

USE OF EXTINCTION AND REINFORCEMENT TO  
INCREASE FOOD CONSUMPTION AND  
REDUCE EXPULSION

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Extinction and reinforcement contingencies were used to treat 2 children with feeding disorders. Positive reinforcement and avoidance extinction effectively increased food acceptance but also increased food expulsion. Reduced expulsion and increased swallowing were achieved by repeated presentation of expelled food, a second extinction component.

DESCRIPTORS: feeding disorders, extinction, positive reinforcement, children

Behavioral treatments for young children with feeding disorders frequently target acceptance of food into the mouth or actual swallowing (Babbitt, Hoch, & Coe, 1994). For some children, contingencies for acceptance alone are sufficient to obtain consumption because, when the children allow food into their mouths, they reliably swallow. For other children, however, additional contingencies are needed to establish swallowing. This study demonstrates use of extinction and reinforcement with children who first refused and then later expelled food.

#### METHOD

Participants were 2 children with food refusal and gastrostomy tube dependence who were treated on a pediatric inpatient unit. Robert was 5 years old with average intelligence and Russell-Silver syndrome. Hilary was 2 years old with borderline intelligence and Treacher-Collin syndrome. Before intervention, Robert and Hilary obtained 0% and 27%, respectively, of their nutritional needs orally. Data were collected on four dependent

measures. *Acceptance* was defined as receipt of food into the child's mouth within 5 s of initial presentation. *Expulsion* was defined as discharge of food from the child's mouth. *Swallowing* was defined as consumption of an entire food bolus within 30 s of initial insertion into the child's mouth. *Food intake* was measured in grams, subtracting within-meal emesis. Data on acceptance, expulsion, and swallowing were summarized as the percentage of trials on which they occurred, with each new food presentation constituting a separate trial. Mean interobserver agreement was 100% based on 43% of sessions. Mean interobserver agreement for intake was 98% based on 23% of sessions. Meals were conducted three times per day for 50 trials or 1 hr, whichever came first, in treatment rooms adjacent to the unit. Both children were fed in chairs, with therapists facing the children at arm's length. Foods from five major food groups (protein, starch, fruit, vegetable, and liquid) were presented in rotating order at each meal from a spoon or cup in quantities specified below. Reinforcement during all treatment phases involved 15 s of access to materials and activities that were identified prior to intervention (Hoch, Hammel, Hajimihalis, Brodeur, & Johnson, 1996). A multiple baseline across subjects design was used with the following conditions:

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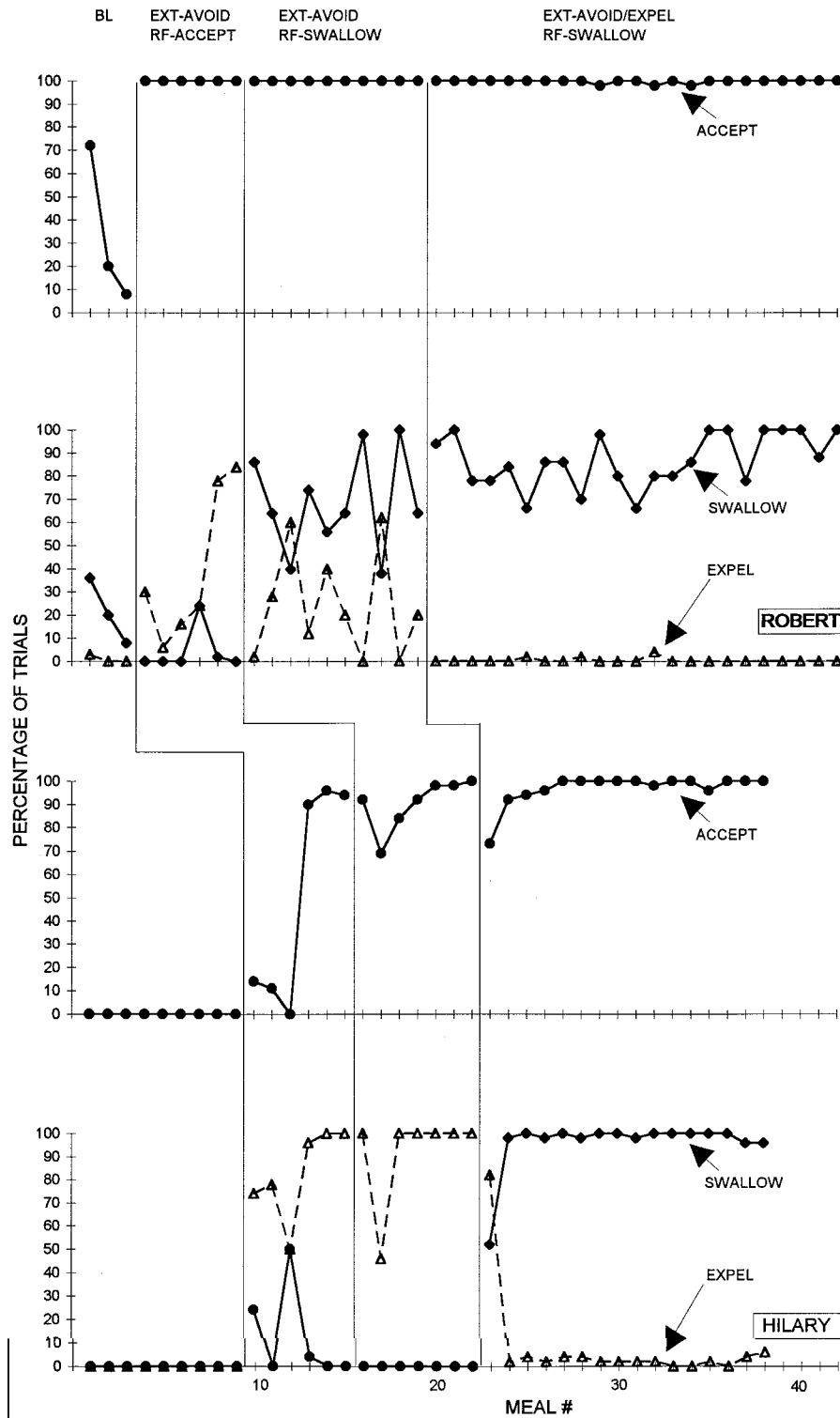


Figure 1. Percentage of trials with acceptance, expulsion, and swallowing (BL = baseline, EXT = extinction, RF = reinforcement).

*Baseline (A).* Food was presented at the child's lips for 5 s or until the child turned away or pushed away the food (food and liquid bolus sizes were 1 spoon and 0.75 oz).

*Extinction of food avoidance and reinforcement of food acceptance (B).* Food was presented at the child's lips, with a verbal prompt given every 30 s until the child allowed food into his or her mouth. Reinforcement was provided when acceptance occurred (food and liquid bolus sizes were 0.25 spoon and 0.5 oz).

*Extinction of food avoidance and reinforcement of swallowing (C).* Food was presented as in Condition B. When food acceptance occurred, a verbal prompt to swallow was delivered twice at 15-s intervals and then every 30 s until the food was swallowed or expelled. Reinforcement was provided when the food was swallowed. If food was expelled, the next trial began (food and liquid bolus sizes were 0.25 spoon and 0.5 oz).

*Extinction of food avoidance and expulsion and reinforcement of swallowing (D).* Food was presented and reinforcement was provided as in Condition C. In addition, expelled food was recovered on the spoon and presented to the child's lips again until acceptance occurred, with a verbal prompt provided every 30 s. Food and liquid bolus sizes were eventually increased contingent on stable intake over three consecutive meals. Food and liquid bolus sizes were as follows: (a) 0.25 spoon and 0.5 oz (Robert, Meals 20 to 27; Hilary, Meals 23 to 29), (b) 0.5 spoon and 0.75 oz (Robert, Meals 28 to 33; Hilary, Meals 30 to 32), (c) 0.75 spoon and 0.75 oz (Robert, Meals 34 to 39; Hilary, Meals 33 to 35), (d) 1 spoon and 0.75 oz (Robert, Meals 40 to 42; Hilary, Meals 36 to 38).

## RESULTS AND DISCUSSION

The percentages of trials with acceptance, swallowing, and expulsion are de-

picted in Figure 1. For both children, acceptance, and consequently expulsion and swallowing, were infrequent during baseline. Baseline intakes were also low (Robert's  $M = 41$  g, Hilary's  $M = 1$  g). Condition B, targeting acceptance, improved acceptance as intended, but expulsion increased and swallowing rarely occurred. Condition C shifted reinforcement from acceptance to swallowing. Robert's expulsion decreased and his swallowing increased; Hilary's expulsion remained high and her swallowing remained low. Condition D added extinction for food expulsion and resulted in consistently high levels of swallowing and low levels of expulsion. Intake increased (Robert's  $M = 309$  g, Hilary's  $M = 102$  g), and acceptance remained high and stable. Reductions in tube feeding schedules were made commensurate with increased intake. At the completion of treatment, the percentage of calories obtained from oral feeding was 78% for Robert and 60% for Hilary. These results demonstrate how multiple extinction and reinforcement contingencies may be required to sequentially treat different topographies of feeding disorders in young children and, in particular, how food consumption or swallowing and a major competing response, expulsion, can be altered inversely.

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