

# Understanding and Addressing Feeding Problems of Children with Autism

William H. Ahearn  
Ph.D., BCBA-D, LABA

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## Overview

- **Fdg prbs in ASDs vs DD/TDC**
  - Are there special concerns? Y/N
  - Issues related to Autism Tx and Fdg
- **Food selectivity in ASDs**
  - Is it a problem?
  - When it is what do (can) you do?
  - Exposure!
  - Vomiting
- **Refusal; Expulsion; Vomiting**
- **And case examples**

## Kids who didn't eat vegetables

### ■ Matt

- 4
- Moderately selective
- Ate chicken nuggets and other breaded proteins, no fruit/veg



### ■ Dave

- 3.5
- Mildly selective
- Ate chicken nuggets, some bread, turkey, some fruit, no veg

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## Txs tried and outcomes

### ■ Matt

- Introduced new brands of old items
- Reinforced eating with TV access
- Ate peas, corn, green peppers, carrots within 2 months

### ■ Dave

- Introduced new brands/items
- Reinforced eating with preferred videos
- Restricted access to preferred videos, blocked disruptive behavior
- 9 months before first veggie eaten

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## Follow-up

- **Matt (mild dev. delays)**
  - TV access moved to end of meal
  - Started eating salad (modeled by mom)
  - Also ate a variety of fruits (req. apple)
- **Dave (Autism)**
  - 3 months after 1<sup>st</sup> veg (was eating 3) got sick refused veg when better
  - 2 months later veg was recovered
  - Video access signaled on token board
  - Eats 3 fruits with prompting

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## Kids who didn't eat

- **Robert (TDC)**
  - 4 (on initial evaluation)
  - Total food refusal
  - Severe GI involvement, OM deficits
- **Bob (CWA)**
  - 3.5 (on intake)
  - Total food refusal
  - History of eating (bottles), gagging/vomiting w/ ear infections



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## Txs tried and outcomes

- Robert (following medical TX)
  - Introduced rewards for accepting ES
  - Gradually introduced pureed foods
  - Required escape prevention (3 times; 1 x per caregiver)
  - Taught OM skills (lateral placement; modeling)
  - Volume limited intake (no more than 4 oz)
- Bob (following ear tube placement)
  - Introduced formula on spoon
  - Gradually introduced pureed foods
  - Introduced rewards for swallowing
  - OM skills emerged; regular foods in 6 mo.

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DISABILITIES

## Empty Spoon: Instructional Fading with Shaping

- In the absence of eating/drinking behavior
  - Establishing appropriate behavior
  - Problem behavior/resistance/anxiety
- Empty Spoon
  - To reinforce or not reinforce
  - Establishing positive history
  - Gradually introduce tastes
  - Gradually increase amount on spoon
- Transfer of stimulus control

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## Empty Spoon: Instructional Fading with Shaping

- **Tastes**
  - Juice, formula, milk, preferred
  - Avoid bitter or chewy at beginning
- **Gradual changes**
  - Shaken (not stirred)
  - Drop → covered →  $\frac{1}{4}$  →  $\frac{1}{2}$  →  $\frac{3}{4}$  → full
  - Gradually introduce variety
  - Gradually increase texture
- **Problem behavior emerges → back up**

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## Feeding behavior

- **Acceptance**
  - Self-feeding/non self-feeding
  - Open mouth
- **Refusal**
- **Expulsion**
- **Swallowing**
- **Chewing**

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## Why is feeding of particular concern to parents of children with ASD/DD?

- Awareness of health risk with ASDs/DD
  - Related conditions
  - Problems in typical development
- Resistance to change (Kanner, 1943)
  - Fdg skills develop as each child ages
- Transitions (Stevenson & Allare, 1991)
  - Liquid → Solid
  - Pureed → Textured
- Typical child prblms during transition

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## Do children with autism have aberrant eating habits?

- Ahearn et al. (2001); 50%+ selective
  - >25% overly selective (1 food grp)
  - 70% for starches
- Remove gluten from diet?
- Parents report more Fdg prb
  - Schreck, Williams, and Smith (2004)
- Narrower range, family diet → child diet
  - Schreck and Williams (2006)
- Children w/ASDs may eat more than TDCs
  - (Raiten & Massaro, 1986)



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## Treating ASDs via Diet?

- Diet and behavior
  - Feingold was wrong
  - Hoover & Milich (1994); words over sugar
- GFCF diet
  - Anecdotal report (e.g., Cade et al., 2000)
  - Elder et al. (2006)
  - Data to determine effects
- Ketogenic diet
  - Evangeliou et al. (2003); intractable seizures

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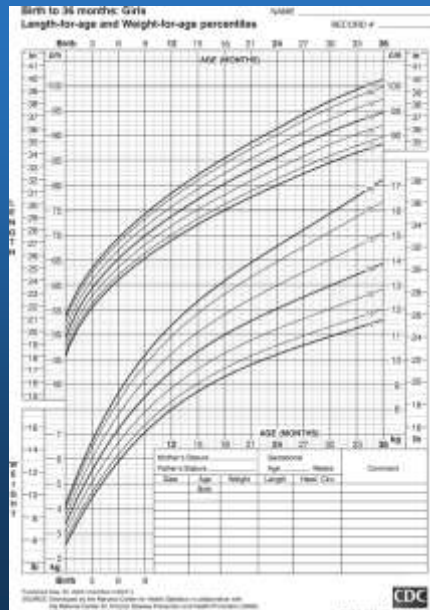
## Treating the gut?

- Gut Tx of ASD → No change in autism
- Diets as Tx → For true allergy/intolerance
- Vitamins as Tx
  - 1995 NIMH Subcommittee
  - Lawson et al. (2007); Overuse & prostate cancer
- Secretin (e.g., Roberts et al., 2001)

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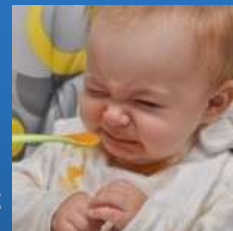
# What is a feeding problem?

- Refusal → Selectivity
  - Ahearn (2001)
- Most critical function of eating
  - Caloric intake
  - Growth and weight gain



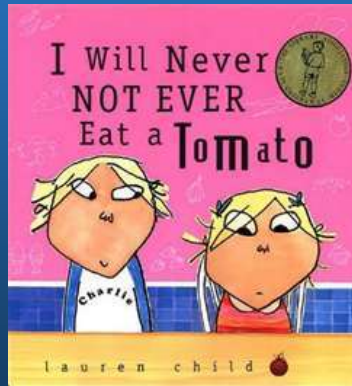
# What is a feeding problem?

- Refusal → Selectivity
  - Ahearn (2001)
- The role of early history
  - TFR = good reason to not want to eat
  - Selectivity = decline in diet or static?
- Food and texture selectivity
  - Early identification = hi prob. Success
  - Texture selectivity/caloric intake/oral motor skills
- Variables associated w/ difficult fdg problems
  - GI symptoms → Pediatric Gastroenterologist
  - OM → SPL





# Questions



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## Assessment of eating

- **Functional assessment?**
- **Evaluate physical status**
  - Weight/growth/output
  - GI functioning
- **Evaluate intake through observation**
  - Food logs (Ahearn, 2001)
  - In vivo assessment (Munk & Repp, 1994)
  - Expert multi-disciplinary assessment (e.g., Kedesdy & Budd, 1998)

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# Direct Assessment – Food Log

## 🕒 Diet history

- Sample of presentation and intake
- Across day
- No changes to mealtime, etc.

## 🕒 Observation in natural environment

- Assessing behavioral dynamics
- Attention/Escape/Esc + access to SR+

### Daily Food Log - Date: / /

*Record food or drink presented at any time during the day. Record each item presented on a separate row. Estimate as either cups presented (e.g., ½ cup of rice, ¼ cup of peas), ounces presented (e.g., 4 oz yogurt, 8 oz of apple juice), or number of items presented (e.g., 2 cookies, one hamburger, 6 chicken nuggets). The record the percentage of the amount presented that was consumed. If you present more of one item, record the additional amount on a separate row.*

TIME	FOOD/AMOUNT PRESENTED	PERCENTAGE EATEN	DRINK/AMNT PRESENTED	PERCENTAGE DRUNK	NOTABLE EVENTS
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## Diet History - Summary

- **Categorizing eating patterns**
  - Overly & moderately selective
  - Mildly selective
  - Food refusal (chronic vs acute)
- **Problems of limited exposure**
  - Other limitations

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## Outcome of observation

- **Rule out physiological factors**
- **Identify skill deficits**
  - Decide whether they are important
- **ID problems in the eating environment**
- **Establish goals**



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## Selective eating

- **Categories (Ahearn et al., 2001)**
  - Overly/severely
  - Moderately
  - Mildly
  - Texture selective
- **Develops why? (Piazza et al., 2003)**
  - Escape from NP
  - Attention (?)
  - Tangibles (Escape to other food)



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## Consequences & Presentation

- **Timing of food presentation**
  - Grazing/Access to food outside of meals
- **Motivational operations**
- **Exposure to foods**
  - Birch & Marlin (1982)

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# Selective Eating

- **Develops when? (Carruth et al., 2004)**
  - As many as 50% of all toddlers
  - Selectivity increases w/ age
  - Typically meet nutritional requirements
- **Transient? (Carruth & Skinner, 2000)**
  - Severe traced to early eating history (Marchi & Cohen, 1990)

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# Structuring mealtimes

- **Existing structure to meals**
  - Meal as routine
- **Altering structure**
  - Eating environment
  - Timing of access to food
  - Discrete trial format
  - Which items are presented
  - How to present them
  - Routines with items/plate
- **From structure to exposure**



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## What to do first

- Diet record summary
- Select foods for exposure
  - Half of foods should be preferred
  - 1-3 target (new) items for each group
  - At least 1 item from each food group
  - Don't choose bitter or smelly foods

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## Procedures

- Exposure program
  - 18 sessions (1 block)
  - Target item presented 6 times per block
  - Self-feeder presentation
  - No differential consequences
  - About 30 minutes before meal

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## Procedures

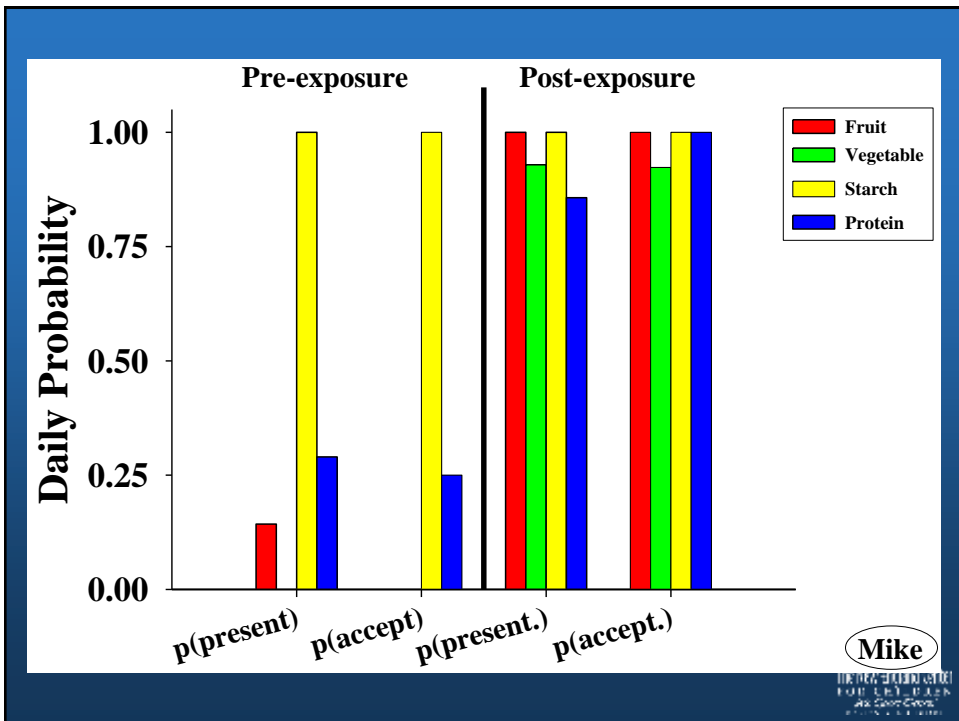
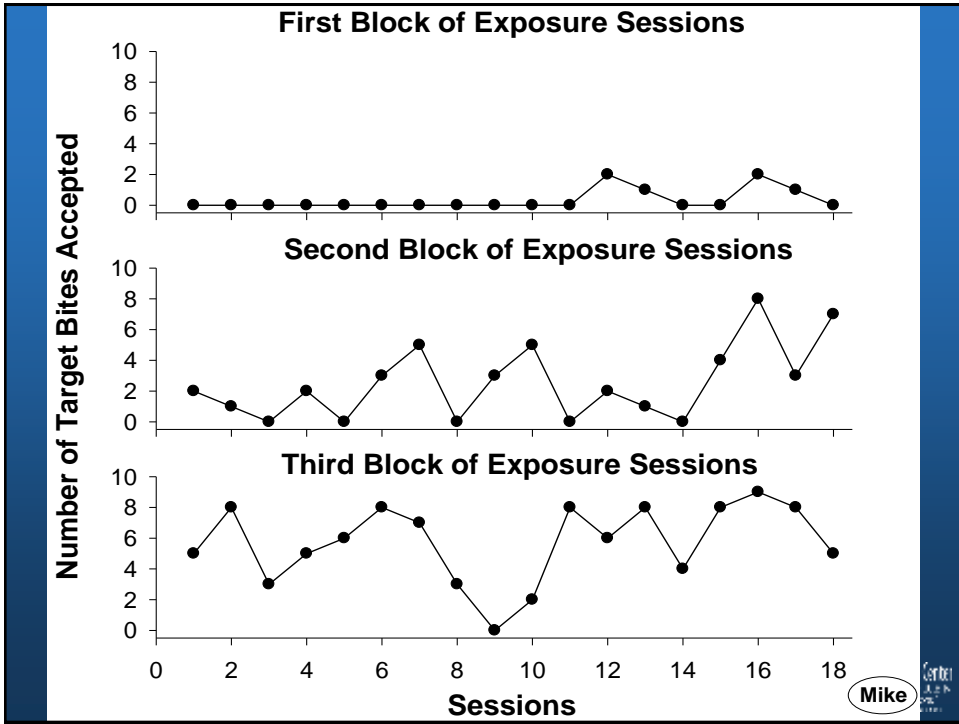
- **Meals (session)**
  - 2 accepted + 2 target items
  - 5 presentations of each item
  - Order of presentation quasi-randomized
  - Single-item on plate
  - “(Child’s name), take a bite”
  - 5-10 s to consume
  - Refusal = neutral removal
  - 30 s ITI

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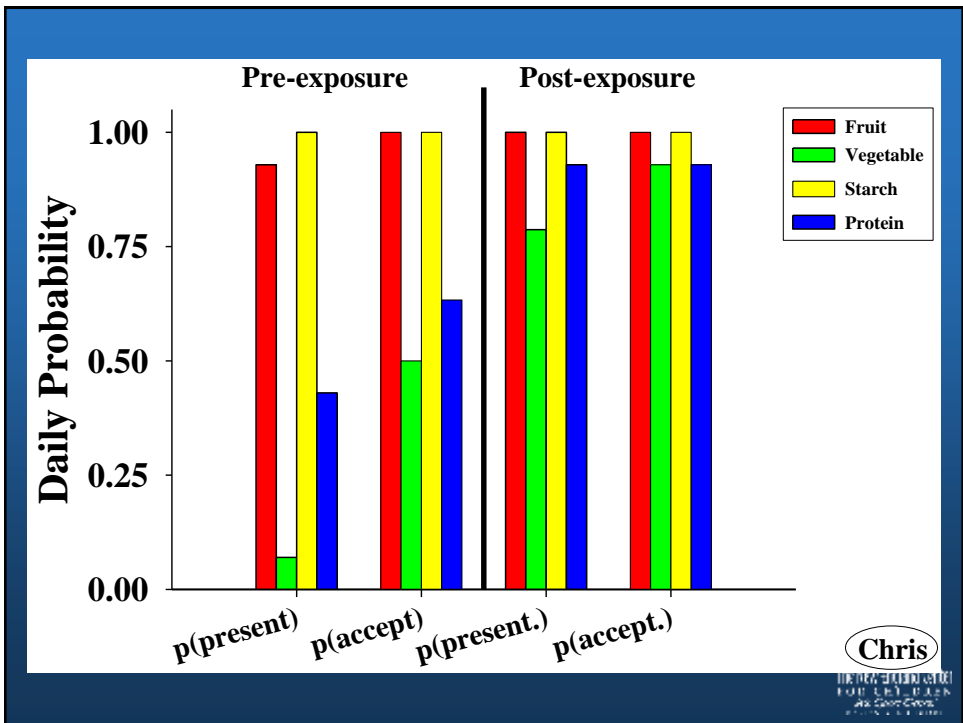
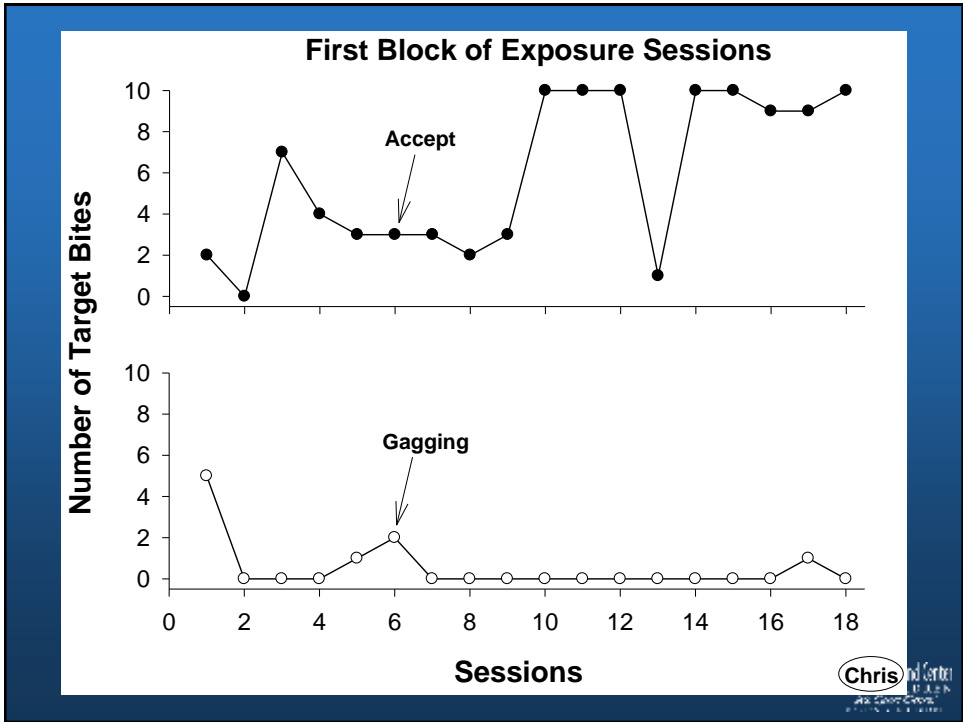
## Picky Eaters

- **Mike**
  - 4, ASD
  - Moderately selective
  - Preferred starch, limited pro, no fruit/veg
- **Chris**
  - 2.5, ASD
  - Mildly selective
  - Preferred starch, limited pro/veg/fruit
  - Gagging/vomiting

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## Results & Discussion

- **Exposure = improved intake**
  - All consumed target items
  - Results generalized to meals
- **Selectivity shaped**
  - Consistent presentation of variety
  - Exposure sessions like DTT
- **Limited to mild feeding problems**
  - Novel foods in assessment

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## Questions?



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# Quick Review of Treatments

- **Medical intervention**
- **Altering the feeding environment**
  - Mealtime structure and food exposure
  - Simultaneous presentation
  - Food blending + fading
- **Arranging new consequences**
  - Pos. reinf. (Kedesdy et al., '98)
  - Escape prevention (Ahearn et al., 1996)
- **Teaching**
  - Texture fading (Shore et al., 1998)
  - Task analysis (Luiselli, 1993)

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# Positive Reinforcement

- **Access to preferred foods???** (Riordan et al., 1980)
- **Access to activities/attention** (Kerwin et al., 1995)
- **Using highly preferred items**
  - Motivated to earn/limited access at other times
  - Assessment (Fisher et al., 1992)
  - Reinforce each accepted bite immediately



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## Example - Larry

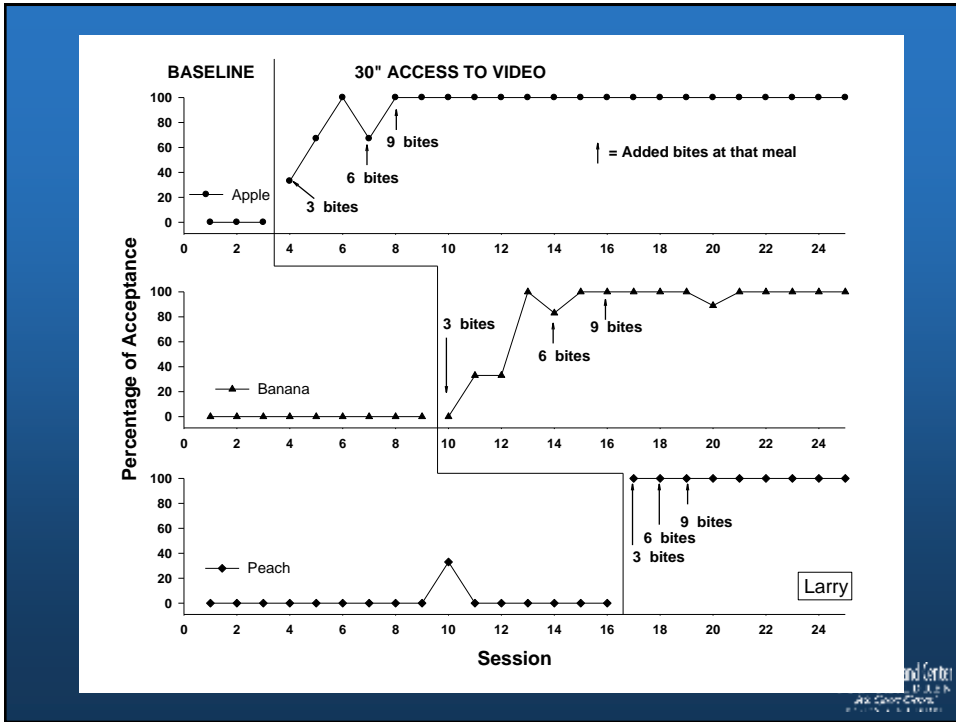
- 4 year old boy diagnosed with autism
- Eating at meals good but variety decreasing
- Accepted a variety of starches/proteins
  - Limited intake of fruits/vegetables
- Goal - Increase acceptance of Fruit/Veg
  - Starting point - Fruit

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## Feeding Sessions

- **Baseline -15 presentations of fruit**
  - 5 each
- **Most preferred item was video**
  - 30 seconds of “Barney” for acceptance
- **Data recorded on Accepts/Expel**
- **15 total bites presented during treatment**
- **Target Item**
  - Beginning of session
  - 3 bites added after eating criteria met

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## Simultaneous presentation

- Sequential presentation (as SR+)
  - (Riordan et al., 1980; 1984)
- Simultaneous presentation
  - (Kern & Marder, 1996)
- Sim. Presentation w/out EP (SR+)
  - (Piazza et al., 2002)



## Simultaneous presentation w/out SR+

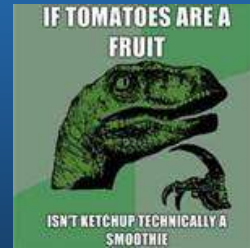
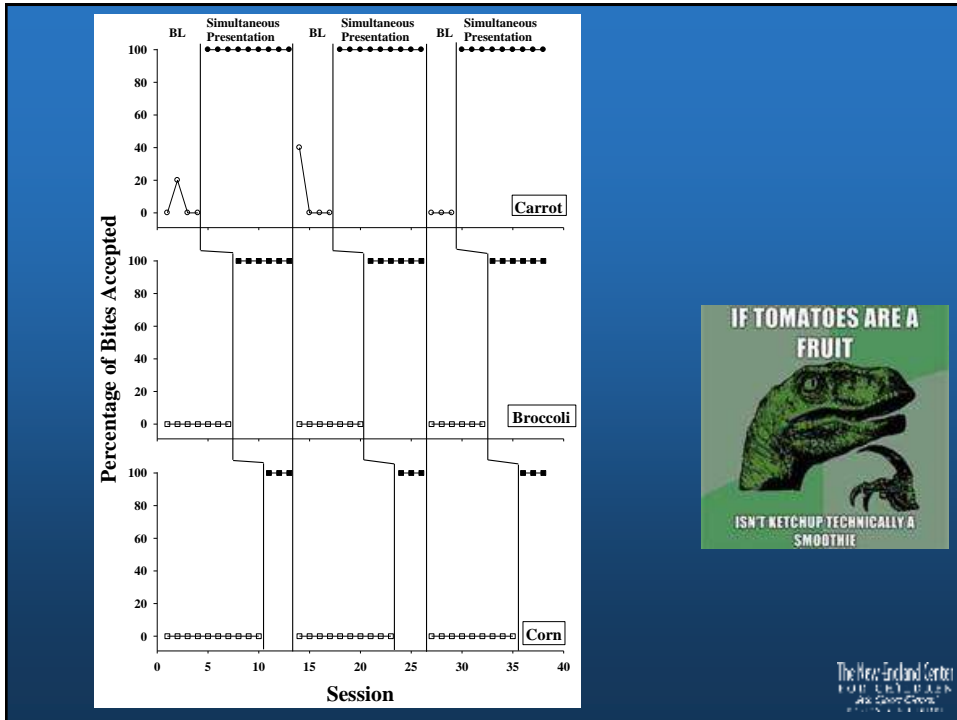
- Fred ate no vegetables  
(Ahearn et al., 2001)
  - Ate a variety of starches, proteins, condiments
- PS preference assessment
  - Ketchup, BBQ sauce, salad dressing
- Multiple baseline design across V
  - Withdrawal to BL btw condiments

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## Simultaneous presentation w/out SR+

- 5 consecutive presentations of each
- BL – no differential consequences
- SP – food + 5cc of condiment
- Each condiment introduced in MB

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## Simultaneous presentation and fading

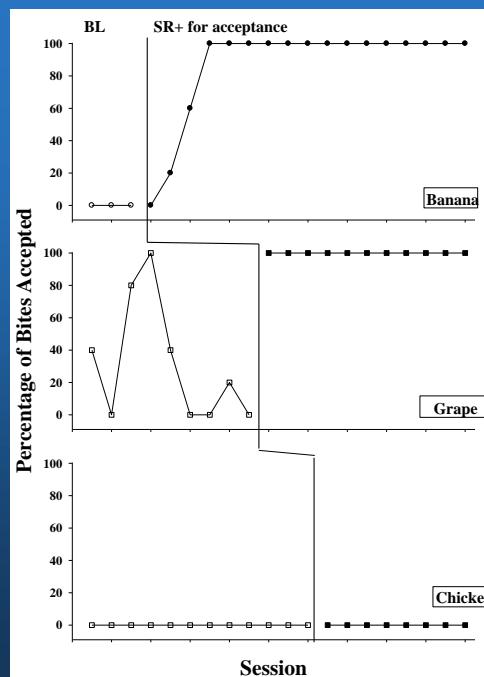
- Transfer of stimulus control
- Texture fading
  - (Shore et al., 1998)
- Probes and “errorless”
- Blending preferred and nonpreferred
  - Low concentration of NP

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# Simultaneous presentation and fading

- Phil - selective and ate few proteins
- Consumed variety of fruits
  - Inconsistent acceptance
- Targeted fruits and chicken
  - 5 nonconsecutive bites of each item
- Differential reinforcement
  - Acceptance resulted in activity access
  - Refusal resulted in neutral removal

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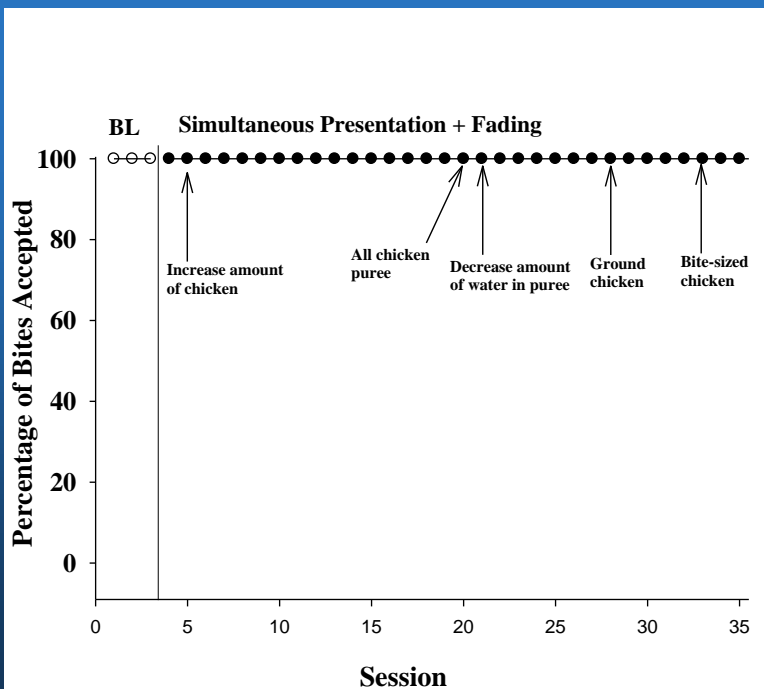
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# Simultaneous presentation and fading

- Accepted age-appropriate texture
- Decreased texture of banana to puree
  - About  $\frac{3}{4}$  of spoonful
- Mixed in a small amount of chicken
- Gradually increased amount of NP
  - Concomitant decrease in banana
- Increased texture of chicken back to small bite sized pieces

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## Escape prevention

- Consumption of food required to end meal
- Professional supervision necessary
- Nonremoval of the spoon
  - (Ahearn et al., 1996; Cooper et al., 1995)
- Physical guidance
  - (Ahearn et al., 1996; Riordan et al., 1980)

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## Example - Paul

- 4 year old boy diagnosed with autism
- Overly selective
- Quit eating solid food during illness
- Previously ate grilled cheese and pancakes
- Accepted no food for 4 weeks
- Goal - Increase acceptance
  - Starting point – Foods previously consumed

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# Physical Guidance

- Parent selected intervention
- Conducted at school
- Two therapists for each meal
- SR+ food acceptance – HP items
- Refusal – prompt at jaw
- 4 total prompts prior to Ind. ACC
  - New food at 7<sup>th</sup> meal
  - 12 foods IA in 39 meals
  - 3 months from no solids to feeding himself at home without physical prompting

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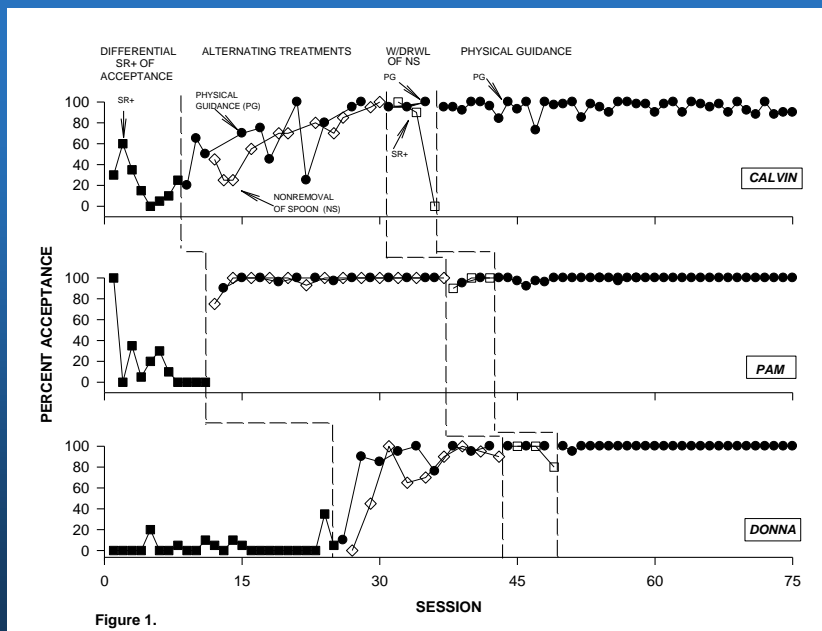


Figure 1.

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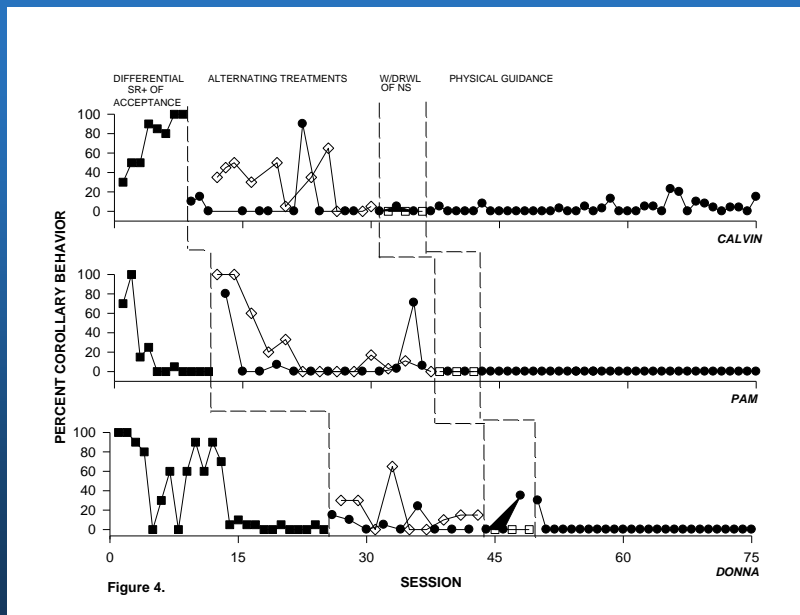


Figure 4.

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## Comparing NR and PG

- Both very effective
  - Acceptance may be more rapid with PG
- Side effects
  - In NR Meals longer - more time=more side effects
  - PG sometimes suppresses other aberrant behavior
- Treatment acceptability

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## Gagging and Vomiting

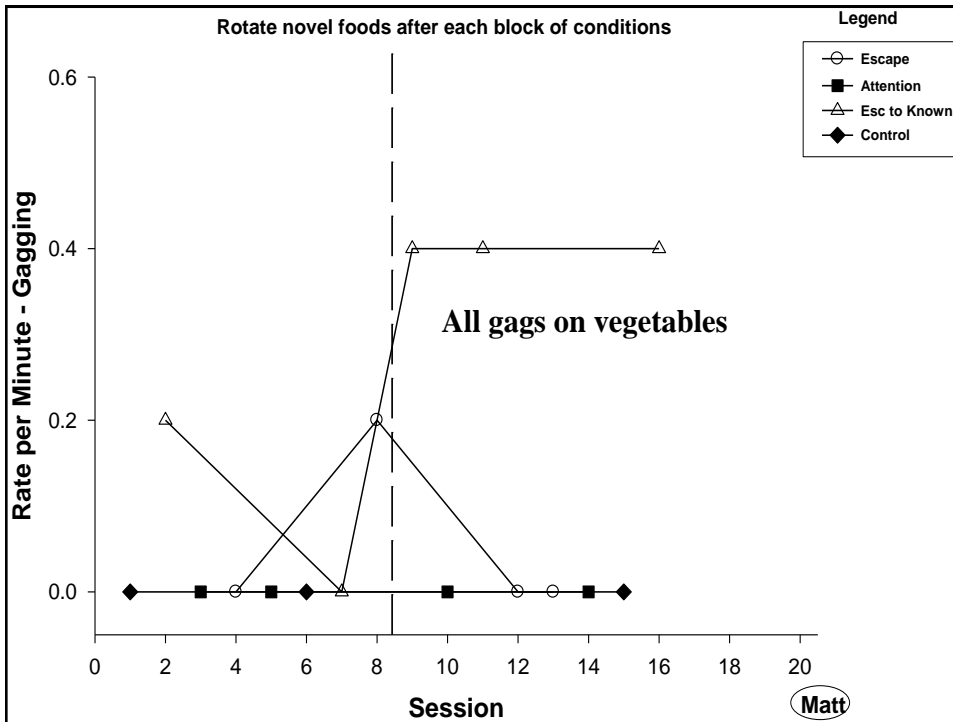
- Why do children gag?
  - Novel textures (Texture sensitivity?)
  - Lack of oral competence (elicitation)
  - Illness
  - To avoid consuming NP foods
- What can be done?
  - Do not provide undue attention/escape
  - Teach oral skills/repeated exposure
  - Access to preferred liquids
  - Escape prevention???

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## Example - Matt

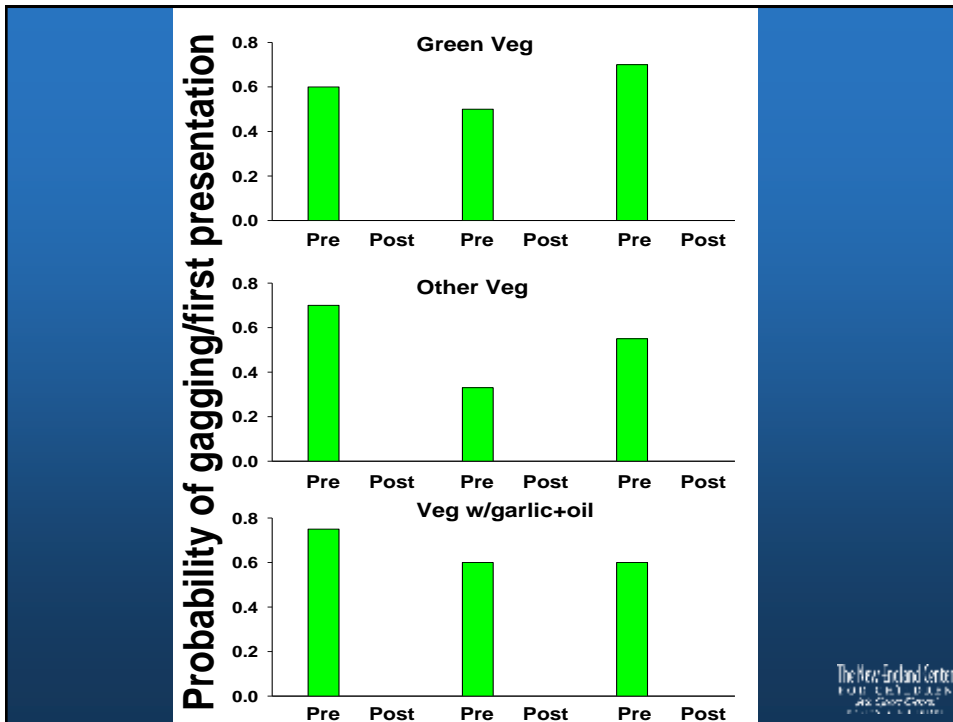
- 5 year old boy diagnosed with autism
- Eating at meals good but gagged/vomited 4-5x/week
- Accepted a variety of starches/proteins
  - Limited intake of fruits/vegetables
- Goal – Decrease vomiting
  - Starting point – Assessing cause

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## Exposure

- During assessment
  - Gags on veggies (mostly greens)
  - Gags during first 1-2 presentations
- Exposed to foods that led to gags
  - Consecutive presentations of NP/P
  - No attention (lined garbage can)
  - Later presented novel foods/scents



## Expulsion

- Lacking OM skills
  - Texture fading → lumps
  - Lateral placement (on molars)
  - Modeling
- Escape prevention
  - Re-presentation (standard in PG/NR)
  - Flipped spoon/nuk brush (Piazza and colleagues, 2011)

## Closing comments

- Prevention of the development of selective feeding for children with autism
- Early intervention
- Availability and accessibility of resources

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## Gut theory of autism

- Measles insults the gut causing bowel dysfunction which then results in regression
  - Wakefield et al. (1998) – **RETRACTED**
- GMC hearing
- Gut-theory of autism: Empirical evidence against
  - MMR (e.g., Madsen et al., 2002)
  - MMR/Bowel (Taylor et al., 2002)
- GI/Autism (Black, Kaye, & Jick, 2002)
- Mayo clinic (Ibrahim et al., 2009)
- Buie et al. (2010)

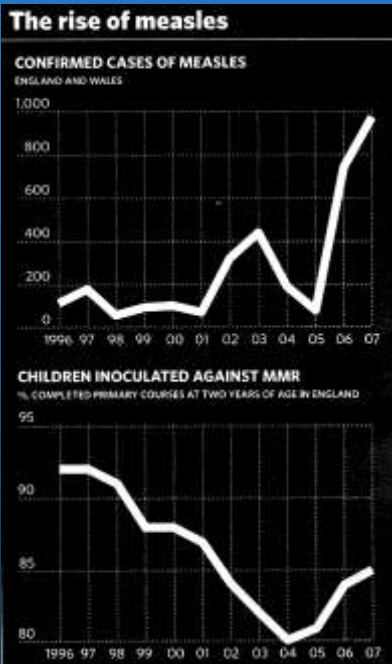
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# D'Souza, Fombonne et al. (2006)

- Presence of measles in gut/blood/tissue
  - Detected by polymerase chain reaction assays
- Used same techniques as others
- Larger N
- Used improved contaminant control
- No measles virus found in control or ASDs
- Stephen Bustin/Nicholas Chadwick OAP

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Number of deaths last year = over 200,00

Millions maimed – blind, deaf, scarring

US – prevaccine 3-4 M cases/yr; 1 in 250 died; 50k hospital; 1000 permanently disabled

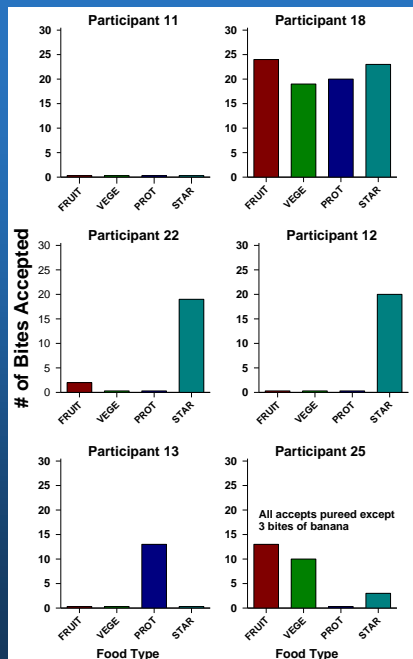
Post 1997 usually fewer than 100/yr, until 2008+

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# Eating patterns of children w/ASD

- 30 children diagnosed w/ Autism/PDD-NOS (Ahearn et al., 2001)
  - Ranging in age from 3y 9m to 14y 2m
- Survey of eating habits
- 6 meals for each child
  - 24 presentations per session
  - 4 food groups
  - 3 items per group
  - 2 textures

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FOR CHILDREN  
AND ADULTS WITH  
AUTISM SPECTRUM DISORDERS

# Questions?

The New England Center  
for Health Care  
and Quality  
Improvement