Acknowledgements

Amanda P. Laprime, Center for Children with Special Needs

Christine J. Evans, Simmons College

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The kids, families, and teachers
Overview

1. Review recent research on social skills and autism
2. Conditioning praise as a reinforcer
3. Teaching responses to facial expressions
4. Recommendations for research and practice

Diagnostic Criteria for ASD (DSM-5)

Deficits in social-emotional reciprocity
- Failure of back-and-forth conversation
- Failure to initiate or respond to social interactions

Deficits in nonverbal communication
- Abnormalities in eye contact and body language
- Deficits in understanding and using gestures
- Lack of facial expressions and nonverbal communication

Deficits in developing and maintaining relationships
- Difficulty adjusting to social contexts
- Difficulty sharing imaginative play or making friends
- Absence of interest in peers
Review of Recent Research

Search: autism + social + behavior analysis

14 studies in the past 5 years

- Playing and sharing
- Social communication: initiations and responses
- Identifying social reinforcers
- Assessing and reducing inappropriate social behaviors
- Teaching safety skills
- Teaching empathic responding
Remove the Adults!

1. Picture Activity Schedules
2. Video Modeling
3. Script Training and Fading

With adults
1. Teaching Interaction Procedure
2. Social Stories

Participants – Number and Ages

<table>
<thead>
<tr>
<th>Study</th>
<th># Participants</th>
<th>Ages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broadhead et al. (2014)</td>
<td>6</td>
<td>3-5</td>
</tr>
<tr>
<td>MacDonald et al. (2009)</td>
<td>2</td>
<td>5-7</td>
</tr>
<tr>
<td>Marzullo-Kerth et al. (2011)</td>
<td>4</td>
<td>7-8</td>
</tr>
<tr>
<td>Jones et al. (2014)</td>
<td>4</td>
<td>4-6</td>
</tr>
<tr>
<td>Paden et al. (2012)</td>
<td>2</td>
<td>7-9</td>
</tr>
<tr>
<td>Garcia-Albea et al. (2014)</td>
<td>4</td>
<td>4-6</td>
</tr>
<tr>
<td>Leaf et al. (2012)</td>
<td>6</td>
<td>5-13</td>
</tr>
</tbody>
</table>
Playing and Sharing

1. The use of linked activity schedules to teach hide-and-seek. (2014)


Graduated guidance

- Full physical prompts, faded with improvement
- Script fading – last word faded first
Participants alternated between hider and seeker

Participants increased hide-and-seek game-playing skills, with novel locations

Did not respond with activity schedule alone

Did not play when activity schedule was taken away
  • Should they be faded?
  • Do children with autism always need activity schedules (like planners)?
MacDonald et al. (2009)

Each video had 14-17 scripted verbalizations
- Adult models

Three play sets:
- Airport – “We need gas,” put in gas, “I’ll get my suitcase”
- Zoo – Polar bear → “Can I feed him?” “Sure, he loves fish”
- Grill – “Let’s check our food,” “I think it’s ready”

Measured scripted and unscripted verbalizations and actions, and cooperative play (4-min play sessions)

MacDonald et al. (2009)

Video model – watched twice and then told to play

No prompting or reinforcement

Video modeling might work well because they show play behaviors without distractions inherent in the natural environment

Student have a history of reinforcement for imitating others
Marzullo-Kerth et al. (2011)

Video models
- Two peers sharing an activity
- 6 video models per child; 8-10 seconds in duration
- Taught sharing with many items (multiple exemplar instruction)

Measured: offers to share
1. Motor – holds out item
2. Verbal – “Do you want to try?”

Non-sharing items: worksheets, towel, clothing
Video Model Content

Verbal Responses
- “Would you like to try this?”
- “Do you want to try?”
- “Try this”
- “Do you want to try?”
- “Here, you try it”
- “Why don’t you try?”
- “Would you like to try this?”

Stimuli
- Cookies
- Cars
- Magnets
- Velcro mitt and ball
- Pretzel
- Ball
- Play-doh
- Colored pencils
- Football

Procedures

Verbal Direction & Materials
- If verbal and motor response, reinforcement

Incorrect or no response
- Present video model
- Present verbal direction and materials

Incorrect or no response
- Physical and audio prompts
Marzullo-Kerth et al. (2011)

- All four children increased sharing behaviors
- All children shared with untaught items
- All children shared in a novel setting, novel peer
- Children did not share with mundane objects
- 3 children maintained sharing behaviors
- All children emitted unscripted offers to share

“Sharing a highly preferred item may be aversive”
Sharing more likely when multiple items

Social Communication: Initiations and Responses

1. Teaching engaging in peer-directed mands using a picture exchange communication system. (2012)

2. Using audio script fading and multiple-exemplar training to increase vocal interactions. (2014)

TEACHING CHILDREN WITH AUTISM TO ENGAGE IN PEER-DIRECTED MANDS USING A PICTURE EXCHANGE COMMUNICATION SYSTEM

AMBER R. PADEN, TIFFANY KODAK, WAYNE W. FISHER, ELIZABETH M. GAWLEY-BULLINGTON, AND KELLY J. BOUSSEIN
MUNROE-MEYER INSTITUTE
UNIVERSITY OF NEBRASKA MEDICAL CENTER

We evaluated differential reinforcement of alternative behavior (DRA) plus prompting to increase peer-directed mands for preferred items using a picture exchange communication system (PECS). Two nonvocal individuals with autism participated. Independent mands with a peer increased with the implementation of DRA plus prompting for both participants. In addition, peers engaged in brief social interactions following the majority of mands for leisure items. These results suggest that teaching children to use PECS with peers may be one way to increase manding and social interactions in individuals with limited or no vocal repertoire.

Key words: autism, differential reinforcement of alternative behavior, mand, picture exchange communication system, social interactions

• 2 participants with autism – PECS
• DRA + prompts: mand to peer
• 69% of trials – social interaction
Paden et al. (2012)

Fewer mands with peers in baseline
- More history of reinforcement for mands with adults
- Adults reinforce mands more immediately

Limitations, future research, practice
- Peers did not always take PECS card and reinforce; therapist had to prompt reinforcement
- Need to teach mands away from the table – moving around
- Could incorporate reinforcers that were more social – games
**Stimuli and Target Behaviors**

Determined by observing typical children

<table>
<thead>
<tr>
<th>Category</th>
<th>Sample Toy</th>
<th>Scripts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle</td>
<td>Car</td>
<td>“Check this out!”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“Look, it’s red”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“Cars go beep”</td>
</tr>
<tr>
<td>Instruments</td>
<td>Piano</td>
<td>“I can play piano”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“It’s black”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“Watch me hit the keys”</td>
</tr>
<tr>
<td>Balls</td>
<td>Soccer ball</td>
<td>“I have the soccer ball!”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“It’s black and white”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“Let’s kick it!”</td>
</tr>
<tr>
<td>Taught (general case)</td>
<td>Gen probes</td>
<td></td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>-----------------------------</td>
<td></td>
</tr>
<tr>
<td>Dan  Balls, animals, buildings</td>
<td>Instruments</td>
<td></td>
</tr>
<tr>
<td>Justin Instruments, balls, vehicles</td>
<td>Action figures</td>
<td></td>
</tr>
<tr>
<td>James Vehicles, animals, action figures</td>
<td>Balls</td>
<td></td>
</tr>
<tr>
<td>Adam Building materials, instruments, action figures</td>
<td>Vehicles</td>
<td></td>
</tr>
</tbody>
</table>

**Dependent Measures**

<table>
<thead>
<tr>
<th>Category of Interaction</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initiations</td>
<td>Scripted</td>
</tr>
<tr>
<td>(said before partner)</td>
<td>Unscripted</td>
</tr>
<tr>
<td></td>
<td>Novel</td>
</tr>
<tr>
<td></td>
<td>In VivoScripted</td>
</tr>
<tr>
<td></td>
<td>In Vivo Unscripted</td>
</tr>
<tr>
<td>Elaborations</td>
<td>Scripted</td>
</tr>
<tr>
<td>(said after partner)</td>
<td>Unscripted</td>
</tr>
<tr>
<td></td>
<td>Novel</td>
</tr>
<tr>
<td></td>
<td>In Vivo Scripted</td>
</tr>
<tr>
<td></td>
<td>In Vivo Unscripted</td>
</tr>
<tr>
<td>Generalized Interactions</td>
<td>Within Category</td>
</tr>
<tr>
<td></td>
<td>Across Category</td>
</tr>
</tbody>
</table>
Child: “I like to play soccer”
Adult: “Soccer is my favorite”
• Dropped edible in cup
• Play with toy for 30 seconds

Faded scripts to partial
• If error: played full script

Physical prompts to
• Push button
• Look at therapist

Table 3
Fading Levels Used During Script Fading

<table>
<thead>
<tr>
<th>Fading level</th>
<th>Script content</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Full script</td>
</tr>
<tr>
<td>1</td>
<td>Last word removed</td>
</tr>
<tr>
<td>2</td>
<td>Last two words removed</td>
</tr>
<tr>
<td>3</td>
<td>All but the first word removed</td>
</tr>
<tr>
<td>4</td>
<td>All but the first word removed on three stimuli and no script on six stimuli</td>
</tr>
<tr>
<td>5</td>
<td>All words removed from audio recorder</td>
</tr>
<tr>
<td>6</td>
<td>No scripts (i.e., recorder removed)</td>
</tr>
<tr>
<td>7*</td>
<td>No scripts (assistant presses recorder during prompts)</td>
</tr>
</tbody>
</table>

*Level 7 was used only for Adam.
Garcia-Albea et al. (2014)

Not much elaboration: played with toy, no teaching

Need more variety of toys:
- More engaging
- More generalization
Jones, Lerman, & Lechago (2014)

Target responses:
- Therapist took iPad \( \rightarrow \) “Give it back please”
- 1-min timer goes off \( \rightarrow \) “My turn”
- “Give me something to play with” \( \rightarrow \) “What do you want?”

Role play with adult and peer
- Bluetooth device cued peer what to do

Training: most-to-least prompting (verbal)
PC = person change
SC = stimulus change
V = watched video of peer
Jones, Lerman, & Lechago (2014)

Results: generalization to adults, but not peers

Controlled for other stimuli: materials, location
  - Only peer influenced less responding

Maybe gender: adults were female; peers were male
  - Probably not

Similar procedural integrity with adults and peers
  - “My turn” – peer did not always hand over, but usually

More animation, enthusiasm with adults than peers
Leaf et al. (2012) – Skills Taught

- Losing graciously
- Sportsmanship
- Giving compliments
- Cheering up a friend
- Showing appreciation
- Reciprocal compliments
- Negotiation
- Appropriate greetings
- Changing the conversation
- Providing assistance
- On-topic conversation
- Showing off work
- Explaining a “cool” event
- Showing interest
- Clarifying instructions
- Interrupting
- Joining into a game
- Disagreeing appropriately

Leaf et al. (2012) – Skills Taught

Teaching Interaction
- State skill of the day
- State rationale for skill
- State when to use the skill
- Name all steps in order
- Therapist modeled skill
- Child stated if correct
- Child role-played the skill

Both:
Correct: tickets, praise; Incorrect: prompts

Social Stories
- Descriptive, perspective, affirmative, directive
- Pictures and text
- Therapist read story
- Comprehension questions
  - What book about?
  - When display behavior?
  - Why display behavior?
  - What are the steps?
Leaf et al. (2012) – Results

• Teaching Interaction Procedure: mastered 18/18
• Social Stories: mastered 4/18

More generalization to novel adults and peers in TIP

Need modeling and role play

Explanation: probe procedure more like TIP (role play)

MacDonald et al. (2009)

Reinforcement for social behaviors

“Acquiring play skills may also make it more likely that natural social consequences for interaction will come to exert an influence on the behavior of children with autism. That is, social consequences that were ineffective may come to have some value for these children through this training.”
### Reinforcers in Recent Studies

<table>
<thead>
<tr>
<th>Study</th>
<th>Reinforcers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brodhead et al. (2014)</td>
<td>Praise, small edible</td>
</tr>
<tr>
<td>MacDonald et al. (2009)</td>
<td>None</td>
</tr>
<tr>
<td>Marzullo-Kerth et al. (2011)</td>
<td>Accept, confirm, manipulate, token (video game, snacks, toys)</td>
</tr>
<tr>
<td>Jones et al. (2014)</td>
<td>Praise, edible</td>
</tr>
<tr>
<td>Paden et al. (2012)</td>
<td>Tangible item (manded)</td>
</tr>
<tr>
<td>Garcia-Albea et al. (2014)</td>
<td>Edibles</td>
</tr>
<tr>
<td>Leaf et al. (2012)</td>
<td>Praise, tokens (tangible items, activities)</td>
</tr>
</tbody>
</table>

### Verbal Operants (Skinner, 1957)

<table>
<thead>
<tr>
<th></th>
<th>Antecedent</th>
<th>Behavior</th>
<th>Consequence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mand</strong></td>
<td>Motivating</td>
<td>“Book”</td>
<td>Specific SR+ (book)</td>
</tr>
<tr>
<td></td>
<td>operation</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Tact</strong></td>
<td>Nonverbal</td>
<td>“Book”</td>
<td>Generalized Cond. Social SR+ (e.g., “Oh,” “Yes”)</td>
</tr>
<tr>
<td></td>
<td>stimulus</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Listener</strong></td>
<td>Verbal stimulus</td>
<td>Touch, point</td>
<td>Generalized Cond. Social SR+</td>
</tr>
<tr>
<td><strong>Responding</strong></td>
<td>Nonverbal stimuli</td>
<td>to book</td>
<td></td>
</tr>
<tr>
<td><strong>Echoic</strong></td>
<td>Verbal stimulus</td>
<td>“Book”</td>
<td>Generalized Cond. Social SR+</td>
</tr>
<tr>
<td></td>
<td>– model</td>
<td>– repeats model</td>
<td></td>
</tr>
<tr>
<td><strong>Intraverbal</strong></td>
<td>Verbal stimulus</td>
<td>“book”</td>
<td>Generalized Cond. Social SR+</td>
</tr>
<tr>
<td></td>
<td>– not in antecedent</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Toward a Behavioral Analysis of Joint Attention

William V. Dube
University of Massachusetts Medical School
Shriver Center

Rebecca P. F. MacDonald, Reneé C. Mansfield, William L. Holcomb, and William H. Ahearn
New England Center for Children

Joint attention (JA) initiation is defined in cognitive-developmental psychology as a child's actions that verify or produce simultaneous attending by that child and an adult to some object or event in the environment so that both may experience the object or event together. This paper presents a contingency analysis of gaze shift in JA initiation. The analysis describes reinforcer-establishing and evocative effects of antecedent objects or events, discriminative and conditioned reinforcing functions of stimuli generated by adult behavior, and socially mediated reinforcers that may maintain JA behavior. A functional analysis of JA may describe multiple operant classes. The paper concludes with a discussion of JA deficits in children with autism spectrum disorders and suggestions for research and treatment.

Key words: joint attention, social reinforcer, development, autism
Problem!

- Praise and attention not reinforcers for all children
- Attention is reinforcer for all verbal operants except mand
- Generalization and maintenance are unlikely without generalized conditioned social reinforcers
- Primary reinforcers: more time to consume than praise
- Edible reinforcers are unhealthy
- We are told to pair praise with reinforcers: research?

Contingent Pairing to Establish Praise as a Reinforcer with Children with Autism

OR

Towards Establishing a Generalized Social Conditioned Reinforcer
Conditioned Reinforcement

- **Tokens**: contingent pairing (Moher et al., 2008)
- **Books**: observational intervention (Singer-Dudek et al., 2011)
- **Sounds**: stimulus-stimulus pairing (Petursdottir et al., 2011)
- **Nods and smiles**: paired with toys (Isaksen & Holth, 2009)
- **Praise** (psychiatric disorders; e.g., schizophrenia)
  - Pairing with biological reinforcers (Miller & Drennen, 1970)
  - Pairing with removal of aversive stimuli (Caulfield & Martin, 1976; Lovaas et al., 1965)
  - Pairing with tokens (Jones & Kazdin, 1975; Stahl et al., 1974)
3 Types of Conditioning

1. Discrimination training
   - *Lovaas et al.* (1966)
   - *Isaksen & Holth* (2009)
   - *Taylor-Santa* (2014)

2. Noncontingent pairing
   - *Dozier et al.* (2012)

3. Contingent pairing
   - *Dozier et al.* (2012)
AN OPERANT APPROACH TO TEACHING JOINT ATTENTION SKILLS TO CHILDREN WITH AUTISM

Jørn Isaksen* and Per Holth

*Inlandet Hospital Trust, Norway
Akershus University College, Norway

A lack of joint attention skills may constitute a core impairment in autism. In the present study, a training protocol was developed, based on the literature on joint attention and on behavioral interventions. The training was organized into a sequence of three main parts respectively aimed at establishing each of the following skills: (1) responding to joint attention bids, (2) engaging in turn-taking activities based on joint attention skills, and (3) initiating joint attention. Two novel components were incorporated in the training: (a) a discrimination training procedure aimed at establishing the adult’s nods as conditioned reinforcers and (b) tasks based on turn-taking, where joint attention skills were targeted and reinforced. The study was conducted according to a single-subject experimental design, in which joint attention skills were measured before and after intervention, using the “behavioural assessment of joint attention.”

Four 3.5–5.5 year-old children diagnosed with autism participated in the study. All four children completed the training successfully and made significant progress in engaging in joint attention and in initiating joint attention skills. Following the completion of training and at 1 month follow-up, parents reported that their children used their skills in different settings. Moreover, at follow-up, all four children were reported to engage in joint attention behaviors and to enjoy doing so. Copyright © 2000 John Wiley & Sons, Ltd.
Behavioral Interventions
Behav. Intervent. 29: 157–176 (2014)
Published online 12 March 2014 in Wiley Online Library
(wileyonlinelibrary.com) DOI: 10.1002/bin.1384

A DISCRIMINATION TRAINING PROCEDURE TO
ESTABLISH CONDITIONED REINFORCERS FOR
CHILDREN WITH AUTISM

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and Kenneth F. Reeve3
1Department of Applied Behavior Analysis, Caldwell College, Caldwell, NJ 07006, USA
2Behavior Analyst Certification Board, Littleton, CO 80127, USA

Although conditioned reinforcers are used in many behavioral intervention programs for individuals
with developmental disabilities, little research has been conducted to determine optimal methods for
establishing conditioned reinforcers. An early method that has received relatively little research attention
is to condition a neutral stimulus as a discriminative stimulus and then use the stimulus as a programmed
consequence during skill acquisition. The current study evaluated the effects of a discrimination training
procedure on establishing conditioned reinforcers for three children with autism. For all participants,
previously neutral stimuli reinforced behaviors after acquiring discriminative properties during discrimi-
nation training. Copyright © 2014 John Wiley & Sons, Ltd.

Figure 1. Stimulus assessment data for Marc.
STUDY 1: RESULTS AND DISCUSSION

Results of Study 1 indicated that stimulus pairing was not effective in establishing praise as a reinforcer for 3 of 4 subjects. Results were inconclusive for the 4th subject. Results of Study 2 indicated that response-stimulus pairing was effective in establishing praise as a reinforcer for 3 of 8 subjects. After conditioning, praise also increased the occurrence of additional target responses for these 3 subjects.

By name conditioned reinforcement, praise, social reinforcement.

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Table 1

<table>
<thead>
<tr>
<th>Subject</th>
<th>Age (years)</th>
<th>Diagnosis or sensory impairments</th>
<th>Receptive or expressive ability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bill</td>
<td>39</td>
<td>Severe MR, Down syndrome</td>
<td>1- to 2-step instructions, gestures and limited signs</td>
</tr>
<tr>
<td>Lily</td>
<td>47</td>
<td>Moderate to severe MR</td>
<td>1- to 2-step instructions, gestures</td>
</tr>
<tr>
<td>Bill</td>
<td>38</td>
<td>Mild MR</td>
<td>3- to 5-step instructions, vocal-verbal</td>
</tr>
<tr>
<td>Ben</td>
<td>42</td>
<td>Mild MR</td>
<td>3- to 5-step instructions, vocal-verbal</td>
</tr>
<tr>
<td>Alicia</td>
<td>26</td>
<td>Severe MR</td>
<td>1-step instructions, gestures</td>
</tr>
<tr>
<td>Mike</td>
<td>23</td>
<td>Severe MR</td>
<td>1- to 2-step instructions, gestures</td>
</tr>
<tr>
<td>Rick</td>
<td>56</td>
<td>Severe MR</td>
<td>1- to 2-step instructions, gestures</td>
</tr>
<tr>
<td>Riley</td>
<td>54</td>
<td>Moderate MR</td>
<td>3- to 5-step instructions, vocal-verbal</td>
</tr>
<tr>
<td>Larry</td>
<td>48</td>
<td>Moderate MR, seizure disorder, hearing impaired</td>
<td>3- to 5-step instructions, gestures and limited signs</td>
</tr>
<tr>
<td>Chris</td>
<td>36</td>
<td>Moderate MR</td>
<td>3- to 5-step instructions, vocal-verbal</td>
</tr>
<tr>
<td>Eric</td>
<td>17</td>
<td>Severe MR, autism</td>
<td>3- to 5-step instructions, gestures and limited signs</td>
</tr>
<tr>
<td>Shari</td>
<td>48</td>
<td>Moderate MR</td>
<td>3- to 5-step instructions, vocal-verbal</td>
</tr>
</tbody>
</table>

*Note: MR = mental retardation.*
Noncontingent pairing:

Praise (test): each session followed 5 pairing (food + praise) sessions

10 novel praise statements (e.g., “get on with your bad self”)
Contingent Pairing

- BL vs. praise (R1)
- Food+ praise (R1)
- BL vs. praise (R3)
- BL (R2)
- Praise
- BL (R3)

R1 = standing from chair
R2 = stair stepping
R3 = desk sorting
Purpose of Axe & Laprime

Extend Dozier et al. (2012)

- Children with autism, severe delays
- Pair praise with edible and non-edible reinforcers
- Pair commonly-used praise statement: “Nice job”
- Examine time between pairing and testing sessions
- Evaluate the maintenance of pairing effects

Participants and Setting

**Jack**: 5-year-old male with a diagnosis of autism
- Nonverbal; stereotypy, noncompliance, rumination
- Limited reinforcers: history of satiating on tangible reinforcers such as toys and edibles; failed attempts at establishing tokens as conditioned reinforcer
- Setting: small cubby area in preschool classroom

**Andrew**: 9-year-old male with a diagnosis of autism
- Verbal; severe SIB, aggression, tantrums
- Tangible reinforcers necessary for compliance and skill acquisition (edibles, markers and paper, toys, movies)
- Setting: separate workspace in elementary school
Dependent Variable

Button Presses:
- Pressing down on top of button with hand and releasing
- If no release after 2 sec, hand physically prompted down
- Hand must be off button prior to next button press

Rate (presses per minute) in 1-minute sessions

IOA for Jack 35% of sessions, 93% agreement
IOA for Andrew 76% of sessions, 98.6% agreement

4 Conditions: Consequences

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Jack</th>
<th>Andrew</th>
</tr>
</thead>
<tbody>
<tr>
<td>Praise</td>
<td>“Nice Job”</td>
<td>“Nice Job”</td>
</tr>
<tr>
<td>Known Reinforcer</td>
<td>Tickles</td>
<td>Edible</td>
</tr>
<tr>
<td>No Programmed Consequence</td>
<td>No experimenter response</td>
<td>No experimenter response</td>
</tr>
<tr>
<td>Pairing</td>
<td>Praise + Tickle</td>
<td>Praise + Edible</td>
</tr>
</tbody>
</table>
General Procedures

- Bring participant to chair at table
- Present button
- Physically prompt the button press 3 times and deliver the condition-specific consequence each time
- Start the timer – set for 1 minute
- When the participant presses the button, deliver consequence
- Minimum 10 minutes between sessions

Experiment 1: SR+, Pairing

1. Reinforcer Analysis (multielement design).
   VERIFY:
   - Reinforcers: tickles (Jack), potato chip (Andrew)
   - Not a reinforcer: Praise (“nice job”)
   - Not a reinforcer: no programmed consequence

2. Pairing Analysis
   - Within-day analysis
   - Praise probe $\rightarrow$ 3-5 Pairings $\rightarrow$ Praise probe
### JACK

**Experiment 1**

- **Verify praise not reinforcer**
- **Evaluate pairing**

### Andrew

**Experiment 1**

- **Verify praise not reinforcer**
- **Evaluate pairing**

* = changed from 2-min sessions to 1-min sessions
Experiment 2: Exp. Control

Validate experimental control:

- Pairing: increased responding with praise (reversal)
- Pairing: praise > no programmed consequence (multielement)

- A condition: Praise vs. No Programmed Consequence
- B condition: 2-Day Pairing Analysis

### Pairing Analysis

<table>
<thead>
<tr>
<th>NPC-Pr-NPC-Pr-Pairing</th>
<th>Day 1</th>
<th>Pairing-NPC-Pr-NPC-Pr</th>
<th>Day 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Button Presses Per Minute</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sessions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>10</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>No Consequence</td>
<td>Praise</td>
<td>Tickles</td>
<td>Pairing</td>
</tr>
<tr>
<td>11/21</td>
<td>11/22</td>
<td>11/23</td>
<td>12/21</td>
</tr>
<tr>
<td>1/18</td>
<td>1/24</td>
<td>2/28</td>
<td>4/11</td>
</tr>
<tr>
<td>4/12</td>
<td>4/24</td>
<td></td>
<td>4/25</td>
</tr>
</tbody>
</table>

Experiment 2

2-day analysis

Gain experimental control in ABAB design
**Experiment 2**

2-day analysis

Gain experimental control in ABAB design

* = changed switch b/c Andrew started touching it repetitively (automatic SR+)

**Experiment 3: Maintenance**

Jack only

Examine sustained effects of pairing

Compare different dosages of pairings

- 3 pairing sessions → 7 praise sessions
- 6 pairing sessions → 4 praise sessions

2-Day Analysis: 5 sessions per day across 2 days
### Summary of Maintenance

<table>
<thead>
<tr>
<th></th>
<th>3 pairing $\rightarrow$ 7 praise</th>
<th>6 pairing $\rightarrow$ 4 praise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average rate of responses across praise sessions</td>
<td>2.8 (range, 0 to 17)</td>
<td>10.3 (range, 0 to 35)</td>
</tr>
<tr>
<td>Percent of praise sessions with 0 responses</td>
<td>64% (18 of 28 sessions)</td>
<td>17% (2 of 12 sessions)</td>
</tr>
<tr>
<td>Percent of praise sessions with greater than 0 responses</td>
<td>36% (10 of 28 sessions)</td>
<td>83% (10 of 12 sessions)</td>
</tr>
</tbody>
</table>
Discussion

Contingent pairing with a known reinforcer effectively conditioned praise as a reinforcer for student behavior.

Multielement within reversal design demonstrated experimental control of pairing over effectiveness of praise as a reinforcer.

Time matters

- 2-day analysis: required to control conditioning effects
- Dosages sustain effects for different lengths of time

Findings → Future Research

Jack: downward trends (AO) →

- Evaluate pairing with one vs. multiple effective reinforcers
- Pairing with multiple reinforcers – generalized cond. reinforcer
- Generalized cond. reinforcer not as susceptible to satiation

Andrew: increased responding in praise condition after long break, adult may signal availability of reinforcer →
Control for discriminative versus reinforcing control

Variable responding in praise condition → Evaluate amount of pairing needed for sustained effects
Future Research

- Thin schedule of reinforcer paired with praise
- Compare number of praise statements (1 vs. many) paired with known reinforcer
- Pair with one praise statement and test the effects of another praise statement
- Demonstrate effects of praise from another person
- Evaluate facial expression, tone of voice, enthusiasm

Limitations → Future Research

- Button pressing not a socially significantly response → Demonstrate strengthening of a second response with conditioned praise
- Jack: variable times, missed days, sessions in summer
- Time to consume food/receive tickles may have restricted rate of responding
Recommendations for Practice

- Program frequent pairings in educational settings
- Probe intermittently to test for praise as a reinforcer
- Test schedule of pairings needed to establish and maintain praise as a reinforcer
- Examine dosages of pairings necessary for maintenance of responding with praise
- Use intermittent pairings for maintained effects
- Consider the praise statements you use in your settings

Teaching Children with PDD-NOS to Respond to Facial Expressions using Video Modeling and Tactile Prompts
Teacher’s Concerns

<table>
<thead>
<tr>
<th>Social Delay</th>
<th>Teacher's Facial Expression</th>
<th>Child’s Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perseveration on topic</td>
<td>&quot;Move-along&quot; expression and gesture</td>
<td>End topic</td>
</tr>
<tr>
<td>Inappropriate behaviors (e.g., nose picking, hands in pants)</td>
<td>&quot;Not nice&quot; face</td>
<td>Stops behavior, &quot;that’s not nice&quot;</td>
</tr>
<tr>
<td>Rambunctious behavior, noncompliance</td>
<td>Disapproving look</td>
<td>Quiet down, comply with teacher, &quot;I'll be good&quot;</td>
</tr>
<tr>
<td>Tantrums</td>
<td>Calming expressions and gestures</td>
<td>&quot;I'll calm down&quot;</td>
</tr>
</tbody>
</table>

Looking at Faces and Autism

Responding to faces: observational learning, social behavior
- (Ekman, 1984)

Autism: delays
- Perceiving gaze (Ashwin et al., 2009)
- Recognizing emotions (Dyck et al., 2001; Rump et al., 2009)
- Responding to faces (Grossman & Tager-Flusberg, 2008; Klin et al., 1999)

Autism: look at mouths
- (Riby et al., 2009; Spezio et al., 2007)

fMRI – amygdala function when looking at faces
- (Ashwin et al., 2007; Kleinhans et al., 2008)
Research: Emotions, Empathy

Bernad-Ripoll (2007) – AB design
- Self-as-model videos, social stories
- Frustration, happiness, boredom, calmness, anger
- “How are you feeling?” – labeling emotions
**Sadness/Pain Category**

<table>
<thead>
<tr>
<th>Discriminative Stimuli</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Training</strong></td>
<td>“Are you okay?” and patting arm</td>
</tr>
<tr>
<td>“Ouch” and bumping leg on the table</td>
<td>“Are you alright?” and patting arm</td>
</tr>
<tr>
<td>“I don’t feel good” and sitting down</td>
<td>“It’s okay” and patting arm</td>
</tr>
<tr>
<td>“I hurt my elbow” and touching elbow</td>
<td></td>
</tr>
<tr>
<td>“I’m so upset” and sniffling or crying</td>
<td></td>
</tr>
</tbody>
</table>

**Others:**

- “Oh no” and wiping eyes with tissue
- “I have a headache” and holding forehead

**Happiness/Excitement**

**Frustration**

**Generalization**

Taught with dolls and puppets

Prompt delay, modeling, rehearsals, reinforcement

Generalization to people
Video Modeling

Adult or child demonstrates desired behaviors

Show right before expectation to demonstrate skills

Kids like videos: strong reinforcers, discriminative stimuli

Once prepared, efficient method of instruction

- **Toilet training** (Lee et al., 2014)
- **Multicomponent tasks** (Mechling et al., 2014)
- **Role-playing skills** (Akmanoglu et al., 2014)
- **Social responses** (Jones et al., 2014)
- **Compliments** (Macpherson et al., 2014)
- **Social-communicative initiations** (Cihak et al., 2012; Grosberg & Charlop, 2014)
- **Imitation** (Cardon, 2013; Cardon & Wilcox, 2011; Kleeberger & Mirenda, 2010; Tereshko et al., 2010)
- **Sorting mail** (Alexander et al., 2013)
Video Modeling

- **Play** (Boudreau & D’Entremont, 2010; Dupere et al., 2013; Lyden et al., 2011; MacDonald et al., 2009; Ozen et al., 2012; Sancho et al., 2010; Scheflen et al., 2012)
- **A series of novel skills** (Taber-Doughty et al., 2013)
- **Self-help skills** (Shrestha et al., 2013)
- **Functional skills** (Smith et al., 2013)
- **Greetings** (Kagohara et al., 2013)
- **First aid skills** (Ozkan, 2013)
- **Vocational tasks** (Allen et al., 2010; Kellems & Morningstar, 2012; Van Laarhoven et al., 2012)

Video Modeling

- **Communicative socials skills of college students with Aspergers** (Mason et al., 2012)
- **Cooking** (Mechling et al., 2009; Taber-Doughty et al., 2011)
- **Verbal repertoires** (Plavnick & Ferreri, 2011; Marcus & Wilder, 2009)
- **Transitions** (Cihak, 2011; Cihak et al., 2010; Cihak & Ayres, 2010)
- **iPod use** (Hammond et al., 2010)
- **Play video games** (Blum-Dimaya et al., 2010)
- **Social skills** (Charlop et al., 2010; Tetreault et al., 2010)
Purpose of Axe & Evans (2012)

Use video modeling to teach children with PDD-NOS to respond to facial expressions

Participants and Setting

Three children with PDD-NOS, age 5
- Hank, Bill, Ken

Verbal, rigid with routines, easily frustrated, working on using age-appropriate social skills

Public early childhood center in a suburban district

Self-contained classroom; typical classroom

2 - 3 sessions per week, 10 min per session
<table>
<thead>
<tr>
<th>Facial Expressions</th>
<th>Teacher's Behavior</th>
<th>Child's Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approval</td>
<td>Wink</td>
<td>“I did good”</td>
</tr>
<tr>
<td>Bored</td>
<td>Hand on cheek, drowsy eyes</td>
<td>“You look bored”</td>
</tr>
<tr>
<td>Calming</td>
<td>Inhale, exhale, hands down</td>
<td>“I’ll calm down”</td>
</tr>
<tr>
<td>Disgusted</td>
<td>Squinted mouth and eyes, shaking head</td>
<td>“That’s not nice”</td>
</tr>
<tr>
<td>Impatient</td>
<td>Gesturing hand, eyes wide open</td>
<td>“Ok, ok, I'm done”</td>
</tr>
<tr>
<td>Pain</td>
<td>Squinted eyes, rubbing forehead</td>
<td>“Are you ok?”</td>
</tr>
<tr>
<td>Pleased</td>
<td>Nodding head, ends of mouth down</td>
<td>“I did good”</td>
</tr>
<tr>
<td>Disapproval</td>
<td>Arms crossed, head down</td>
<td>“I’ll be good”</td>
</tr>
</tbody>
</table>

We Prepared Two Sets of Videos

Facial expressions alone – probe

Facial expressions with modeled responses – training (video models)
Experimental Design, Procedures

Multiple probe across facial expressions design

Probe at start of each session (mean IOA 94%)

- Facial expressions alone – “What do you say?”
- Correct responses → praise and pat on back
- If correct, no training
- If incorrect → training

Generalization Probes

Hank
- Teacher in cubby
- Researcher in cubby
- Teacher in typical classroom
- Aide in typical classroom
- Typical peers in classroom

Bill
- Teacher in cubby
- Teacher in classroom

Ken
- Teacher in empty room
- Aide in classroom
Teaching Steps

1. Showed video of adult making facial expressions and another adult responding.
2. Asked student to repeat response.

If incorrect:
- If correct:
  - Praise

---

Hank

**Baseline**

- Video Cubby
- Teacher Cubby

Correct Responses to Facial Expressions:

- 0
- 1
- 2
- 3

Sessions:

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13

**Post-Video Modeling**

- Aide Classroom
- Researcher Cubby
- Teacher Classroom

- Approval
- Bored
- Calming
- Disgusted
- Impatient
- Pain Disapproval
- Wink
Bill

Correct Responses to Facial Expressions

Sessions

Baseline

Video Modeling

Approval
Impatient
Bored

Disgusted
Pain
Disapproval

Wink

Calming

Ken

Correct Responses to Facial Expressions

Sessions

Baseline

Video Modeling

Teacher
Aide
Classroom

Impatient
Disapproval

Approval
Disgusted
Wink

Bored
Calm
Pain

2 mo
Conclusions

Video modeling effective in teaching three children with autism to respond to facial expressions

Generalization across people and settings

Adds to research on applications of video modeling

Adds to research on facial expressions – applied

Strength: one-trial learning for Hank

Limitation: inconsistent responding by Bill

Next Steps

So far, contrived situations – all faces presented in a row

Target real-life situations, such as conversations
Next Steps

What is the first behavior a child must emit to respond to the teacher’s facial expression?
- Look at the teacher

Respond to faces in more natural situations
- Interactive play with games/toys
- Conversations
Carbone et al: Eye Contact

Eye contact is critical for:
- Joint attention
- Learning language
- Learning from an instructor

Previous research:
- Early research: physical and vocal prompts
- Recent research: naturalistic training, peer modeling
- Limitation: tangible, edible, praise as reinforcers

Carbone et al. (2013)

Baseline: mand → deliver reinforcer

Treatment: Extinction-induced variability
  mand → extinction until eye contact

Mand: I want car
Next step: have adult turned away

Carbone et al. – Next Steps

Mand: I want car

No SR+

SR+
Research – Tactile/Pager Prompt

- Social initiations: “When you feel prompt, go to friend”
  - Taylor & Levin (1998)
  - Shabani et al. (2002)
  - Tzanakaki et al. (2014)

- Increase on-task behavior (Moore et al., 2013)
- Reducing rapid eating (Anglesea et al., 2008)
- Staff training (Mowery et al., 2010)
Purpose of Axe & Evans (in prep)

Use MotivAider to prompt eye contact and increase responding to facial expressions

Eye contact: anytime the student’s eyes are not looking at the adult’s eyes and then look at adult’s eyes

Method

Large table in classroom
- Conversation: 4 minutes
- Game: 4 minutes

Baseline: no MotivAider

Intervention: child wore MotivAider set for 30 sec
- Explained to child purpose of MotivAider
- Reviewed responses to four facial expressions
- Eye contact → praise
- Respond to facial expression → social response
Changing the Interval

Can change the interval of the MotivAider

Participants not responding as much as we wanted

We changed the interval from 30 to 15 seconds

Another change for Ken

We observed that when I made a facial expression, Ken looked up at me and responded

We changed my intervals to 15 seconds

So both the experimenter’s and participant’s MotivAiders were set for 15 seconds
Reward System

Ken, even at 15 second intervals, was not responding as much as we wanted

Token system
- When he looked at the instructor he received a stamp
- If he received more stamps than in the previous session, he earned a preferred item (chocolate, game, sensory activity)
Responding to Facial Expressions

Video modeling was effective in teaching 3 children with PDD-NOS to respond to 8 facial expressions

MotivAiders were effective in increasing eye contact during play and conversation – necessary for responding to facial expressions

Learning to respond to subtle facial cues is critical for succeeding with teachers and making and retaining friends

Future Research

Responding to facial expressions in more natural settings
- More research on responding to peers’ faces
- Teach verbal AND motor response
- What’s the reinforcer? Teach peers to reinforce responses
- How fade MotivAider? Need natural cue in the natural environment

Generalization
- Stimulus generalization: people make facial expressions different – multiple exemplar training
- Response generalization: different ways to respond to a facial expression
Applications: Video Modeling

Video modeling to teach a variety of skills
- Conversations, social play skills, daily living skills

Kids like videos

Once videos are prepared, use across days, settings, and students

Cost-effectives – least costly than therapist modeling

Applications: MotivAiders

Target skills
- Increase eye contact and responding to faces
- Increase social initiations and responses to peers
- Increase hand raising in class
- Self-management

Non-stigmatizing
- Child can have in pocket
- Less teacher prompting

Fading: interval and sensation; might need reward system
## Recent Research on Social Skills

<table>
<thead>
<tr>
<th>Social Skills</th>
<th>Teaching Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Playing games</td>
<td>Less adult assistance</td>
</tr>
<tr>
<td>Pretend play</td>
<td>Picture Activity Schedules</td>
</tr>
<tr>
<td>Sharing</td>
<td>Video Modeling</td>
</tr>
<tr>
<td>Manding to peers</td>
<td>Script Training and Fading</td>
</tr>
<tr>
<td>Social initiations</td>
<td>Tactile Prompts</td>
</tr>
<tr>
<td>Social responses</td>
<td></td>
</tr>
<tr>
<td>Responding to faces</td>
<td>More adult assistance</td>
</tr>
<tr>
<td>Making eye contact</td>
<td>Teaching Interaction Procedure</td>
</tr>
<tr>
<td></td>
<td>Social Stories</td>
</tr>
</tbody>
</table>
Diagnostic Criteria for ASD (DSM-5)

Deficits in social-emotional reciprocity
- Failure of back-and-forth conversation
- Failure to initiate or respond to social interactions

Deficits in nonverbal communication
- Abnormalities in eye contact and body language
- Deficits in understanding and using gestures
- Lack of facial expressions and nonverbal communication

Deficits in developing and maintaining relationships
- Difficulty adjusting to social contexts
- Difficulty sharing imaginative play or making friends
- Absence of interest in peers

Praise/Attention as a Reinforcer

Social behaviors are maintained by social interactions

All verbal operants (ex. mand) maintained by attention

Praise is commonly used in general education

Contingent pairing of praise and reinforcer

For all children with autism? We must try.
Programming for Generalization

Prompting, prompt fading, positive reinforcement

- They work

We need to get beyond using those tactics alone to simply increase social behaviors

Must analyze all variables influencing behavior for typical children, in the natural environment

Must teach in the context of those variables: must make teaching setting like generalization setting

---

Generalization: Examples

<table>
<thead>
<tr>
<th>Teaching Setting</th>
<th>Natural Setting</th>
<th>Generalization?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saying “hi” sitting in chairs</td>
<td>Saying “hi” approaching in the hallway</td>
<td>Don’t expect generalization</td>
</tr>
<tr>
<td>Edibles for turn taking</td>
<td>No edibles – continued game play is reinforcer</td>
<td>Don’t expect generalization</td>
</tr>
<tr>
<td>Adult praise when manding to peers</td>
<td>No adult praise when manding to peers</td>
<td>Don’t expect generalization</td>
</tr>
<tr>
<td>Motivaider cuing eye contact</td>
<td>Motivaider cuing eye contact</td>
<td>Increase likelihood of generalization</td>
</tr>
</tbody>
</table>
The Thing About Research

Studies answers small research questions

Practitioners need to combine research findings

Practitioners must teach skills throughout the day

Thank you for your attention!

judah.axe@simmons.edu