and Regulation, and with similar variability for all factors.
- None of the temperament factors significantly predicted the likelihood of displaying the behaviors of interest. Infants' regulation was associated with avoidance behaviors at a trend level such that infants with higher regulation were less likely to exhibit avoidance at the end of the task (p=.08).

Discussion

- Our findings can inform future administration of the infant food reinforcement task.
- Identifying distraction as a common behavior at the end of the task is helpful because it can act as a consistent guideline for ending the task. This can be integrated into training protocols to ensure that the task is administered consistently as additional investigators use this new paradigm to measure food reinforcement in infants.
- Temperament was not systematically related to behaviors at the end of the food reinforcement task, suggesting that decisions to end the task are not influenced by these individuals differences in behavioral styles.

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