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# Treating Food Refusal & Selectivity in Children With Autism Spectrum Disorders: A Review - Part 2

*Begin Code:* **mlca12012s**

# Treating Food Refusal and Selectivity in Children with Autism Spectrum Disorder: A Review – Part 2

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# 3 Objectives Today

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1. Identify commonly used reinforcement-based behavior analytic procedures for treating food refusal.
2. Identify successful behavior analytic treatment packages for treating food refusal and selectivity.
3. Identify legal and ethical considerations around treatment of feeding problems.

*This is a detailed review of the current literature on food refusal and selectivity, specific to children with autism.*

# Prevalence of Feeding Issues

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- "Feeding problems are common in children, affecting those with developmental disabilities and medical conditions as well as children who are typically developing" (Laud, et al., 2009).
- Reported prevalence of feeding problems (Bachmeyer, 2009):
  - 2%-35% of typically-developing children
  - 33%-80% of children diagnosed with a developmental disability
- More recent figures suggest prevalence of feeding problems in children with ASD are as high as 90% (Volkert & Vaz, 2010)

# Signs of a Feeding Problem

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- Poor weight gain
- Mealtime tantrums
- Mealtime extending beyond 40 minutes
- Refusal to feed oneself
- Extreme pickiness
  - Eating fewer than 12 foods

- Around 67% of parents of children with autism report their child is a “picky eater”, but only 6-7% consider their child to have a feeding problem (Thompson, 2010).

# What is food refusal?
# What is food selectivity?

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- Food refusal (as defined in Laud, et al., 2009):
  - Turning head from utensil
  - Spitting out food (expulsion)
  - Throwing utensils (attempt included)
  - Pushing utensils away from mouth
  - Packing or holding food in mouth
  - Aggression (toward feeder, toward self)
  - Keeping lips closed
  - Getting out of seat

- Food selectivity (as defined in Piazza, et al., 2002):
  - Strong preference for particular types of food
  - Strong preference for particular textures of food
  - Limited variety of foods regularly consumed for prolonged periods of time
- *Within the context of this presentation…*
  - *Food refusal will be discussed with the assumption that the behavior stems from varying degrees of selectivity.*
  - *"Inappropriate mealtime behavior" will be mentioned, with regard to both refusal and other problem behavior around mealtime.*

# The Problems Food Refusal and Selectivity Present

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- Health concerns
  - Failure to thrive
  - Obesity
  - Poor diet affects ability to learn effectively
- Family stress
  - Making multiple meals
  - Throwing away food
  - Problem behavior around each meal
  - Parents may feel like inadequate providers
- Social
  - The child may feel left out or rejected by peers
    - Lunch at school
    - Birthday parties
    - Restaurants
    - Sleepovers with friends

# Comparing the Eating Behavior of Children with Autism and Typically-Developing Children

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*A comparison of eating behavior between children with and without autism* (Schreck, Williams, & Smith, 2004)

- Children with autism have ***significantly*** more feeding problems than children without autism
- Children with autism have a tendency to eat fewer foods than children without autism
  - *To accept foods, children with autism are more likely to require specific utensils, particular food presentations, and foods with low texture*
- The family's repertoire of foods were not related to the child's restricted eating behavior
  - The differences in food eaten did not appear to be a direct result of fewer opportunities for different food in the family

# Food Selectivity Specific to Children with ASD

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*Food preference and factors influencing food selectivity for children with autism spectrum disorders* (Schreck & Williams, 2006).

- 138 children with ASD (autism, Asperger's Disorder, & PDD-NOS); average age of 8.3 years
- Findings:
  - Children with ASD only ate a small variety of foods
  - The majority of the groups' selectivity of restricted variety of food was related to its presentation (e.g., food touching each other, or food requiring the use of particular utensils)
  - Selectivity was not related to the texture of the food
  - Children with ASD ate less than half of the reported items across all food groups
  - The majority of the families ate more than half of the reported items across all food groups
  - There was not a significant relationship between eating behavior and the severity of ASD diagnostic characteristics

# Evaluating Degrees of Food Selectivity Behavior

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*An assessment of food acceptance in children with autism or pervasive developmental disorder – not otherwise specified* (Ahearn, et al., 2001).

- 30 children and adolescents diagnosed with either autism or pervasive developmental disorder – not otherwise specified (PDD-NOS)
- Evaluated to what extent the children/adolescents would accept foods presented across 4 types of food (fruit, vegetable, starch, protein)
- For the 17 of the 30 subjects demonstrated low overall food selectivity for food type and texture:
  - 1 demonstrated selectivity by texture only (accepted in a pureed form)
  - 5 were deemed mildly selective (accepts food moderate to high in from one group and low in all others)
  - 3 were deemed moderately selective (accepts food moderate to high in one food group and low in only 1 or 2 other)
  - 8 were deemed overly selective (accepting from only one food group)

*Demonstrates that there are measureable degrees by which we can categorize selectivity to help determine intrusiveness of the needed behavioral intervention*

# Additional Results
# Ahearn, et al. (2001)

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- No consistent pattern of disruptive feeding behavior was observed (i.e., no one particular type of food, when presented, evoked disruptive feeding behavior), though children were more likely to exhibit disruptive behavior when refusing food.
- From data collected, investigators' findings appear consistent with anecdotal reports of feeding problems in children with ASD.

*The presence of problem behavior related to feeding should not be interpreted to mean that food selectivity is unique to children with ASD, nor should it be counted as a diagnostic trait of persons with ASD.*

# Causes of Maintaining Factors of Food Refusal/Selectivity

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- Medical conditions
  - Gastroesophageal reflux (GER)
- Physiological or anatomical dysfunction
  - Cleft lip and palate
  - Dysphagia
    - Difficulty swallowing, may experiencing pain
- Reinforcement of inappropriate behavior
  - Food refusal & selectivity
  - Other inappropriate mealtime behavior

# Reinforcement – Operant Behavior

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- To get something that you want
  - Access to a tangible object
  - Access to attention from another
  - It feels, smell, tastes, sounds, or looks good
- To get away from something that you don't want
  - Get out of the task presented
  - It doesn't feel, smell, taste, sound, or look good

*Reinforcement can be determined through descriptive and experimental analyses.*

(Austin & LaMarche, 2012)

# Indirect Assessment Tools

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- Children's Eating Behavior Inventory (CEBI)
  - Measures the frequency of 19 different eating behaviors through the use of a 5-point rating scale
    - Determines if there is an eating problem
- Behavioral Pediatric Feeding Assessment Scale
  - 35 item measure developed as a measure of mealtime behavior
    - 25 items specific to the child's behavior
    - 10 items specific to the parent's behavior
- Food Preference Inventory
  - Rating scale to determine if the child will eat age appropriate portions of food and whether the food is typically offered at meals and eaten by the family
    - What will he/she eat?

# Descriptive Analysis

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## Antecedent Behavior Consequence (ABC Chart)

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| Instructor | Date/Time | Antecedent | Behavior | Consequence | Intensity/ Duration | Notes |
|---|---|---|---|---|---|---|
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# Probability Analysis

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| Setting Events | Antecedents | → | Behavior | → | Consequence |
|---|---|---|---|---|---|
| | | | | | |

**Analyze the data that you have collected over *repeated* observations to determine the maintaining variables**

**Create statements to provide yourself a visual analysis**

# Preference Assessment
# Levin & Carr (2001)

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- The goal is to determine a child's preferred and non-preferred foods.
- Can you use the *Food Preferences Questionnaire* as a starting point.
- Assess across 20 different food items
  - 10 foods are already regularly consumed by the child and 10 were novel foods
  - **A total of 4 food items were presented 5 times each randomly, for a total of 20 trials per session**
- Instructors presented bite-sized portions of each food item and asked the child to "try some," if the bite was consumed within 5 seconds of presentation, the trial was terminated.
- If the child did not consume the item within 5 seconds, instructors modeled eating the item and presented the same food again as part of the same trial. The child had 5 additional seconds to eat the food before the trial was terminated.
- The child was given credit for consuming an offered item during any portion of the trial; the total number of trials in which the item was consumed out of 10 provided a measure of overall food preference.

# Multiple Stimuli without Replacement Preference Assessment


- Place 5 to 7 food bite-sized items on a table, in front of the child
- List these items on a piece of paper
- Allow the child to sample each food item
- Place the food items equal distance from each other in a line
- Tell the child, “pick one” or identify the first one the child grabs
- Remove the food item that the child chose and randomize the presentation of the items again
- Repeat this until all items are gone or if the child does not respond within 30 seconds
- Conduct this assessment multiple times and then determine the percentage of preference – providing a hierarchy of preference

# Experimental Analysis

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- Functional Analysis of Behavior:
  - Thompson & Iwata (2007) explains the general characteristics as:
    - Direct & quantitative observation of Behavior
    - Conditions of observation are controlled
    - Comparison between test and control conditions

# Functional Analysis for Challenging Behavior

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- Attention
- Demand
- Alone
- Access to Tangible
- Play (Control)
  - During all conditions the designated consequence was delivered every time the problem behavior occurred
  - All sessions last a minimum of 10 minutes
  - Order of conditions are randomized

# Functional Analysis of Inappropriate Meal Time Behavior

Special Learning

Baseline (control):

- Child has access to toys and instructor's attention throughout the session.
- Instructor attempts to feed the child in 30 second intervals;
  - If the child did not accept, a new bite of food was presented.
  - If the child engaged in inappropriate mealtime behavior, a new bite of food was presented.
  - If the child accepted the bite, a new bite was presented after consumption.

# Functional Analysis of Inappropriate Meal Time Behavior

Special Learning

Escape:

- The instructor presents a bite of food to the child every 30 seconds.
- If the child engages in inappropriate mealtime behavior, the instructor removes the bite of food for 30 seconds.
- If the child accepts the bite, a new bite is presented after consumption.

# Functional Analysis of Inappropriate Meal Time Behavior

Special Learning

Attention:

- An instructor presents a bite of food to the child every 30 seconds
- If the child engaged in inappropriate mealtime behavior, the instructor delivers a brief (5-10 seconds) periods of attention in the form of coaxing (e.g., “you like this, come on”) or as a statement of concern (e.g., “don’t cry, you’re okay”)
- The utensil remains at the child’s lips for the remainder of the 30-second interval, then removed, and another trial begins.

# Functional Analysis of Food Acceptance

Special Learning

Tangible:

- An instructor presents a bite of food to the subject every 30 seconds
- If the child engages in inappropriate mealtime behavior, the instructor delivers a preferred toy, food, or drink.
- The utensil remained at the child's lips during the interval.
- At the end of 30 seconds, the object was removed, the spoon was removed, and another trial began.

# Functional Analysis
# Preferred vs. Non-Preferred Items

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- To examine the relationship between problem behavior and the presence of preferred versus non-preferred food items, within the context of mealtime.
- Preferred and non-preferred food conditions were alternated, with results from the previous phase directing which foods were preferred and which were non-preferred.
- Investigators offered the subject a piece of food (whether in the preferred or non-preferred condition); if the subject ate the item, the investigator praised the child and offered another bite. If the child did not accept, the investigator continued to present the item once every 10 seconds. If the subject engaged in problem behavior, the investigator removed the food item, turned away from the child, and did not present another bite of food until 30 seconds had elapsed.
- Sessions conducted were 10 minutes in length and occurred during the subject's regular lunchtime. If the entire portion of food was consumed prior to 10 minutes, sessions were terminated following total consumption.

# Review of Assessment Research

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- Borrero, et al. (2010) – probability analysis
  - Parental attention was more likely to occur for food refusal than for food acceptance (e.g. coaxing the child to eat)
  - Parental delivery of a tangible item was very low for both food refusal and for food acceptance
  - Escape from the spoon or drink was the most common event that followed food acceptance
- Piazza & Fisher, et al. (2003) – functional analysis of inappropriate mealtime behaviors
  - 10 /15 subjects displayed high levels of inappropriate mealtime behavior during 1 or more of the test conditions

Suggests that environmental variables play a role in problem feeding behavior.

9 children: escape

8 children: attention

2 children: tangible

# Effective Behavioral Interventions for Feeding Problems

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- Antecedent Interventions
  - Altering the texture of the food served prior to the meal
  - Using high probability tasks related to eating prior to serving low probability foods
- Consequent Interventions
  - Differential reinforcement
    - Delivering a reward for an appropriate mealtime behavior and withholding a reward for the inappropriate mealtime behavior
  - The Premack Principle
    - Delivering an effective reward a child regularly receives (TV, dessert)
  - Escape extinction
    - Not allowing the child to refuse the bite of food

# Antecedent-Based Interventions

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- Patel, et al (2001)
  - 6-year-old boy diagnosed with PDD, and whose medical history was positive for failure to thrive and G-tube dependence
  - Child would drink water, but would not accept mixtures of 1 packet of Carnation Instant Breakfast (CIB) and water or mixtures of 1 packet of CIB and milk.
  - When the child accepted the 80% of the mixture or more for 3 consecutive sessions, the ratio of CIB to water was increased to10%, until he was accepting a mixture that was equal parts CIB and water
  - Investigators were able to increase the variety of fluids the child accepted; he was readily receiving 100% of his daily caloric intake by mouth

# Simultaneous Reinforcement

Special Learning

- Ahearn (2003)
  - 14-year-old boy diagnosed with autism and profound range of ID
  - Condiments on vegetables
  - Results: child's food consumption increased to 100% of presented veggies and remained at 100% consumption at 1-year follow up; a fading procedure was not used

# Simultaneous Reinforcement vs. Sequential Reinforcement

- Kern & Marder (1996)
  - 7 year old boy with pervasive developmental disorder
  - Baseline: repertoire of 5 different food items. When presented non-preferred foods, he would refuse to accept them or expel them out. He would also sometimes engage in self injury.
  - Fruits were exposed to escape-extinction with simultaneous reinforcement (chip with banana slice) and vegetables were presented escape-extinction and delayed (sequential) reinforcement (chip was provided immediately after a bite of vegetable).
  - Results: both were equally effective

  *Showed the both intervention resulted in increased acceptance with simultaneous reinforcement being slightly superior.*

# Simultaneous Reinforcement vs. Sequential Reinforcement

*An evaluation of simultaneous and sequential presentation of preferred and non-preferred food to treat food selectivity* (Piazza, et al., 2002)

Testing the efficacy of a simultaneous presentation condition vs. a sequential presentation condition. Procedures varied by subject.

- 3 children
  - 10-year-old boy diagnosed with autism, who demonstrated independence with feeding skills (A)
    - Simultaneous was more efficient
  - 11-year-old girl diagnosed with PDD-NOS and seizure disorder, functioning with severe to profound intellectual disability; this subject required assistance with feeding during mealtime (B)
    - Simultaneous was more effective
  - 8-year-old boy diagnosed with PDD-NOS, ADHD, and identified to be functioning with severe intellectual disability; this subject required assistance with feeding during mealtime (C)
    - Simultaneous was more effective but only with escape extinction

# Differential Reinforcement of Alternative Behavior

Special Learning

Wood et al. (2009)

- 5 ½ year old boy with autism with a restricted gluten-free/casein-free diet
- Procedures: Child was presented with 10 child sized bites and given the direction, “take a bite.” If at any time, he ate a bite of food, he was praised. If he did not pick up the spoon within 5 seconds, an adult hand-over-hand prompted him to pick up the utensil. If he did not put the utensil to his mouth within 5 seconds, the feeder prompted this. If he did not take a bite within 5 seconds, a smaller portion was presented to him. If this was not consumed, he was required to taste it to his tongue.
- Results: Food consumption increased and a total of 4 new foods were introduced. Escape behavior continued to occur at low rates in some of the sessions of introducing new foods. Mother was highly satisfied with the intervention.

# Premack Principle

Special Learning

Levin & Carr (2001)

- 3 children (2 males, 1 female), all diagnosed with autism and all identified to be functioning in the moderate to severe range of intellectual disabilities
- Target food was almost never consumed unless the children were given no access to preferred food prior to the meal and the implementation of positive reinforcement contingencies.

> The Premack principle states that any high-probability activity can be used as a reinforcer for a low-probability activity if the subject prefers the high-probability activity.

*Deprivation of all preferred food and application of the Premack principle were the only conditions under which subjects consumed any non-preferred food, suggesting that this combination is effective in increasing food consumption.*

# Consequent Interventions

Special Learning

*"As a rule, the least restrictive, effective intervention should be used for severe problem behavior but given the substantial consequences of prolonged food refusal it is sometimes necessary to use more intrusive procedures with positive reinforcement alone is ineffective (physical guidance and non-removal of the spoon)"* (Laud et al., 2009)

# Escape Extinction with Differential Reinforcement

Special Learning

*Combining stimulus fading, reinforcement, and extinction to treat food refusal* (Freeman & Piazza, 1998)

- 6 year old girl with autism and other medical diagnoses
  - Did not reliably eat, engages in aggression toward others, self injury and disruptive behavior during meals
- Intervention: stimulus (food) fading, reinforcement (termination of the meal), and escape extinction using guided compliance.

# Escape Extinction with Differential Reinforcement
# Freeman & Piazza (1998)

- She was presented a plate of age-appropriate portions of fruit, protein, starch, and vegetables. If she did not start initiate eating, the adult would provide a verbal prompt, “take a bite” every 30 seconds. Meals were terminated when if she ate 100% of the meal or after 30 minutes, which ever came first. If she did not comply with the demand within 5 seconds, the adult used a *partial physical prompt*. If she still did not comply, a *physical prompt* was given. Verbal praise was provided for a successful bite, with and without a prompt.
- 2-4 treatment meals were presented daily. The adult started with foods that she has previously eaten. Criteria was increased by 5% when she was 80% compliance for 3 consecutive meals. As she demonstrated success, the criterion changed to 2 consecutive meals to fade more rapidly. When she would eat 50% of an age appropriate portion, the adult introduced a new type of food.
- Results: within 12 weeks, the girl increased from about 25 grams of consumption to 150 grams and consistently consumed 50% of age appropriate portions of fruit, protein, starch and vegetables

# Escape Extinction with Differential Reinforcement

Special Learning

*The use of an escape contingency and a token economy to increase food acceptance* (Kahng, et al., 2003)

- 4 year old girl with speech delay and possible pervasive developmental disorder
- Intervention compared the following procedures:
  - Differential Positive Reinforcement of Alternative Behavior (DPRA) = social praise. The meal was terminated once 10 bites of food were presented or after 20 min had elapsed.
  - (DPRA) and physical guidance (PG: the application of gentle pressure to the jaw and depositing the bite of food in the mouth). The feeding session ended after 10 bites of food were presented or 20 minutes were up.
  - She was reinforced with a token signally the termination of the meal (negative reinforcement) DNRA. If she refused or did not accept within 5 seconds, physical guidance was used.

# Escape Extinction with Differential Reinforcemer
# Kahng, et al. (2003)

Special Learning

- The number of tokens required to terminate the meal was gradually increased after two meals in a row in which she met criterion to terminate the session, and the terminal goal was 15 tokens.
- Results:
  - DPRA did not increase food acceptance or decrease food refusal behavior
  - DPRA and physical guidance did not increase food acceptance but it did decrease food refusal
  - DNRA and DPRA and DPRA + PG increased food acceptance and maintained low rates of food refusal

Differential Reinforcement + Escape Extinction + Physical Guidance = *Success*

# Parents can be therapists, too!

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- The following studies demonstrated success parents had with implementing behavioral assessments and interventions:
  - Parents conducting an experimental functional analysis of inappropriate mealtime behavior
  - Parental implementation of escape extinction and differential reinforcement to treat food selectivity

# Parents Conducting Assessments

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*Caregiver-conducted experimental functional analyses of inappropriate mealtime behavior.* (Najdowski, et al., 2003)

- 6 children (5 diagnosed with an autism spectrum disorder and 1 was identified to be typically-developing); ages of subjects ranged from 2-4 years of age, averaging 3.5 years; all children displayed food selectivity (eating between 4-12 foods only); all children demonstrated self-feeding skills with independence, none were identified to have a medical condition
- Each child's mother served as the implementer for her child's functional analysis.
  - Each conducted 12 5-minute sessions during either lunch or dinner within their home kitchen setting.

# Parents Conducting a Functional Analysis Najdowski, et al. (2003)

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- Parent training:
  - Mothers received 1 hour of training by an experimenter (read procedural instructions and then modeled their implementation). Mothers then role-played the different conditions with the experimenter and received feed-back from the experimenter when errors in implementation were made.
- Parent conducted sessions: child was seated at a table, plate of non-preferred food is presented.
  - The environment was arranged in such a manner to prevent the child leaving the table (additional chairs were placed on either side of the child to create a barrier).
  - Mothers measured the presence of Inappropriate Mealtime Behavior (IMB): expulsion of food the size of a pea or larger following its acceptance, vocal protesting, covering mouth with hands, pushing or throwing utensils, dishes, or food away, gagging or vomiting across 4 conditions

# Parents conducting a functional analysis Najdowski, et al. (2003)

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- Mothers were evaluated by investigators, who scored correct antecedent events per condition according to the training they'd received. Mothers demonstrated an average of 98% procedural integrity across conditions.
- Results:
  - Parents or other caregivers can be taught to implement experimental functional analysis procedures following minimal guided training.
  - IMB was most likely to be reinforced by avoiding consuming the non-preferred food.

# Escape Extinction and Differential Reinforcement Anderson & McMillan (2001)

- Parental use of escape extinction and differential reinforcement to treat food selectivity (Anderson & McMillan, 2001)
- 5-year-old boy diagnosed with pervasive developmental disabilities; identified to be functioning in the severe range of intellectual disabilities.
  - Consumed only 3 total foods prior to intervention: mashed potatoes, yogurt, and applesauce.
- Child's parents acted as feeders for the study and implemented the intervention
  - Training: reviewing verbal and written instructions from trainers; review of video implementation between trainer and a confederate; role-play between trainers and parents; and feedback provided in the home
- The study measured the frequency of acceptance behavior, expulsion behavior, self-injurious behavior, and interruption behavior

# Escape Extinction and Differential Reinforcement Anderson & McMillan (2001)

- Target food = pureed fruits
- Baseline: the child's parents fed as they normally do with the presence of the target food at every meal. Parents prompted the child to eat by holding the utensil near his mouth; if he opened his mouth, parents placed the bite within, but if he did not readily accept, the utensil was removed.
- Differential Reinforcement of Alternative Behaviors (DRA) and escape extinction procedures when presenting target food

# Results
# Anderson & McMillan (2001)

Special Learning

- Parents initially had trouble implementing the procedure; trainers then guided parents to implement the procedure using preferred food only. When procedural integrity was gained to have increased dramatically, target food was reintroduced.
- Baseline: child engaged in interruption behavior for 55% of the time and escaped from the presentation of non-preferred food 83% of the time.
- Intervention: child escaped from non-preferred food 3% of the time and engaged in interruption behavior 33% the time.
- The final phase of DRA plus escape extinction showed the child accepting 100% of target fruit.

# Escape Extinction and Differential Reinforcement

Special Learning

- *Parental assessment and treatment of food selectivity in natural settings* (Najdowski et al., 2003)
  - 5 year old boy with ASD; only consumed candy, chips and McDonald's chicken nuggets and french fries
  - Target (non-preferred) foods: broccoli, grapes, cheese, chicken and hot dogs
  - Mother conducted functional analysis and interventions

# Escape Extinction and Differential Reinforcemer
# Najdowski et al. (2003)

Special Learning

- Differential Reinforcement of Alternative Behavior (DRA)
  - Feeding session was terminated when the child took the bite or 30 minutes lapse
  - When he did eat one bite, he would receive a plate full of preferred foods
- DRA + escape extinction + demand fading
  - Feeding session was terminated when the child took the bite
  - Mother told him to take a bite with the bite 1 inch from his mouth until he did or when 30 minutes lapsed
  - Received preferred foods after accepting a bite
    - Criteria of bites increased after 3 consecutive meals, NPF increased as the amount of PF decreased

# Results
# Najdowski et al. (2003)

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- Functional Analysis:
  - Behavior was maintained by negative reinforcement (getting out of eating)
- Intervention:
  - DRA: participant did not accept or swallowed food
  - (DRA) + escape extinction + demand fading: accepted (but expelled) a bite within the first 2 minutes of the first session and began swallowing by the 5$^{th}$ session. He eventually swallowed up to 62 bites of 5 different NPFs. He ate an entire hamburger at a restaurant and consumed novel foods during follow up visits

*FAs can be helpful in the identification of effective treatment and parents can implement treatment packages by parents with little supervision*

# Escape Extinction and Differential Reinforcement

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- *Increasing the variety of foods consumed by a picky eater: generalization of effects across caregivers and settings* (Valdimardottir, et al., 2010) – replication of Najdowski, et al., 2003
  - 5-year old boy with autism
- Intervention:
  - The child was told how many bites he needed to take to receive the identified reward.
  - Verbal prompts of "take a bite" were delivered every 30 seconds from the start of 30 minutes (mealtime). If the child did not take the bite of the food after the verbal prompt, the adult held the fork with the bite of food until he consumed the bite of food (the non-removal of the fork). If he spat out a bite of food, a new bite of food was represented.
  - After he ate predetermined number of bites of food, he received preferred foods, tangible rewards and the termination of the meal.

# Escape Extinction and Differential Reinforcement Valdimardottir, et al. (2010)

- Reinforcement Schedule:
  - Alternative behavior started with social praise and an identified reward delivered on a continuous schedule of reinforcement for accepting the bite of food. This later moved to a Token Economy System (to fade reinforcement).
  - After the child could eat multiple bites of the non-preferred food without the use of the non-removal of the fork, they started to introduce multiple non-preferred foods. They also started to require the child to each within 30 minutes.
- Results:
  - Food variety increased in both the home and preschool: consumed a total of 27 bites of food composed of 7 different non-preferred foods presented together.
  - This maintained at follow up. He participated in regular meals at school and home.
  - Successful replication of parental assessment and treatment

# Escape Extinction and Differential Reinforcement

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*Parent-implemented procedural modification of escape extinction in the treatment of food selectivity in a young child with autism* (Tarbox, et al., 2010)

- 3-year-old boy diagnosed with autism; with mild delays across developmental domains; and demonstrated independence with feeding skills
  - The child's mother acted as primary data collector and implementer of the feeding intervention
- Baseline, the mother was instructed to prepare whatever she wanted to cook for the family and to present to the subject portions of food representative of the size she'd like to see him consume and interact naturally
  - Meals were terminated after the subject consumed 100% of the meal or after 20 minutes had elapsed – whichever occurred first.

# Escape Extinction and Differential Reinforcemer
# Tarbox, et al. (2010)


- IMB = saying “no”, refusing to eat portions of meals presented, or taking an excessive period of time to complete a meal
- Intervention = same as baseline (the mother prepared a meal for the family and served the child ideal portions she wanted him to consume)
- The child was told at the start of the meal, “This is what is for (meal). You cannot have anything else. If you eat your whole meal, you can go play. If you do not eat, you have to just sit here. If you are not done with your meal by bedtime, you need to eat it for breakfast in the morning.”
  - This was repeated every 10 minutes of the meal, if the child was not eating when the time period elapsed.
- If the child attempted to leave the table for any reason, he was provided gentle physical prompts to remain seated

# Results
# Tarbox, et al. (2010)

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- Child's consumption increased considerably from baseline.
  - Ate 97% of meals presented, and at no point did his mother need to present an uneaten meal the next day
- Child's average duration time for the consumption of meals stabilized to 24.5 minutes
- Follow-up data (at 1, 2, 4, & 9 weeks): consumption remained at 100% and meal consumption remained near 24.5 minute
- Deprivation acted as an establishing operation that contributed to meal consumption
- Since refusal to eat did not produce escape from the meal, escape extinction may have been the reason for the increase in consumption
- Mother served as an effective implementer with the intervention

# Drawbacks to Escape Extinction Interventions

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- Meals may become aversive to the feeder if she must physically prevent escape
- Extinction bursts may be difficult to manage
  - Problem behavior may increase significantly immediately after the implementation of the intervention
- An increase in desired behavior may not occur immediately
  - Extinction procedures produce a gradual reduction

# Parental Acceptance of Escape Extinction Intervention

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- Parents who have implemented variations of escape extinction procedures reported that they preferred the use of physical guidance (Ahearn, et al., 1996)
  - More time effective
  - Non-removal of the food = power struggle
- Parents reported that escape extinction with physical guidance was "the best fit" for the family and resulted in maintenance at a 2-year follow up (Binnendyk & Lucyshyn, 2009)
- Mother's opinion of contingent reinforcement with physical prompts was reported to be "highly satisfied" (Wood et al., 2009)

# What the Research Has Taught Us

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- Results from both descriptive and experimental analyses have demonstrated food refusal and IMB are mostly likely maintained by escape from eating and attention from the feeder
- Parents can be taught to conduct assessments to determine why the child is engaging in food refusal and IMB
- Escape extinction paired with reinforcement for appropriate behavior is the most effective intervention and most highly preferred by parents
- Parents can successfully make significant changes to their child's eating behavior
  - Children with autism have significantly more feeding problems than children without autism
  - There is no evidence to support that severity of diagnostic characteristics of ASD predicts severity of problem eating behavior

# Ethical Considerations

Special Learning

- Enlist a team from the beginning
  - Physician – rule out medical concerns first
  - Physician/Dietician – assist in guiding and monitoring the target foods
  - Parents – must have informed consent
  - Gather signatures from everyone on the team
  - Monitor every meal from the beginning and fade support as there is success

# Further Possible Investigations

Special Learning

- Origins of the cause of problem feeding behavior in children with ASD
- Testing of a tangible condition in future functional analyses
- Determine the accuracy of results of a functional analysis conducted by a caregiver compared to trained professionals
- Majority of the published research contain a single subject
- More interventions with children with autism as the participant
- Replication of escape extinction procedures currently in the literature

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