Resistance to change: Detrimental Effects of Behavioral Rigidity in Autism

Timothy R. Vollmer
Department of Psychology
University of Florida
Acknowledgements

- Jonathan Fernand, M.A., BCBA, doctoral student
- Varsovia Hernandez, Ph.D., Post-Doctoral Fellow in Psychology
- Mark H. Lewis, Ph.D., PI, NIH collaboration
- Kerri P. Peters, Ph.D., BCBA-D, Clinic Director
- Sarah Slocum, M.S., BCBA, doctoral student
- Cristina Whitehouse, Ph.D., BCBA, Post-Doctoral Fellow in Psychiatry
Overview

- One of the defining characteristics of autism is behavioral rigidity.

- Variations: selective preferences, unusual or repeated patterns of play or activity, unwillingness to change activity, or stereotypy.

- I will first present some examples of translational research on behavioral rigidity conducted in collaboration with Mark Lewis.

- I will then discuss how rigidity can contribute to health-related and behavior-related detrimental effects across a range of domains including feeding, aggression, stereotypic, and sedentary behavior.

- Throughout, I will describe how very basic behavioral procedures can favorably influence behavioral rigidity.
A caveat

• Is all behavioral rigidity a bad thing? Probably not.
• This discussion will center around instances when rigidity has been associated with poor health or behavioral outcomes.
Translational rigidity research

• National Institutes of Health (Mark Lewis, PI, and Timothy Vollmer, co-PI): Developing a novel treatment for restricted inflexible behavior

NIMH of the National Institutes of Health under award R21MH091554
Restricted and Inflexible Behavior

- We compared a group of ASD individuals to a group of typically developing individuals on arbitrary play activities.

- Study one was broken up into two sessions: free play and prompting.

- Study two involved evaluating methods to increase diversity in play.
Study 1

• 20 children with ASD were observed in a condition of free play with 6 different age-appropriate play activities.
• 20 typically developing children were observed under identical circumstances.
• Children with ASD were pre-tested to ensure compliance with the simple request to “change seats” or “sit in another chair.”
• Session 1 was without prompts to change.
• Session 2 had prompts after two minutes of unchanged activity
Study 2

- For children with ASD who showed unchanged activity, we exposed them to an intervention package.
- The intervention included a statement of a contingency, prompting, and shaping of diverse activity.
- Shaping was intended to involve a “percentile schedule of reinforcement.” (but was never needed).
Study 2 Results

Percentage of Session Engaged

- BL no prompt
- BL with prompt
- Per (no video)
- Per (no lego)
- Per (no video or lego)

Sessions

- Computer
- Pencils
- Tangrams
- Dominos
- Videos
- Legos

Gabe
Summary of findings

• Both ASD and TD kids were “rigid” when prompts were not given.
• ASD kids persisted with the most preferred activity in the face of prompting, TD kids did not.
• A simple reinforcement contingency and contingency statement produced and controlled response variation.
Implications of findings

• Rigidity or lack thereof was controlled by the environment, not by something inside the child.

• It is entirely possible that the TD children simply had more ample histories of reinforcement for compliance to prompts.

• Interventions could target the creation of reinforcement histories for varied responding, when varied responding is desired.
Selective food preferences and rigid eating patterns

With Varsovia Hernandez, Ph.D., Post Doctoral Fellow
Jonathan K. Fernand, M.A., BCBA (doctoral student)
Detrimental effects of food refusal, eating rigidity, and selectivity

- Weight loss
- Stunted growth
- Poor nutrition
- Illness and hospitalization
- Possibly death
- Difficult family social dynamics
Our general protocol

- Children are referred to our program due to food refusal or selective food preferences.
- Parents are interviewed and fill out a food preference inventory.
- Children participate in a food preference test (paired stimulus).
- Children are observed freely eating preferred and nonpreferred foods (to note possible patterns).
- Children are subjects of a functional analysis for disruptive mealtime behavior (if needed).
- Children enter treatment (positive reinforcement, differential reinforcement, escape extinction).
- Post-intervention preference assessment.
Parent reports

• To date, parents have correctly identified preferences via survey, and they send their child to clinic or school with the highly preferred “junk” items.

• Parents report essentially that the food they supply is controlled by escape or avoidance of children problem behavior (negative reinforcement) and by the fact that their child will actually eat (positive reinforcement).
During free operant self feeding

- Invariably, the children have selected “unhealthy” foods such as pizza bites and fried nuggets (surprise!)
Other notes

We have also seen highly rigid patterns of eating including but not limited to:

a) Only eating a certain type (or color, or texture) of food

b) Only eating a certain type of food on a certain night of the week

c) Eating in a particular pattern
AM: case example of selective preferences and rigid eating patterns.

- Preference assessment
  - HP: Oreo, Pizza, Chicken nuggets, pretzels
  - LP: Mashed potatoes, carrots, apple, banana
Order of food: Oreo (1), Carrots (2), Pretzel (3), Banana (4), Pizza (5), Apple (6), Nugget (7) and Mashed potatoes (8)
Intervention Phase 1: Positive Reinforcement

- After a highly preferred food item is identified, the child is given successive bites of that food with no contingency for eating other food (baseline).
- Next, the child is required to take one bite of a nonpreferred food to receive a ratio of bites of preferred foods (e.g., 6:1)
- Then, the ratio is gradually reduced (e.g., 5:1, 4:1)
Percentage of bites consumed

Sessions
Intervention 2

- Differential reinforcement (using some other type of reinforcer than food).
- Escape extinction via nonremoval of the spoon.
Pre- and Post- preference assessments
The bar chart shows the percentage of trials with consumption for different foods before and after treatment. The y-axis represents the percentage of trials with consumption, ranging from 0 to 100. The x-axis lists the foods: Apricot, Noodle, Pineapple, Raspberry, Cranberry, Rice, and Oatmeal. The chart compares the pre-treatment (black bars) and post-treatment (gray bars) PSPA for Warren, indicating an increase in consumption for some items post-treatment.
Summary of feeding results

- Some individuals respond favorably to the positive reinforcement only contingency.
- Others (to date, all) respond to the escape extinction intervention.
- In both types of intervention, we have seen the emergence of eating with untreated foods.
- Preference assessment outcomes differ noticeably when comparing pre- to post-interventions.
Rigidity and aggression

With Jonathan K. Fernand, M.A., BCBA
<table>
<thead>
<tr>
<th>Subject</th>
<th>Age</th>
<th>Item Arranging Response(s)</th>
<th>Aggression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abby</td>
<td>13</td>
<td>Arranging and straightening objects moved from their original location</td>
<td>Pushing, prying fingers off of held items</td>
</tr>
<tr>
<td>Remy</td>
<td>5</td>
<td>Repetitive play with items used to build light posts and telephone poles</td>
<td>Hitting, kicking, throwing items at experimenter</td>
</tr>
<tr>
<td>Cameron</td>
<td>3</td>
<td>Repetitive play with block structures, shopping cart with food, and toy cars</td>
<td>Hitting, kicking, throwing items at experimenter</td>
</tr>
</tbody>
</table>
Functional analysis conditions

- Play (control): Free play with rigid play items.
- Item displacement: move items but allow subject to “fix” the displacement.
- Blocking: move items and block displacement. Contingent on aggression → allow subject to “fix” the displacement.
Remy

Item Displacement

Play (Control)

Blocking

Sessions

Rate of Aggression

Sessions

Remy
Treatment procedures

• Baseline was identical to the FA test condition.
• Functional communication training (FCT): A functional communication response (FCR) was taught to replace aggression. Aggression was placed on extinction.
• Schedule thinning: A s-delta was introduced to show that FCR would not be reinforced.
• 60-s signalled delay: The s-delta was presented for the entirety of a delay. These were probed to test the necessity of gradual thinning.
• 60-s briefly signalled delay: The s-delta was replaced by use of a brief signal (e.g., “wait, please”) at the beginning of the delay
<table>
<thead>
<tr>
<th>Subject</th>
<th>Age</th>
<th>Item Arranging Response(s)</th>
<th>FC Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abby</td>
<td>13</td>
<td>Arranging and straightening objects moved from their original location</td>
<td>“Can I move it?”</td>
</tr>
<tr>
<td>Remy</td>
<td>5</td>
<td>Repetitive play with items used to build light posts and telephone poles</td>
<td>“Please don’t touch (object).”</td>
</tr>
<tr>
<td>Cameron</td>
<td>3</td>
<td>Repetitive play with block structures, shopping cart with food, and toy cars</td>
<td>“Stop, please.”</td>
</tr>
</tbody>
</table>
Schedule Thinning & 60-s Delay Probes

- • Immediate Reinforcement
- ○ 60-s Delay (Continuous Signal)
- ○ 60-s Delay (Brief Signal)

Abby

Rate of Aggression

Rate of Mands

Sessions
Summary of findings

- Blocking of access to fixing the environment produced aggression reinforced by access to fixing.
- FCT resulted in reduced aggression and increased FCR.
- Delay to reinforcement was introduced via signals (s-delta) and schedule thinning.
- All interventions concluded with the use of a more natural briefly signaled delay.
- Conceptual note: consider the function of blocking in your behavior intervention plans.
To date, the possible functions of response blocking

- Blocking as punishment (Lerman & Iwata, 1996)
- Blocking as extinction (Smith et al., 1999)
- Blocking as positive reinforcement (Vollmer et al., 1992)
- Blocking as a neutral event
- Blocking as an EO associated with severe problem behavior (Fernand et al., in prep)
Extensions of research on rigidity

- ASD individuals who are prescribed atypical antipsychotics (e.g., risperodone).
- Atypical antipsychotics were developed in part to combat negative side effects such as tardive dyskinesia.
- However, the atypical antipsychotics have negative side effects of their own, such as obesity.
- A primary preventive strategy is early intervention for aggressive behavior leading to prescription.
- A secondary strategy is to prevent negative side effects once the individual is on the medication.
- A tertiary strategy is to intervene with individuals who have become obese as a result of the medication.
The triple “whammy”

- Atypical antipsychotics make a person gain weight (associated with obesity, diabetes, metabolic syndrome OR parents take them off the med).
The triple whammy continued

- Individuals with ASD are (a) relatively less active than same age peers, due in part to (b) large amounts of time on highly preferred sedentary activity.
The triple whammy continued

- Many individuals with ASD maintain a poor diet due to rigid and restricted food interests (as I have shown today).
Proposed solutions

• Identify individuals who receive atypical antipsychotics.
• Study 1: Identify additional risk factors for obesity including:
  • a) restricted food interests for unhealthy food,
  • b) low levels of physical activity, and
  • c) restricted interests in sedentary activity.
Proposed Solutions, continued

• Study 2: Implement the most appropriate interventions including:
  
  • a) escape extinction plus DRA for food refusal,
  • b) contingency management to increase physical activity (collaborating with Jesse Dallery), and
  • c) prompting and shaping to expand range of activities (similar to Lewis et al. NIH study).
Conclusions

• Behavioral rigidity can lead to health problems and behavioral problems.

• Behavioral rigidity and the associated negative outcomes are largely controlled by environmental contingencies.

• Common behavioral approaches can be used to abate these negative effects.

• Larger scale trials may be necessary to convince others.
Thank You