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Assessment and Treatment of Feeding Disorders in Children

Cathleen C. Piazza, Ph.D.
University of Nebraska Medical Center's Munroe-Meyer Institute

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Feeding Behavior

No human activity has greater biological and social significance than feeding.

Feeding Milestones

Physical Growth

Feeding Behavior

Successful feeding is measured against social and cultural standards.

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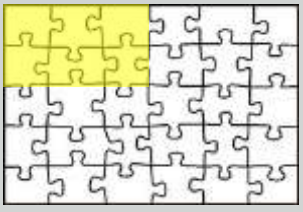
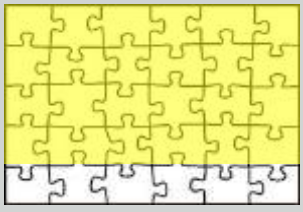
Pediatric Feeding Disorders

Prevalence in Autism





Pediatric Feeding Disorders

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Pediatric Feeding Disorders

Typical

- ❑ Accepts breast or bottle
- ❑ Starts baby food around 4 to 6 months of age
- ❑ Transitions to mashed table foods by 12 months of age

Disordered

- ❑ Has difficulty breast or bottle feeding
- ❑ Consistently rejects baby food
- ❑ Has difficulty transitioning to mashed table foods

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Pediatric Feeding Disorders

Typical

- Picky eating emerges at 18 months of age
- Variety will reemerge with exposure
- Variety will be sufficient to provide adequate nutrition

Disordered

- Reaction to non-preferred food is excessive
- Inflexible food preferences may change, but variety remains restricted
- Variety does not provide adequate nutrition

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Pediatric Feeding Disorders

Typical

- Preferences are influenced by peers
- Eating persists in different environmental conditions
- Will eat non-preferred food when hungry

Disordered

- Insensitive to social cues around eating
- Eating is disrupted in different conditions
- Will not eat non-preferred food even when hungry

Pediatric Feeding Disorders

- **Child has any one of the following:**
  - **Child has three consecutive months of weight loss**
  - **Child is diagnosed with dehydration or malnutrition, which results in emergency treatment**
  - **Child has nasogastric tube with no increase in the amount of calories from oral feeding for 3 consecutive months**

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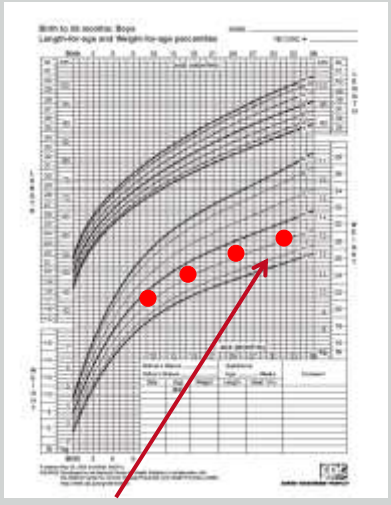
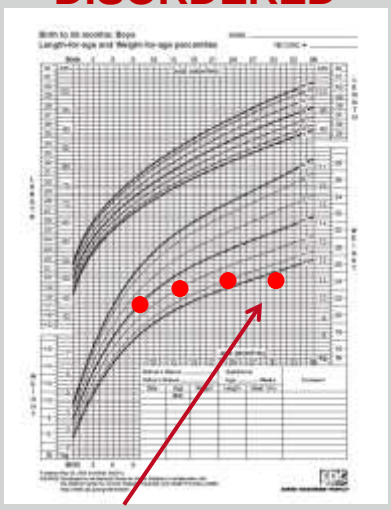
TPYICAL



Child should maintain growth along his or her own curve.

DISORDERED



Growth should not decelerate.

Pediatric Feeding Disorders

- Meal lengths over **30 minutes** are the best predictor of a feeding disorder relative to any other target behavior.

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Pediatric Feeding Disorders

- Consider a comprehensive, interdisciplinary evaluation before starting treatment

Pediatric Feeding Disorders

- **Interdisciplinary team evaluation:**
  - **Medicine: Rule out physical causes of feeding problem**
  - **Nutrition: Evaluate adequacy of current intake**
  - **Social Work: Evaluate family stressors**
  - **Speech or Occupational Therapy: Evaluate oral-motor status and safety**
  - **Psychology: Assess contribution of environmental factors**

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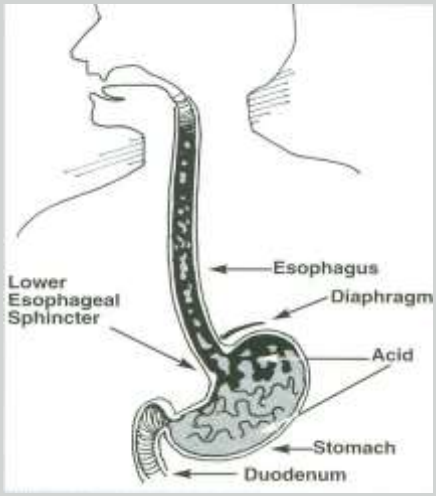
Pediatric Feeding Disorders



Approximately 60% of children with feeding problems also have medical problems.

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Caloric Needs By Age (KCALS)

AGE (YEARS)	1	2-3	4-8	9-13	14-18
	900	1000			
FEMALE			1200	1600	1800
MALE			1400	1800	2200

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Nutritional Requirements

AGE (YEARS)	1	2-3	4-8	9-13	14-18
FAT (%KCAL)	30-40	30-35	25-35	25-35	25-35
DAIRY (C)	2	2	2	3	3
PROTEIN (OZ)	1.5	2	3^F 4^M	5	5^F 6^M
FRUITS (C)	1	1	1.5	1.5	1.5^F 2^M
VEGETABLES (C)	3/4	1	1^F 1.5^M	2^F 2.5^M	2.5^F 3^M
GRAINS (OZ)	2	3	4^F 5^M	5^F 6^M	6^F 7^M

https://www.choosemyplate.gov/

https://www.choosemyplate.gov/MyPlate-Daily-Checklist-input

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USDA
United States Department of Agriculture

MyPlate Daily Checklist

Find your Healthy Eating Style

Everything you eat and drink matters. Find your healthy eating style that reflects your preferences, culture, traditions, and budget—and maintain it for a lifetime! The right mix can help you be healthier now and into the future. The key is choosing a variety of foods and beverages from each food group—*and making sure that each choice is limited in saturated fat, sodium, and added sugars*. Start with small changes—**"MyWins"**—to make healthier choices you can enjoy.

Food Group Amounts for 1,000 Calories a Day

Fruits	Vegetables	Grains	Protein	Dairy
1 cup	**1 cup**	**3 ounces**	**2 ounces**	**2 cups**
Focus on whole fruits	Vary your veggies	Make half your grains whole grains	Vary your protein routine	Move to low-fat or fat-free milk or yogurt
Focus on whole fruits that are fresh, frozen, canned, or dried.	Choose a variety of colorful fresh, frozen, and canned vegetables—make sure to include dark green, red, and orange choices.	Find whole-grain foods by reading the Nutrition Facts label and ingredients list.	Mix up your protein foods to include seafood, beans and peas, unsalted nuts and seeds, soy products, eggs, and lean meats and poultry.	Choose fat-free milk, yogurt, and soy beverages (soy milk) to cut back on your saturated fat.

Limit

Drink and eat less sodium, saturated fat, and added sugars. Limit:

- Sodium to **1,500 milligrams** a day.
- Saturated fat to **11 grams** a day.
- Added sugars to **25 grams** a day.

https://www.choosemyplate.gov/MyPlate-Daily-Checklist

AGE GROUP	CALORIE LEVEL								
Ages 2-3	1,000	1,200	1,400						
Ages 4-8	1,200	1,400	1,600	1,800	2,000				
Ages 9-13	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,200
Ages 14+	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,200

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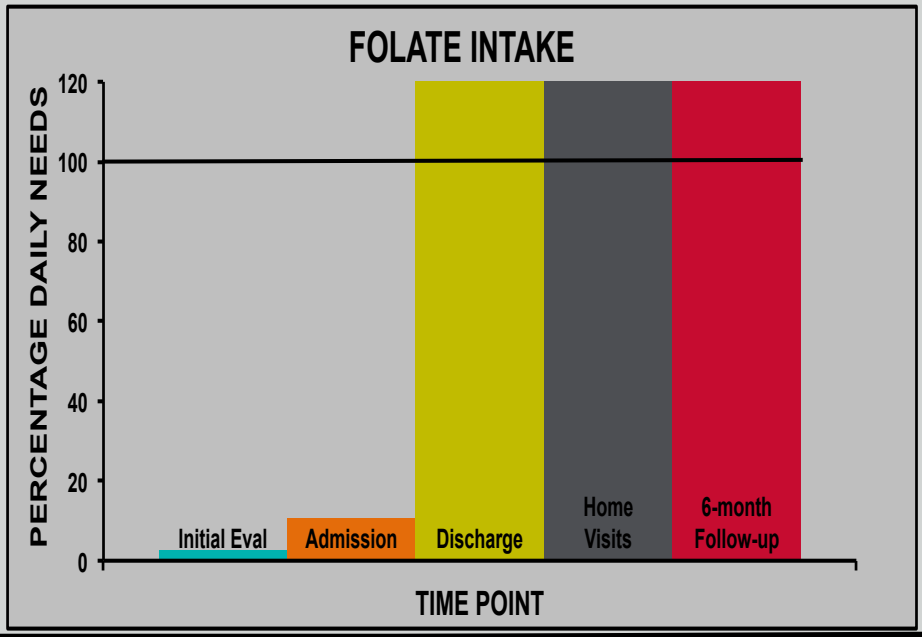

Pediatric Feeding Disorders

Approximately 40% of children diagnosed with a feeding disorder will have an oral-motor skill deficit.

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Setting Goals

- **Goals should be:**
  - **Individualized**
  - **Observable**
  - **Measurable**
- **Sample goals:**
  - **Increase total oral intake to 50% of needs**
  - **Increase variety by 8 new foods**
  - **Increase acceptance of solids to 80%**
  - **Decrease inappropriate mealtime behavior to 1 per minute or less**

Meal Structure

- Creates a predictable environment for the child

- Allows for systematic evaluation

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Danny's Day-Treatment Schedule

9:00-9:45: Meal 1 (Breakfast)

9:45-10:30 Break

10:30-11:00: Meal 2 (Snack)

11:00-11:45 Break

11:45-12:30: Meal 3 (Lunch)

3:00-3:30: Meal 4 (Snack 2)

3:30-4:00 Break

4:00-4:45: Meal 5 (Dinner)

Meal Structure

Maroon Spoons

Rubber- Coated Baby Spoons

Nuk Brush

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Meal Structure

- **Identify foods**
  - **Identify food type**
  - **Specify foods by name, food group, brand, recipe**
  - **Identify food texture**
  - **Precisely describe how you make the texture**

Hand Washing

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Meal Structure

Solids

Meal Structure

Texture

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Meal Structure

Recipes

Food Name	Brand	Canned or Frozen	Amount (g)	Amount & Type of Liquid (oz)
Cut Green Beans	HyVee	Canned	226	None

Meal Structure

Consult a speech or occupational therapist if your child has swallowing difficulties.

Consult a dietitian if your child has poor weight gain or poor nutrition.

Specialty Products

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Meal Structure

5-bite sessions

Meal Structure

Danny's Day-Treatment Schedule

9:00-9:45: Meal 1 (Breakfast)

9:45-10:30 Break

10:30-11:00: Meal 2 (Snack)

11:00-11:45 Break

11:45-12:30: Meal 3 (Lunch)

12:30-3:00 Break (nap, free feed)

3:00-3:30: Meal 4 (Snack 2)

3:30-4:00 Break

4:00-4:45: Meal 5 (Dinner)

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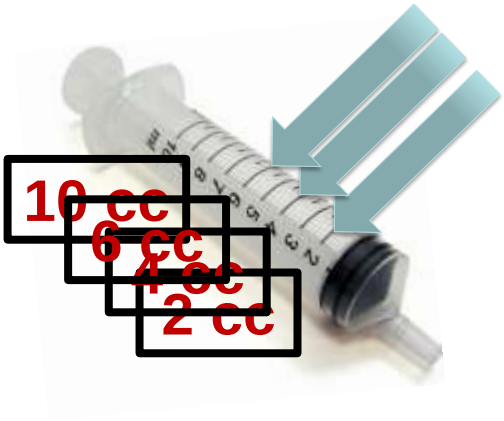
Meal Structure

- Flexible material
- Prevents occlusion of child's face
- Facilitates transition to larger bolus

Meal Structure

Liquids

Meal Structure



Bolus size

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Meal Structure

Adult chair

Highchair

Tumble Form

Special Tomato Chair

Toddler Chair

Booster Seat

Seating

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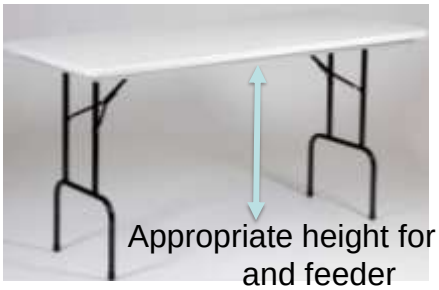
Meal Structure

Cleaning Supplies

Meal Structure



Appropriate height for child and feeder

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Meal Structure

Data Collection

Child

- ❑ Bite presented
- ❑ Active acceptance
- ❑ Expel
- ❑ Mouth clean
- ❑ Pack
- ❑ Gag
- ❑ Cough
- ❑ Vomit
- ❑ Inappropriate mealtime behavior
- ❑ Negative vocalizations

Feeder

- ❑ Correct spoon presentation
- ❑ Correct praise
- ❑ Attention inappropriate mealtime behavior

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Data Collection

- ❑ Concise, detailed definition of behavior

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Data Collection

Name of each food

Bite or presentation number

Child behaviors of concern

FOOD	TRIAL			
	1			
	2			
	3			
	4			

Sample data sheet for a child who refuses food and engages in inappropriate behavior

FOOD	TRIAL	Accept	Inapprop Behavior
Green beans	1		
Chicken	2		
Applesauce	3		
Potato	4		

Sample data sheet for a child who does not swallow food consistently (holds food in mouth) and gags

FOOD	TRIAL	Swallow	Gag
Chips	1		
Hamburger	2		
Peas	3		
Peach	4		

Sample data sheet for a child who spits food out of his or her mouth and cries

FOOD	TRIAL	Spit out	Cries
Fish	1		
Rice	2		
Pears	3		
Broccoli	4		

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Data Collection

Sample data for a child who refuses food and engages in inappropriate behavior.

FOOD	TRIAL	Accept	Inapprop Behavior
Green beans	1	Y	N
Chicken	2	N	Y
Applesauce	3	N	Y
Potato	4	Y	Y

Child accepted green beans.

Child did not have inappropriate behavior during presentation of green beans.

Child did not accept chicken.

Child had inappropriate behavior during presentation of chicken.

Child did not accept applesauce.

Child had inappropriate behavior during presentation of applesauce.

Child accepted potato.

Child had inappropriate behavior during presentation of potato.

Y = Yes
N = No

Functional Analysis

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Functional Analysis

Type
Indirect assessment
Descriptive assessment
Functional analysis

Functional Analysis

Type	Description	Advantages	Disadvantages
Indirect assessment	Structured interviews, rating scales, checklists, or questionnaires	Easy to conduct and helpful for hypothesis formulation	Limited in accuracy

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Functional Analysis

Type	Description	Advantages	Disadvantages
Descriptive assessment	Observation in the natural environment	Can observe in natural environment and easy to implement	Does not provide information on functional relations

Functional Analysis

Type	Description	Advantages	Disadvantages
Functional analysis	Systematically manipulate environmental events	Identify conditions under which inappropriate behavior occurs	Time, resources, and expertise to implement and interpret

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Functional Analysis

Condition	Consequences for Inappropriate Mealtime Behavior	Bite Presentation
Escape	30 s of escape	Removed for 20 s
Attention	30 s of attention	Remained at midline
Tangible	30 s of access to tangibles	Remained at midline
Control	No differential consequences	Remained at midline

- Piazza, C. C., Fisher, W. W., Brown, K. A., Shore, B. A., Katz, R. M., Sevin, B. M., Gulotta, C. S., & Patel, M. R. (2003). Functional analysis of inappropriate mealtime behaviors. *Journal of Applied Behavior Analysis, 37*, 187-204.

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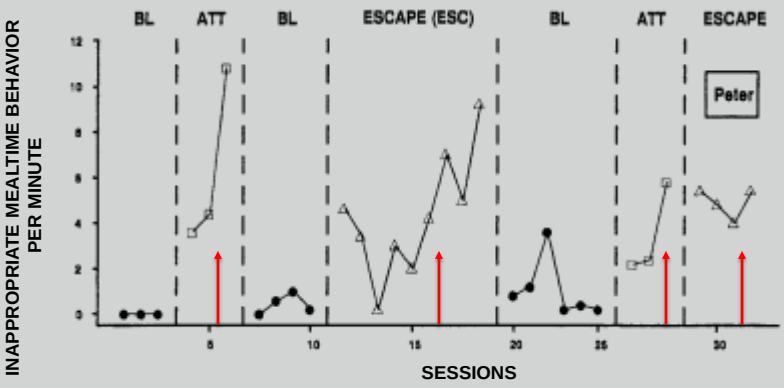
Functional Analysis



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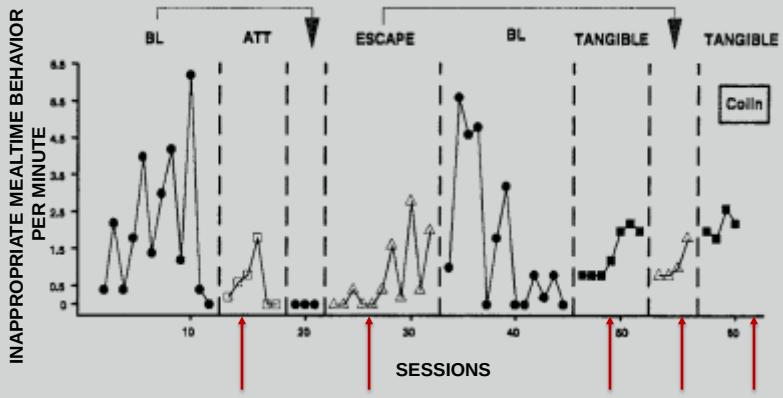

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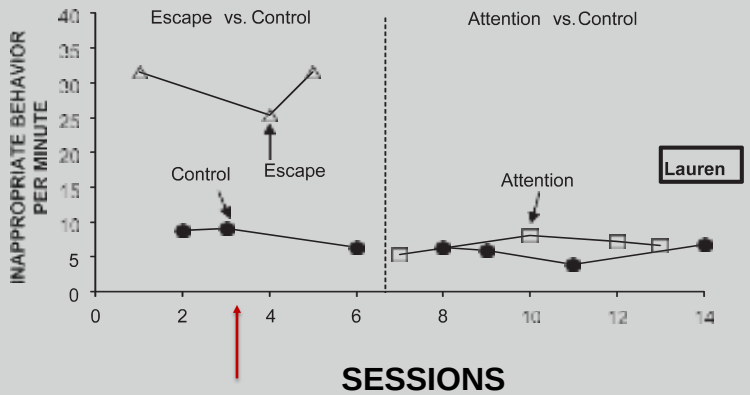
Functional Analysis



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Data Interpretation

In this example, the child accepted 10%, 20%, and 10% of the bites, respectively, in each of the meals. Because acceptance of bites is low and *predictable*, you could start your treatment at the next meal.

Meal 1

FOOD	TRIAL	Accept
Green beans	1	N
Chicken	2	N
Applesauce	3	N
Potato	4	N
Green beans	5	N
Chicken	6	N
Applesauce	7	Y
Potato	8	N
Green beans	9	N
Chicken	10	N
TOTAL Accept		1
%		10%

Meal 2

FOOD	TRIAL	Accept
Applesauce	1	Y
Potato	2	N
Chicken	3	N
Green beans	4	N
Applesauce	5	N
Potato	6	N
Chicken	7	N
Green beans	8	N
Applesauce	9	Y
Potato	10	N
TOTAL Accept		2
%		20%

Meal 3

FOOD	TRIAL	Accept
Potato	1	N
Applesauce	2	Y
Green beans	3	N
Chicken	4	N
Potato	5	N
Applesauce	6	N
Green beans	7	N
Chicken	8	N
Potato	9	N
Applesauce	10	N
TOTAL Accept		1
%		10%

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Data Interpretation

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Data Interpretation

In this example, the child accepted 80%, 20%, and 60% of the bites, respectively, in each of the meals. Because acceptance of bites is variable (unpredictable), you should *wait* to start treatment.

Meal 1

FOOD	TRIAL	Accept
Green beans	1	Y
Chicken	2	N
Applesauce	3	N
Potato	4	Y
Green beans	5	Y
Chicken	6	Y
Applesauce	7	Y
Potato	8	Y
Green beans	9	Y
Chicken	10	Y
TOTAL Accept		8
%		80%

Meal 2

FOOD	TRIAL	Accept
Potato	1	N
Applesauce	2	N
Green beans	3	N
Chicken	4	N
Potato	5	N
Applesauce	6	Y
Green beans	7	N
Chicken	8	N
Potato	9	N
Applesauce	10	Y
TOTAL Accept		2
%		20%

Meal 3

FOOD	TRIAL	Accept
Applesauce	1	Y
Potato	2	N
Chicken	3	Y
Green beans	4	N
Applesauce	5	Y
Potato	6	N
Chicken	7	Y
Green beans	8	Y
Applesauce	9	N
Potato	10	Y
TOTAL Accept		6
%		60%

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Data Interpretation

Level
Stability
Trend

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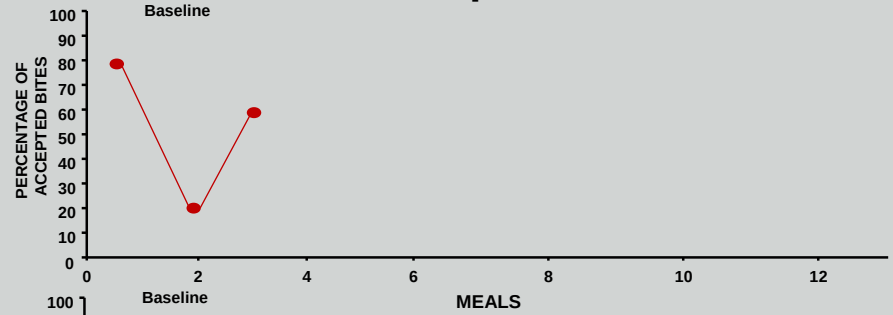
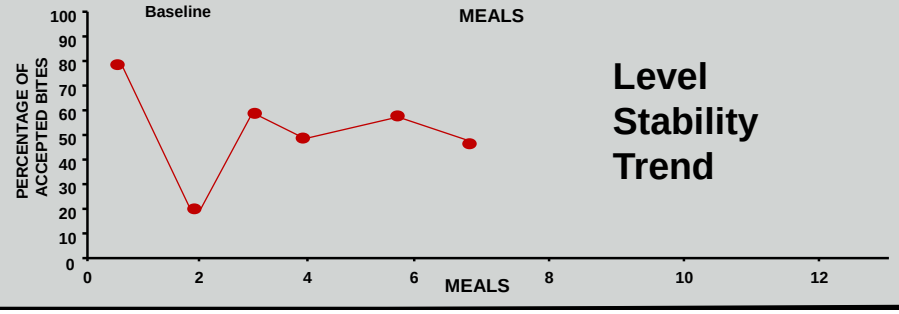
Data Interpretation





Level
Stability
Trend

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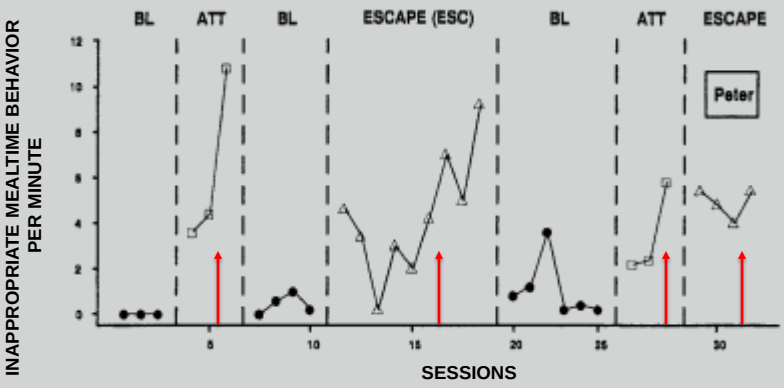
Functional Analysis



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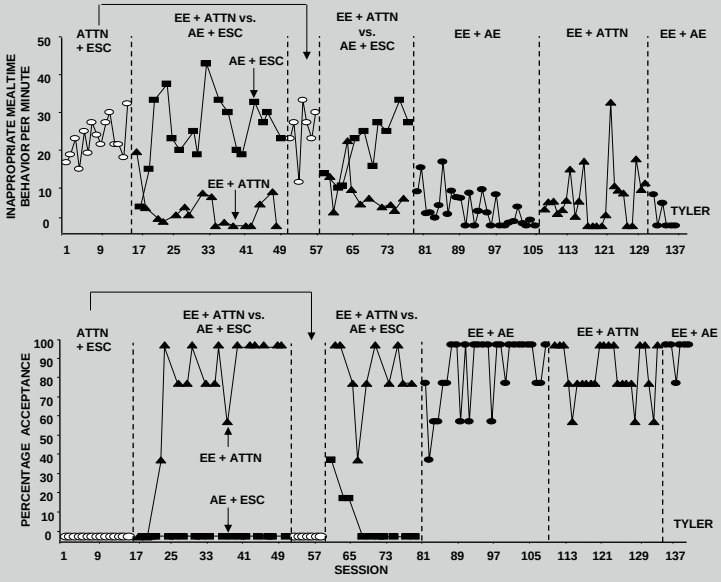

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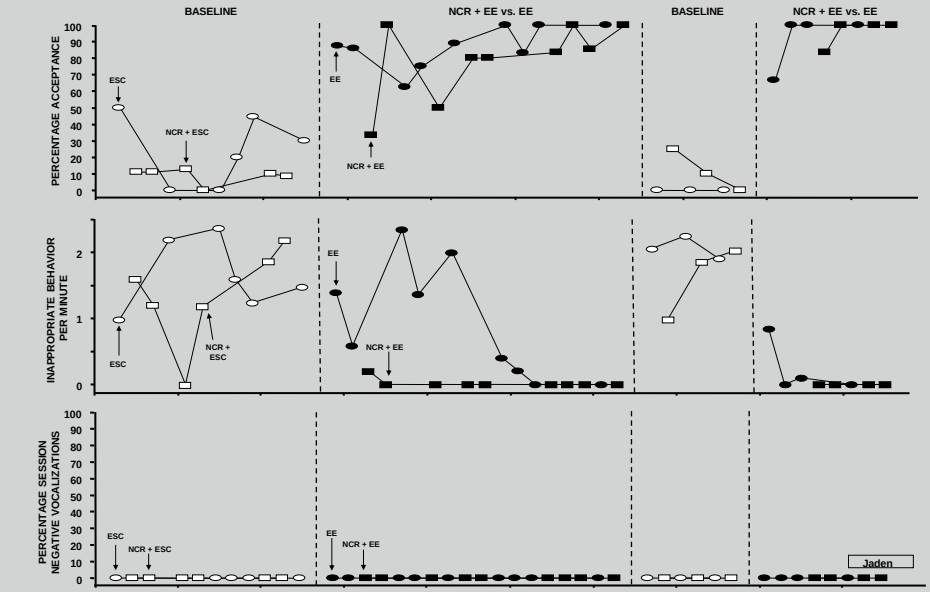

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Reinforcement

- ❑ **High preference**
- ❑ **Immediate**
- ❑ **Restricted**

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Stimulus-Preference Assessment

Fisher, W., Piazza, C. C., Bowman, L. G., Hagopian, L. P., Owens, J. C., & Slevin, I. (1992). A comparison of two approaches for identifying reinforcers for persons with severe and profound disabilities. *Journal of Applied Behavior Analysis*, *25*, 491-498.

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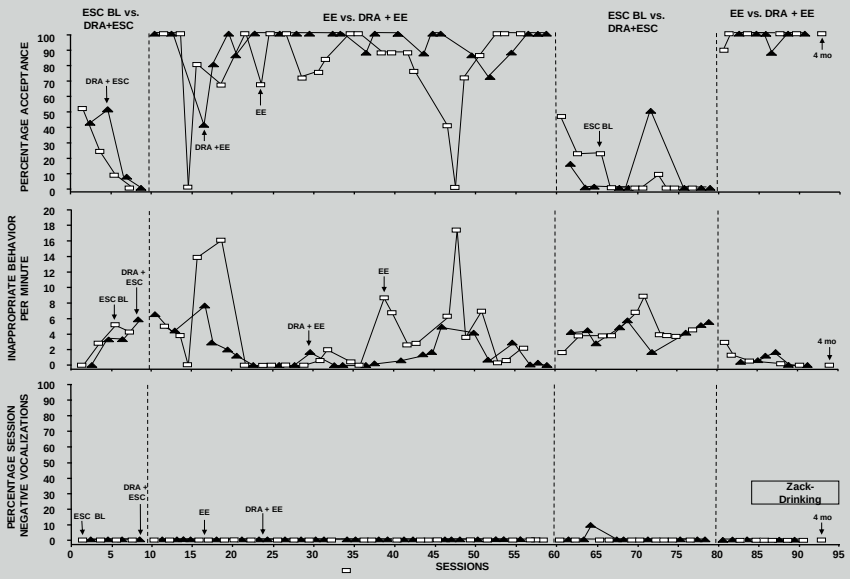
Stimulus-Preference Assessment

Fisher, W. W., Piazza, C. C., Bowman, L. G., & Amari, A. (1996). Integrating caregiver report with a systematic choice assessment to enhance reinforcer identification. *American Journal on Mental Retardation*, *101*, 15-25. http://europepmc.org/abstract/med/8827248



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Fading-based Treatment

- **Fading** can be an effective way to increase consumption.
- There are certain ways to use **fading** so that it will work.

Fading-based Treatment

- **Fading** involves identifying something your child will do now (e.g., eats yogurt consistently).
- **Gradually** changing what your child does now or gradually changing the expectations of what you want your child to do.
- The **gradual** changes result in changes in what or how your child eats.

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Antecedents

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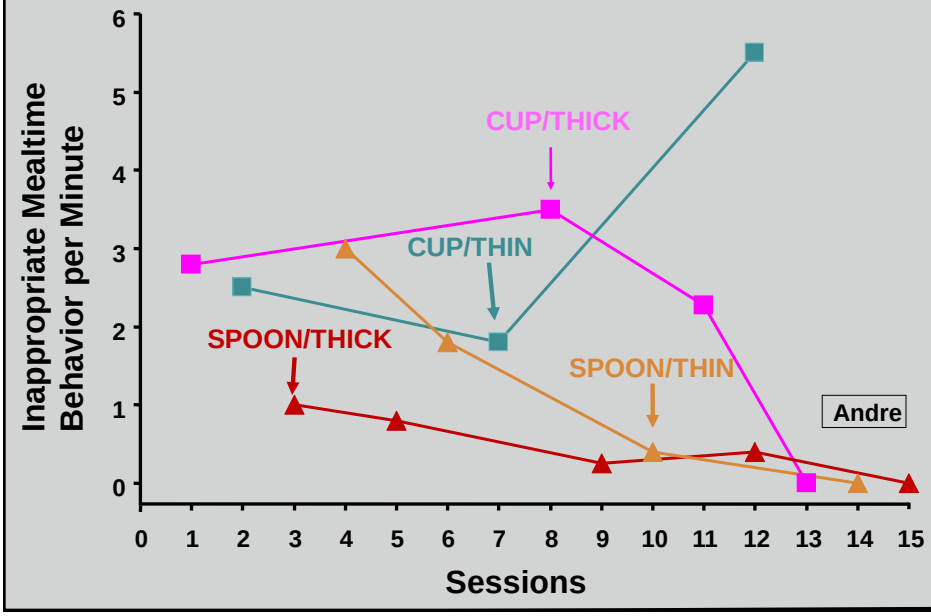

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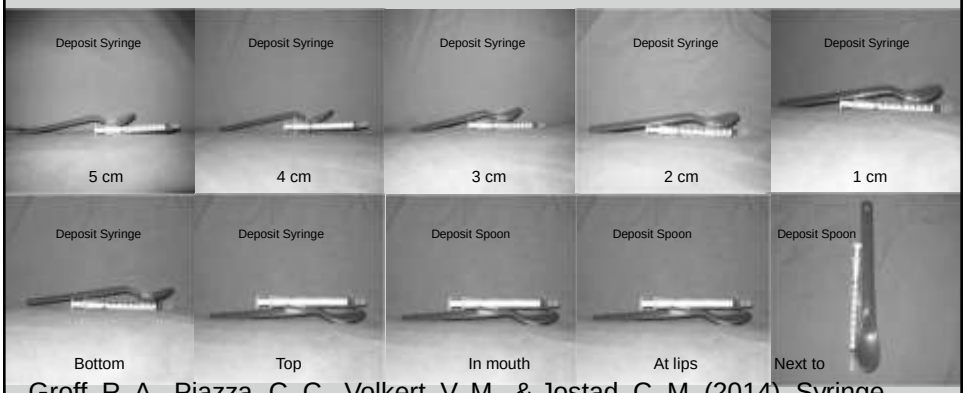
Syringe Fading

When to Use: **Child will swallow liquids or pureed foods from a syringe, but will not accept foods from a spoon.**



Groff, R. A., Piazza, C. C., Volkert, V. M., & Jostad, C. M. (2014). Syringe fading as treatment for feeding refusal. *Journal of Applied Behavior Analysis*, *47*, 834-839. http://onlinelibrary.wiley.com/doi/10.1002/jaba.162/abstract

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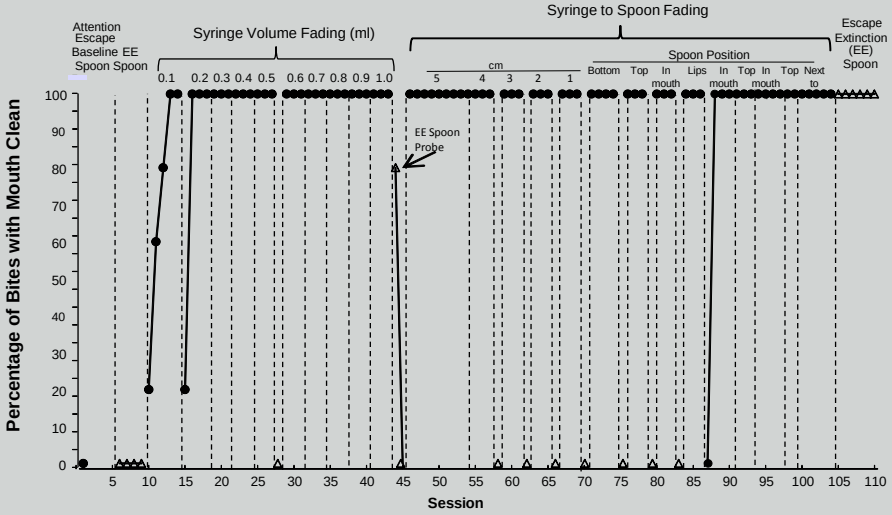

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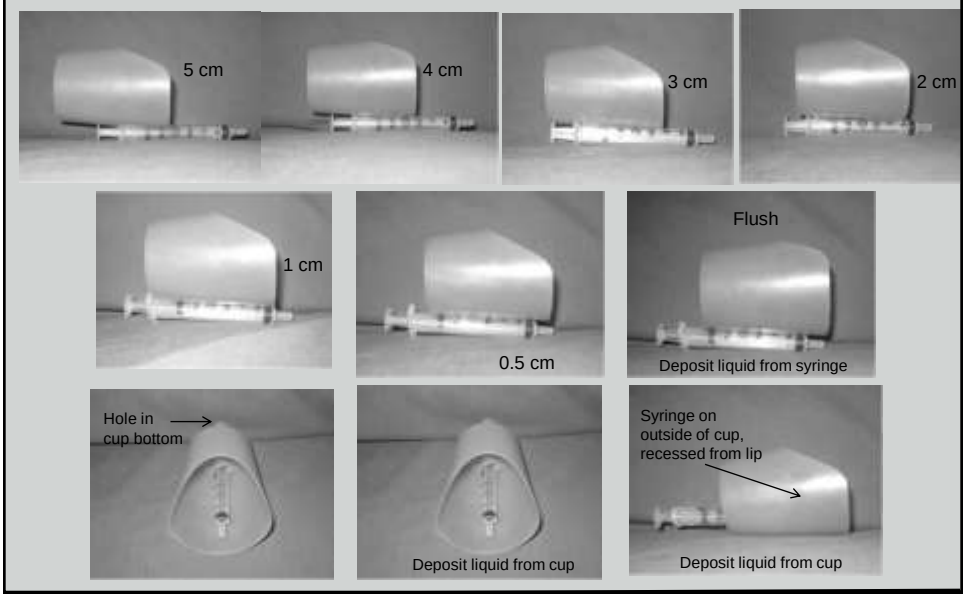

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Blending

When to Use: **Child eats at least three foods reliably and has no concerns with weight.**

Examples of Blends

Mueller, M. M., Piazza, C. C., Patel, M. R., Kelley, M. E., & Pruett, A. (2004). Increasing variety of foods consumed by blending nonpreferred foods into preferred foods. *Journal of Applied Behavior Analysis, 37*, 159-170.

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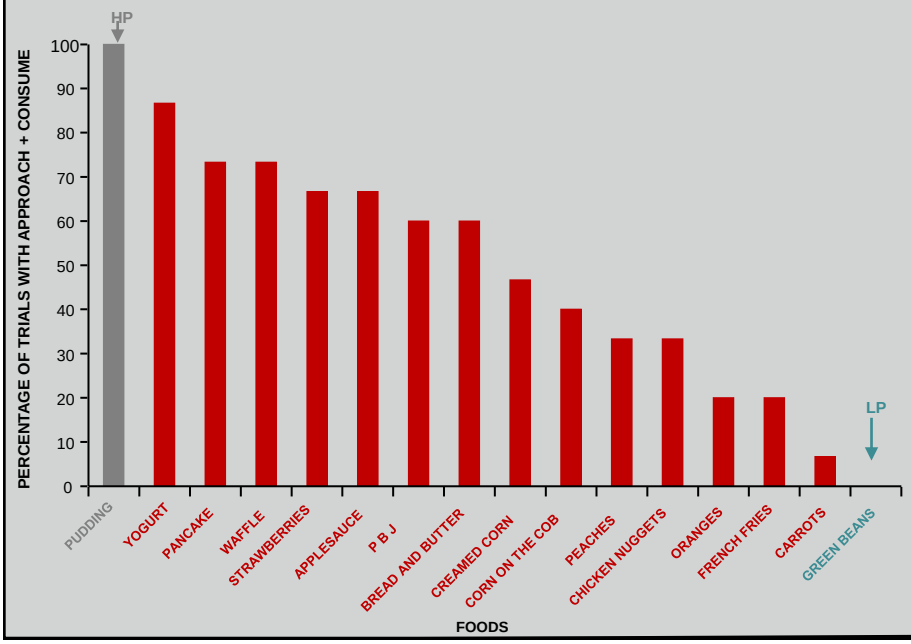

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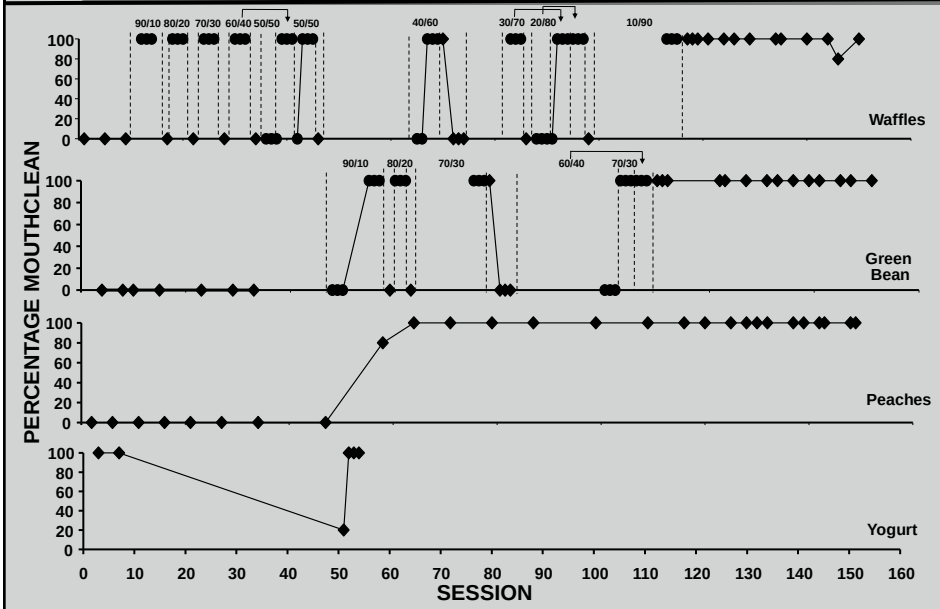

Mueller, M. M., Piazza, C. C., Patel, M. R., Kelley, M. E., & Pruett, A. (2004). Increasing variety of foods consumed by blending nonpreferred foods into preferred foods. *Journal of Applied Behavior Analysis, 37*, 159-170.

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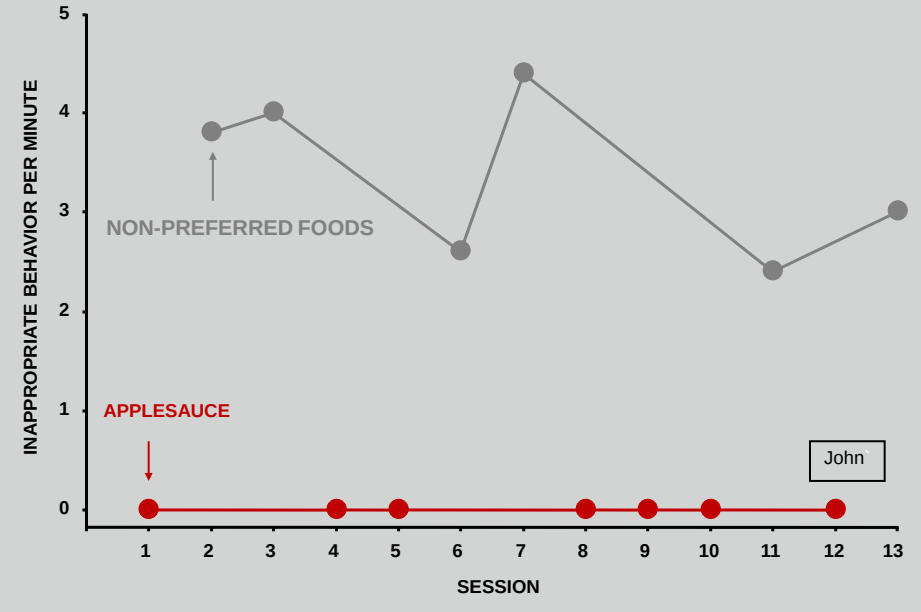

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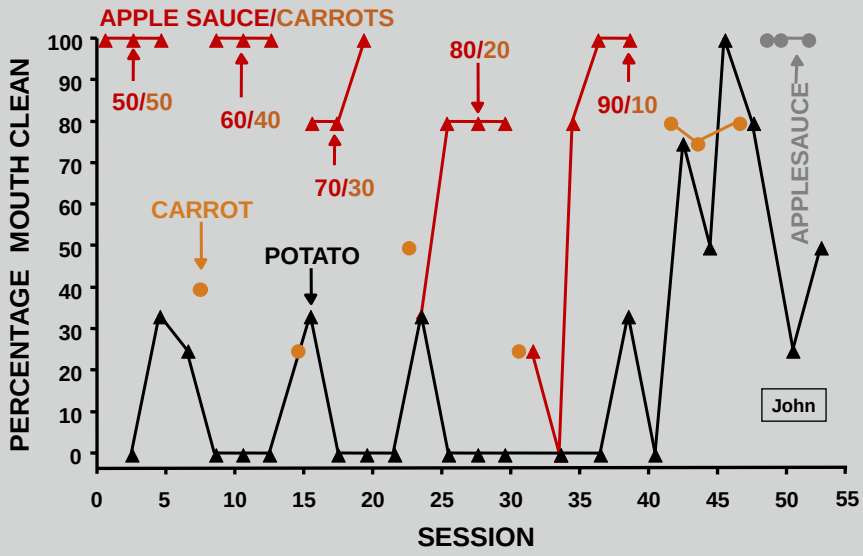

Mueller, M. M., Piazza, C. C., Patel, M. R., Kelley, M. E., & Pruett, A. (2004). Increasing variety of foods consumed by blending nonpreferred foods into preferred foods. *Journal of Applied Behavior Analysis, 37*, 159-170.

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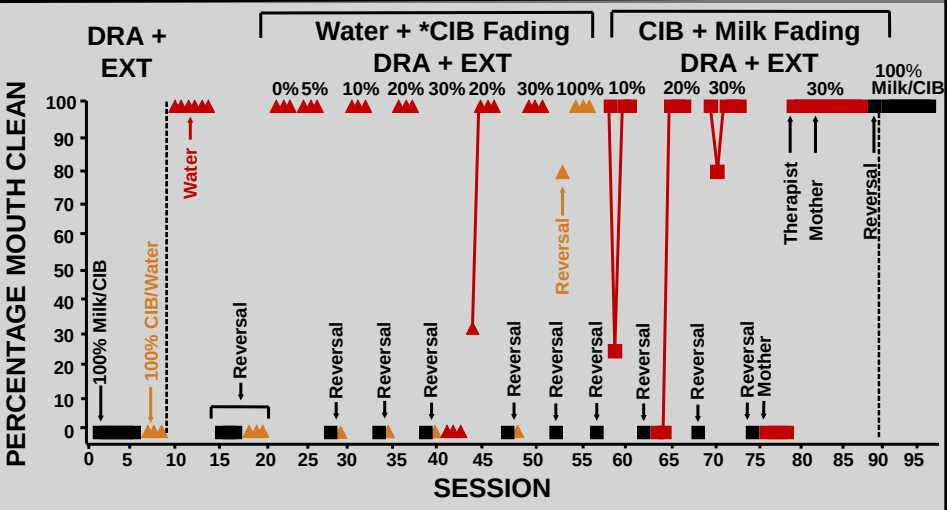

*CIB = Carnation Instant Breakfast

Patel, M. R., Piazza, C. C., Kelly, M. L., Ochsner, C. A., & Santana, C. M. (2001). Using a fading procedure to increase fluid consumption in a child with feeding problems. *Journal of Applied Behavior Analysis, 34*, 357-360.

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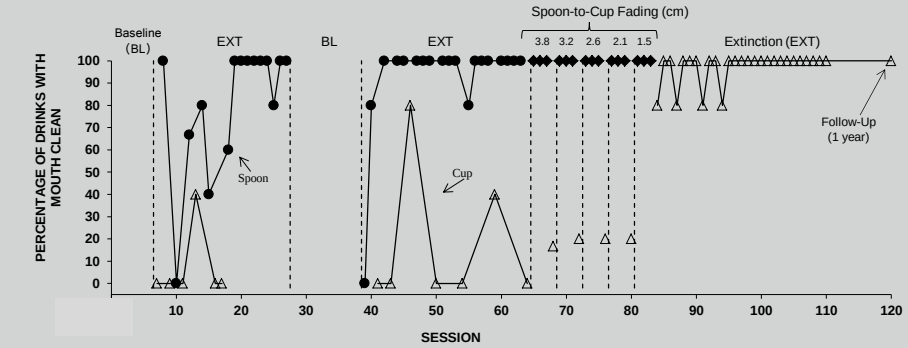

Groff, R. A., Piazza, C. C., Zeleny, J. R., & Dempsey, J. R. (2011). Spoon-to-cup fading as treatment for cup drinking in a child with intestinal failure. *Journal of Applied Behavior Analysis, 44*, 949-954.

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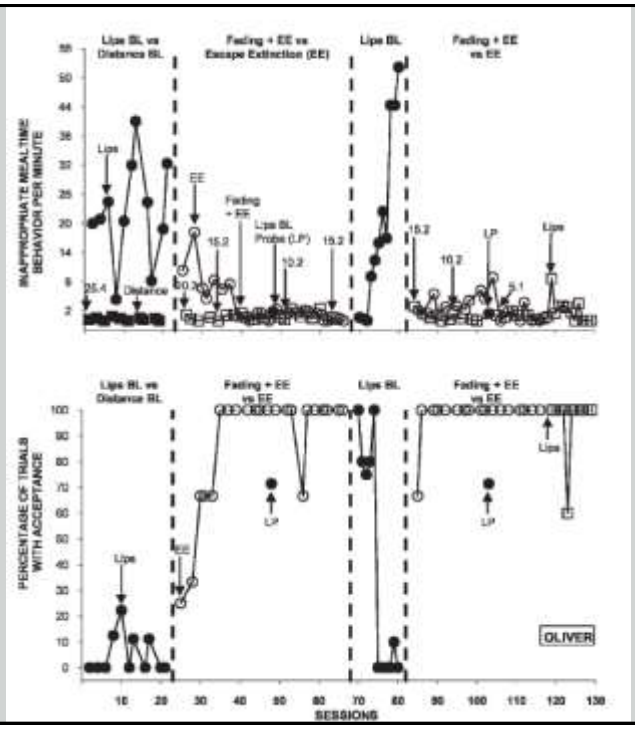
Bite Fading

When to Use: **Child will eat a variety of foods, but only in small amounts.**

STEP	# SPOONS OF FOOD TO PRESENT
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8



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Liquids To Solids

When to Use: **Child will drinks liquids from a cup, but will not eat solids from a spoon.**

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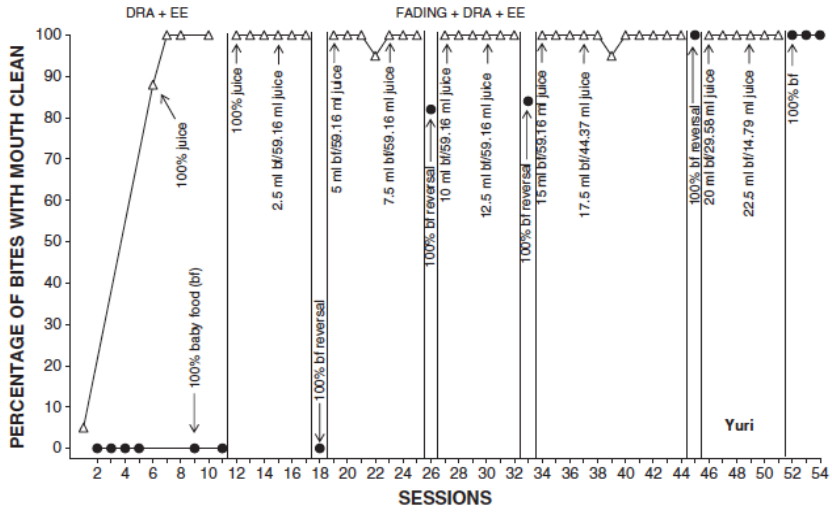

Bachmeyer, M. H., Gulotta, C. S., & Piazza, C. C. (2013). Liquid to baby food fading in the treatment of food refusal. *Behavioral Interventions, 34*, 357-360.

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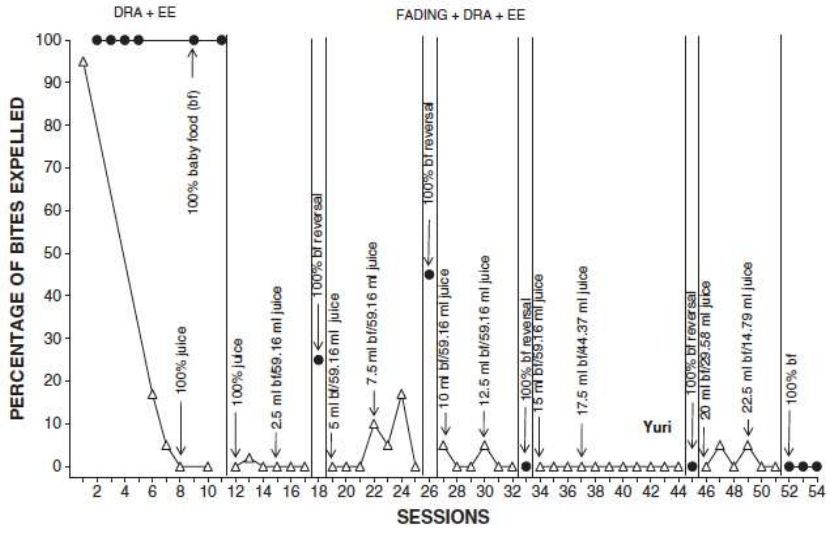

Bachmeyer, M. H., Gulotta, C. S., & Piazza, C. C. (2013). Liquid to baby food fading in the treatment of food refusal. *Behavioral Interventions, 34*, 357-360.

Solids To Liquids

When to Use: **Child will eat pureed solids from a spoon, but will not drink liquids from a cup.**

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Additional Readings

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Avoidance

- Rivas, K. M., Piazza, C. C., Roane, H. S., Volkert, V. M., Stewart, V., Kadey, H. J., & Groff, R. A. (2014). Analysis of self-feeding in children with feeding disorders. *Journal of Applied Behavior Analysis*, *47*, 449-453. http://onlinelibrary.wiley.com/doi/10.1002/jaba.170/abstract
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Escape Extinction

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- LaRue, R. H., Stewart, V., Piazza, C. C., & Volkert, V. M. (2011). Escape as reinforcement and escape extinction in the treatment of feeding problems. *Journal of Applied Behavior Analysis*, *44*, 719-735.
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- Freeman, K. A., & Piazza, C. C. (1998). Combining stimulus fading, reinforcement, and extinction to treat food refusal. *Journal of Applied Behavior Analysis, 31*, 691-694.

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FADING

- **Bite**
  - Freeman, K. A., & Piazza, C. C. (1998). Combining stimulus fading, reinforcement, and extinction to treat food refusal. *Journal of Applied Behavior Analysis, 31*, 691-694.
- **Blending**
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- **Spoon to cup**
  - Groff, R. A., Piazza, C. C., Zeleny, J. R., & Dempsey, J. R. (2011). Spoon-to-cup fading as treatment for cup drinking in a child with intestinal failure. *Journal of Applied Behavior Analysis*, *44*, 949-954.
- **Syringe to cup and spoon**
  - Groff, R. A., Piazza, C. C., Volkert, V. M., & Jostad, C. M. (in press). Syringe fading as treatment for feeding refusal. *Journal of Applied Behavior Analysis.*

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Functional Analysis

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Sequential Oral Sensory

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