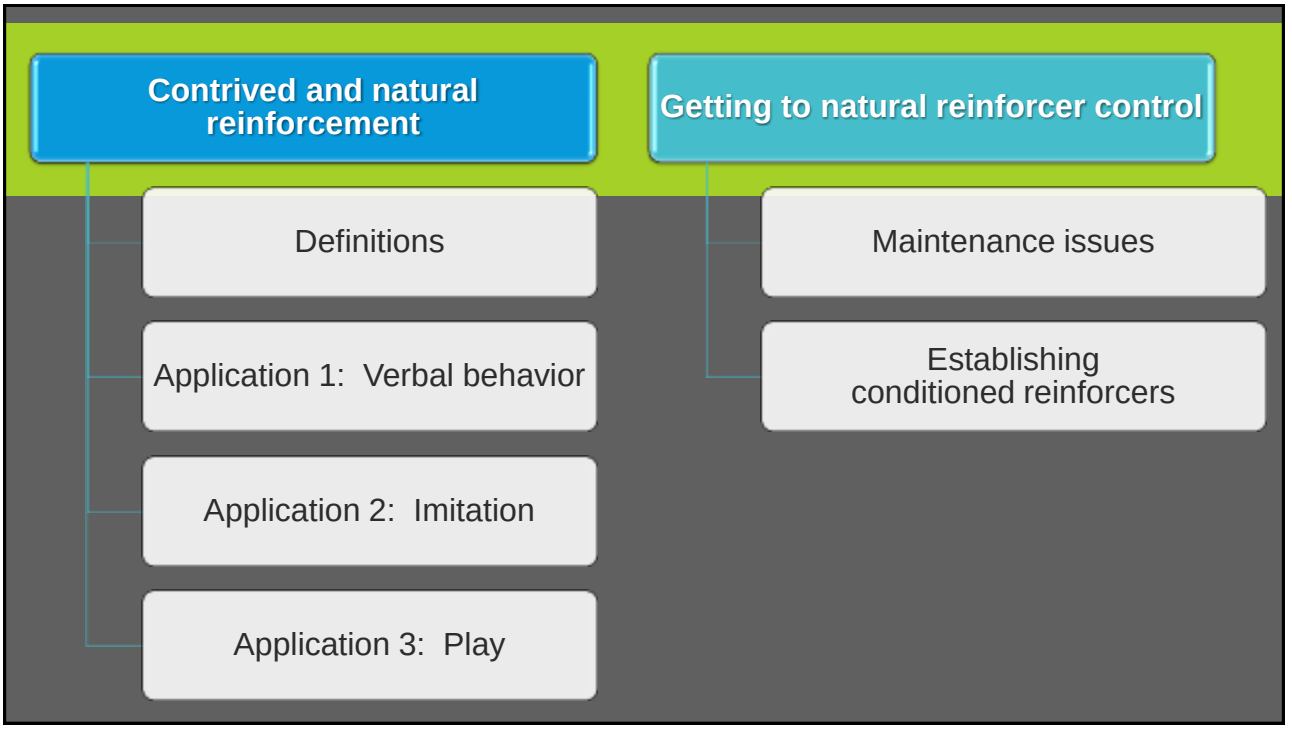
Establishing Natural Reinforcer Control in Children with Autism

Tina Sidener, Ph.D., BCBA-D

Some Observations

- Reinforcers that maintain behaviors of typically developing children?
  - Verbal behavior
  - Social interactions
  - Independent play
- SOME children with autism
  - Social interactions come to function as reinforcers
  - Imitate others "spontaneously"
  - Playing with toys becomes reinforcing



Contrived and Natural Reinforcement

- The power of reinforcement
- May be described as
  - Conditioned and unconditioned
  - Positive and negative
  - Social and automatic
  - Natural and contrived

Contrived and Natural Reinforcement

- Natural reinforcer is "independent of the behavior analyst's or practitioner's efforts" (Cooper, Heron, & Heward, 2007, p. 623)
- Contrived reinforcer
  - Part of a practitioner's efforts to change behavior
  - Something other than the reinforcer in the natural environment for that response

Practice

Consequence	Contrived for…	Natural for…
Attention	Turning page of a book	
Lollipop	Building with blocks	
Token	Doing a puzzle	

Why Do We Use Contrived Reinforcers with Children with Autism?

- Need for many teaching trials
- Teaching skills with no natural counterpart
- Behavior "trapping" (Baer & Wolf, 1970)
- Consequences function differently
  - Social stimuli (Spradlin & Brady, 1999; Vollmer & Hackenberg, 1999)
  - Automatic reinforcement during play (and powerful reinforcement of rituals, sameness, stereotypy)

Benefits of Natural Reinforcer Control

- We know we can change behavior!
- Challenge is to bring responses under control of natural reinforcers
- Benefits
  - Similarity to peers, maintenance
  - Klintwall & Eikeseth (2011): significant positive correlation between having more socially mediated reinforcers and better outcomes of EIBI
- Requires analysis of what maintains responses for typically developing children
  - Consider 3 types of skills…

Natural Consequences for…

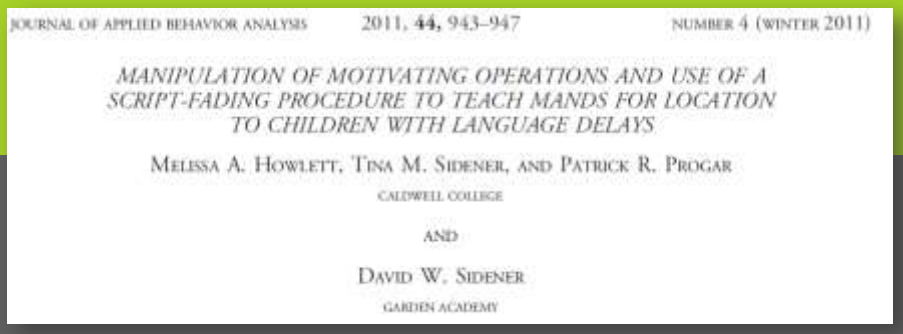
- Verbal behavior
- Imitating peers
- Independent play

Verbal Behavior

- Skinner (1957) - analysis of natural reinforcer control of different types of language
- Teaching children with autism
  - Proper antecedent and consequence control

Mands

- Reinforcer: specific to the response
- For items – relatively easy to teach with natural reinforcers
- For information – Where, What, When, How, Why?



JOURNAL OF APPLIED BEHAVIOR ANALYSIS 2011, 44, 943–947 NUMBER 4 (WINTER 2011)

MANIPULATION OF MOTIVATING OPERATIONS AND USE OF A SCRIPT-FADING PROCEDURE TO TEACH MANDS FOR LOCATION TO CHILDREN WITH LANGUAGE DELAYS

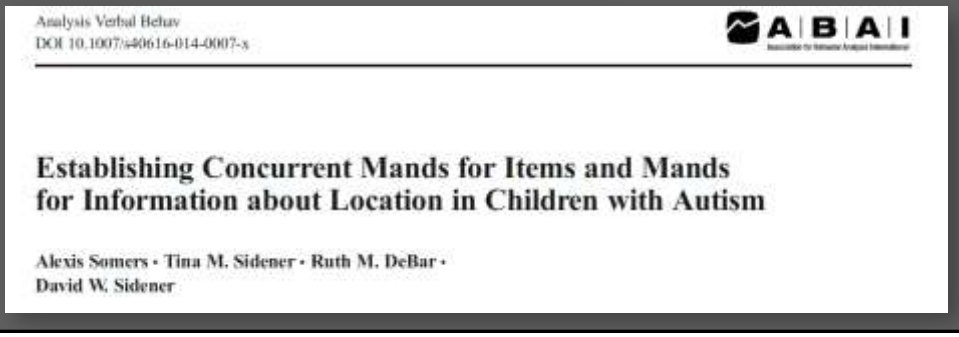
MELISSA A. HOWLETT, TINA M. SIDENER, AND PATRICK R. PROGAR

CALDWELL COLLEGE

AND

DAVID W. SIDENER

GARDEN ACADEMY



Analysis Verbal Behav
DOI 10.1007/s40616-014-0007-x

ABAI

Establishing Concurrent Mands for Items and Mands for Information about Location in Children with Autism

Alexis Somers · Tina M. Sidener · Ruth M. DeBar · David W. Sidener

Verbal Behavior

Tacts

- Nonspecific; generalized conditioned Sr
- Bids for joint attention?

EO:
Child sees novel/ interesting object

S^D:
Someone else is present

→

Child looks at person,
points at item
Says, "Look"
Says, "An (item)!"

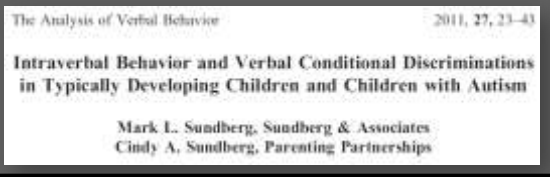
→

Reinforcer?

Verbal Behavior

Intraverbals

- Nonspecific; generalized conditioned Sr
- What type?



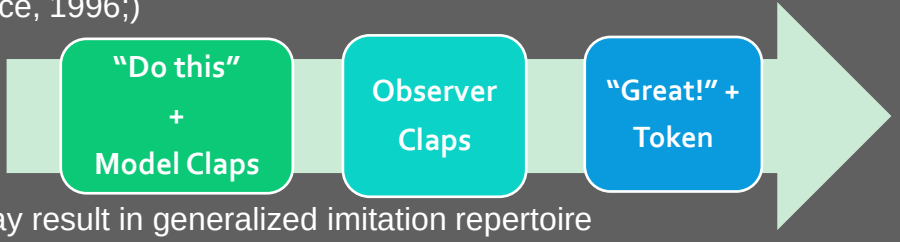
The Analysis of Verbal Behavior 2011, 27, 23–43

Intraverbal Behavior and Verbal Conditional Discriminations in Typically Developing Children and Children with Autism

Mark L. Sundberg, Sundberg & Associates
Cindy A. Sundberg, Parenting Partnerships

Imitating Peers

- **Imitation often delayed or absent in individuals with autism** (Leaf & McEachin, 1999)
- **Effective behavior analytic technology**
  - Contrived antecedents and reinforcers (e.g., Baer, Peterson, & Sherman,1967; Lovaas, 2003; Maurice, Green, & Luce, 1996;)



  - May result in generalized imitation repertoire
  - Does not necessarily result in imitation in the natural environment

What's the Natural Reinforcer?

VB-MAPP
(Sundberg, 2008)

1 point: Spontaneously follows peers or imitates their motor behavior 2 times

Teaching Children with Autism to Differentially Imitate Observed Behaviors

Paula M. Staudinger, MA, BCBA
Tina M. Sidener, Ph.D., BCBA-D
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Bridget A. Taylor, PsyD, BCBA-D

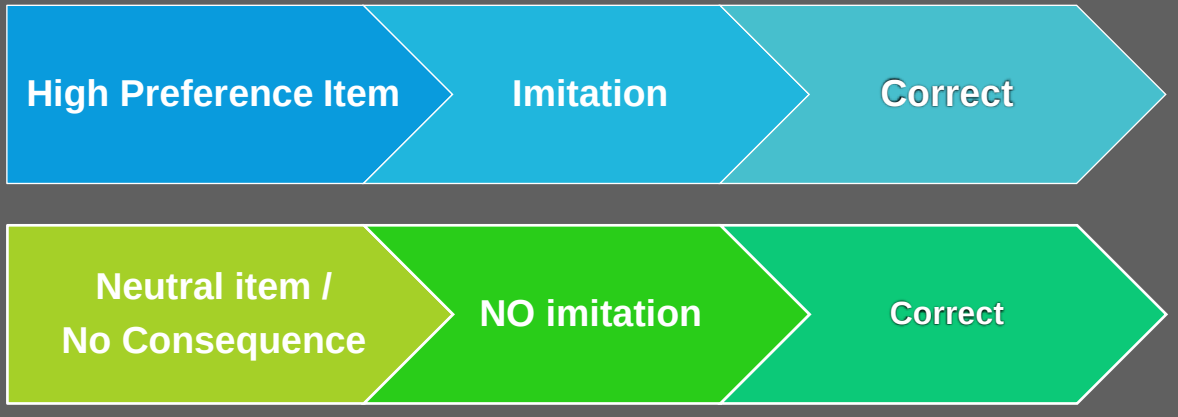
2

Imitating Peers

- Purpose: evaluate effects of
  - A differential observing response (DOR) and prompting
  - On the differential motor imitation
  - Of 2 boys with autism
- Kenny (4), Kepler (11)
  - Matched pictures to objects, objects to pictures
  - Imitated when instructed
  - Spontaneous imitation (VB-MAPP) = 0

9 trials, 3 types of trials (3 of each)

High-Preference Trial	Neutral Trial	No Consequence Trial
• Preferred edible delivered contingent upon model's motor response	• Neutral item delivered contingent upon model's motor response	• No consequence delivered contingent upon model's motor response



Also Check Out

JOURNAL OF APPLIED BEHAVIOR ANALYSIS 2015, **48,** 800–816 NUMBER 4 (WINTER)

TEACHING OBSERVATIONAL LEARNING TO CHILDREN WITH AUTISM

JACQUELYN MACDONALD AND WILLIAM H. AHEARN

WESTERN NEW ENGLAND UNIVERSITY, THE NEW ENGLAND CENTER FOR CHILDREN

What is Play?

Play in Children with Autism

- Substantial delays in development of play
- Persistent deficits in social communication/interaction
- Restrictive/repetitive patterns of behavior, interest, or activities

(DSM-5; American Psychiatric Association, 2013)

Literature Review of Play Interventions

- Search
  - PsycINFO
  - Peer-reviewed journals
- Search terms
  - Play and autis*

- 1593 articles
- 57 met criteria

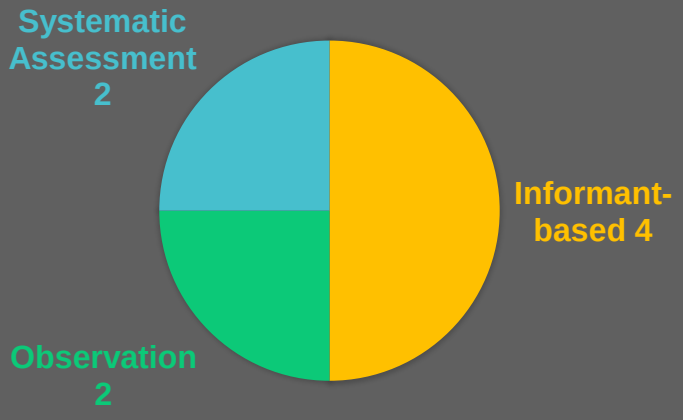
Inclusion Criteria:
Participants diagnosed with autism/PDD-NOS
Dependent variable: play skill
Demonstrated experimental control
English

Exclusion Criteria:
Not replicable
Board/video games
Outdoor/recess play

Parameters

Year of publication	
Age/number of participants	Preference assessment
Setting	Skill assessments
Stimuli used as reinforcers	Toys used
Type of play (functional/symbolic)	Dependent variable
Independent variable	Data collection
Design/experimental control	Generalization
Maintenance	Social validity
Interobserver agreement	Treatment integrity

Preference Assessment of Toys: 8 studies



Example

- Currently no research on teaching block building to children with autism
  - Survey: included in most programs
- Bronstein, Sidener, Reeve, Hoch, & Kaplan-Reimer
  - Select targets by developmental level

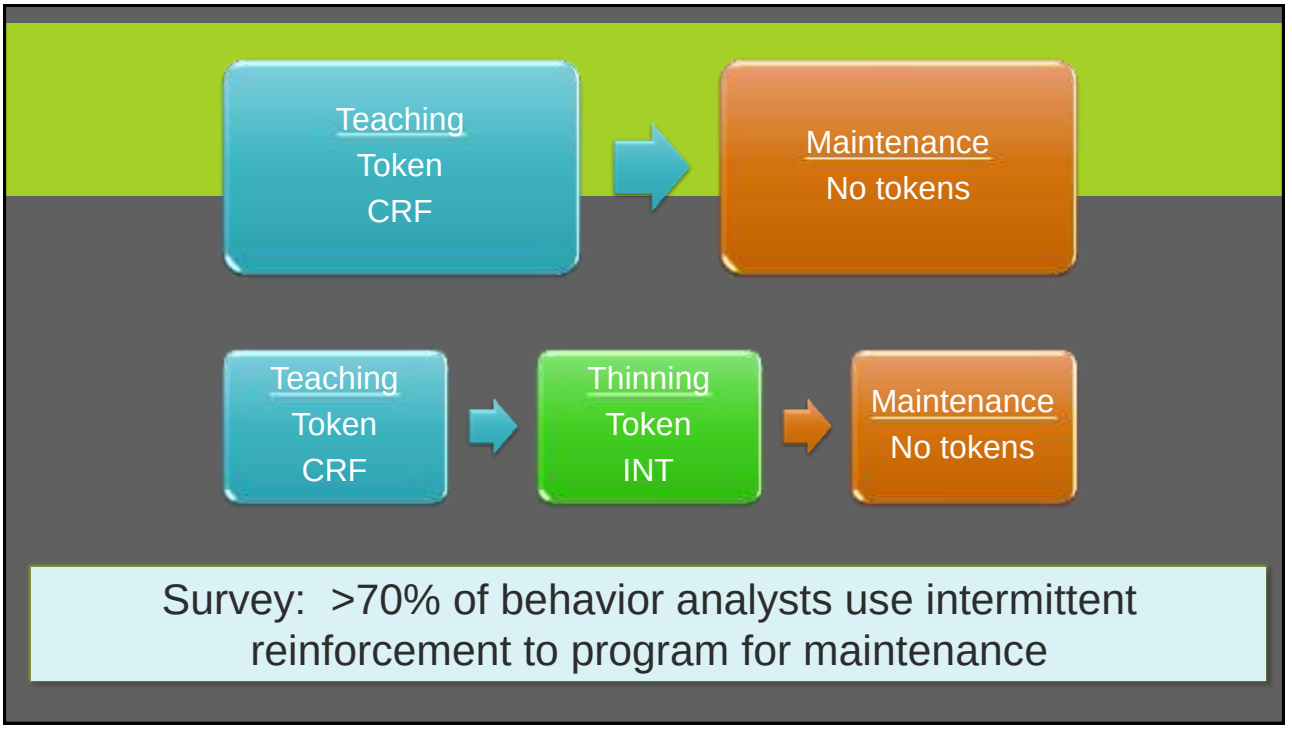
Johnson, H. (1933/1996). The art of block building. In E. Hirsch (Ed.), *The block book* (pp. 9-25). Washington, DC: National Association for the Education of Young Children.

Reifel, S. (1984). Block construction: Children's developmental landmarks in representation of space. *Young Children, 40,* 61-67.

  - Evaluate effects of automatic reinforcement alone
  - Data on engagement and preference

Getting to Natural Reinforcer Control

- How do behavior analysts do this?
  - Teach with natural reinforcers only
  - Teach with contrived - remain in place
  - Teach with contrived - remove later…



ENHANCING & ASSESSING MAINTENANCE EFFECTS IN BEHAVIORAL INTERVENTIONS: A REVIEW OF THE LITERATURE

Erin Richard White, M.A., BCBA

Tina M. Sidener, Ph.D., BCBA-D

Kenneth F. Reeve, Ph.D., BCBA-D

Bridget A. Taylor, Psy.D., BCBA-D

Jason C. Vladescu, Ph.D., BCBA-D

Literature Review Search

Searched *JABA* website using terms:
maintenance, maintain, & follow-up

↓

2002-2011

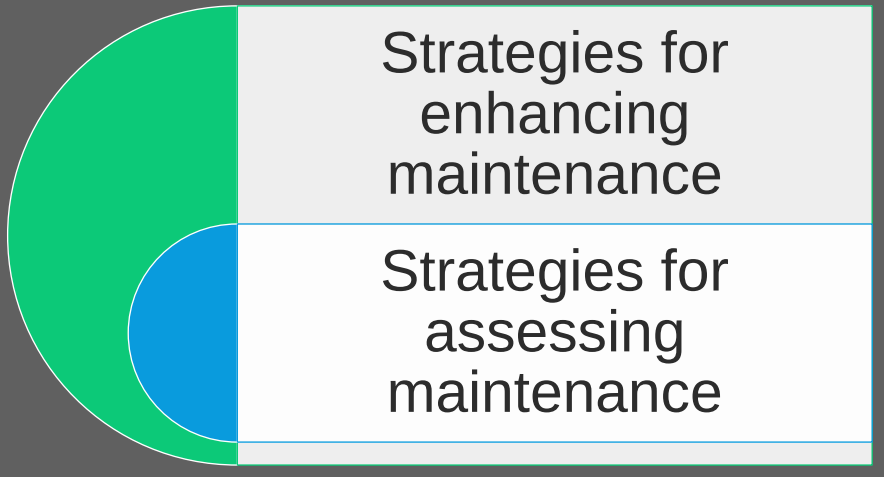
↓

Secondary search using PsycINFO

↓

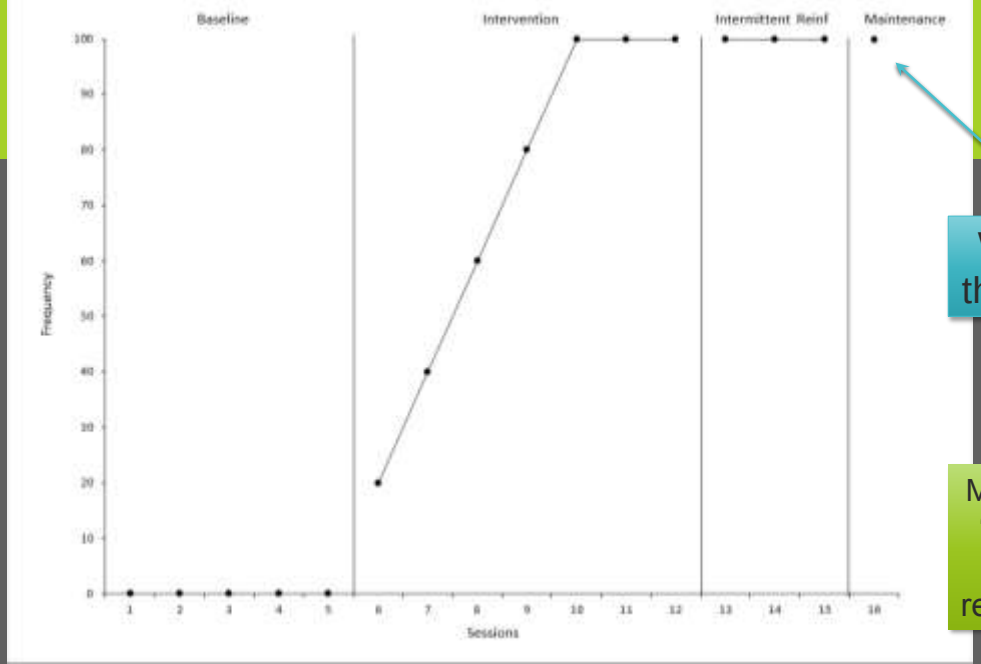
Individually examined articles for inclusion criteria

83 Experiments



Strategies to Enhance Maintenance

	Acquisition	Reduction
Thinning schedule of reinforcement	7.9%	40%
Increasing the delay to reinforcement	1.6%	5%
Use of natural reinforcers	12.7%	0%
Use of booster sessions	11.1%	5%
Use of self-management	11.1%	5%
Other	4.8%	10%
None	61.9%	45%



Why would this happen?

Malott (2008): "the myth of intermittent reinforcement"

Establishing Conditioned Reinforcers

- If natural stimuli don't function as reinforcers, how do we make it so?
- Survey: No technology for establishing conditioned reinforcers, but would like one!
- Technology:
  - The specific methods, materials, and devices used to solve practical problems
    - http://www.thefreedictionary.com/technology

- 158 FA studies in 26 journals

A Technology for Establishing Conditioned Reinforcers

Benefits

Increase variety of toys, reinforcers	Establish social stimuli as reinforcers	Better maintenance than contrived reinforcers?

Why don't we have one?

Establishing Conditioned Reinforcers

- A stimulus that is a reinforcer because it has been paired with another reinforcer
- Skinner (1938): formal beginning
  - Demonstrated producing conditioned reinforcers with rats
  - After consistently presenting a click with food, used the click sound alone to train lever pressing
  - Lever pressing increased but then decreased as the click lost its effectiveness without food pairing

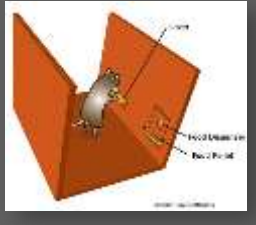
Neutral stimulus (click)

+

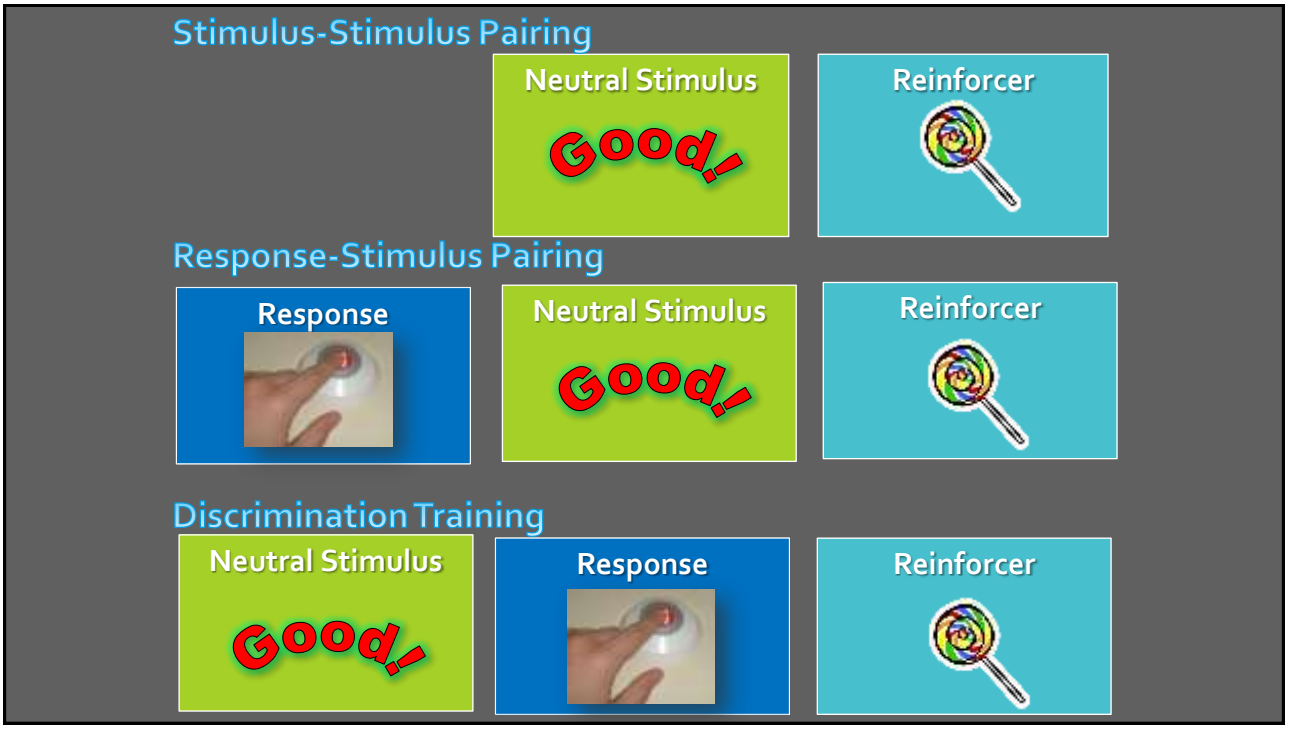
Unconditioned reinforcer (food pellet)

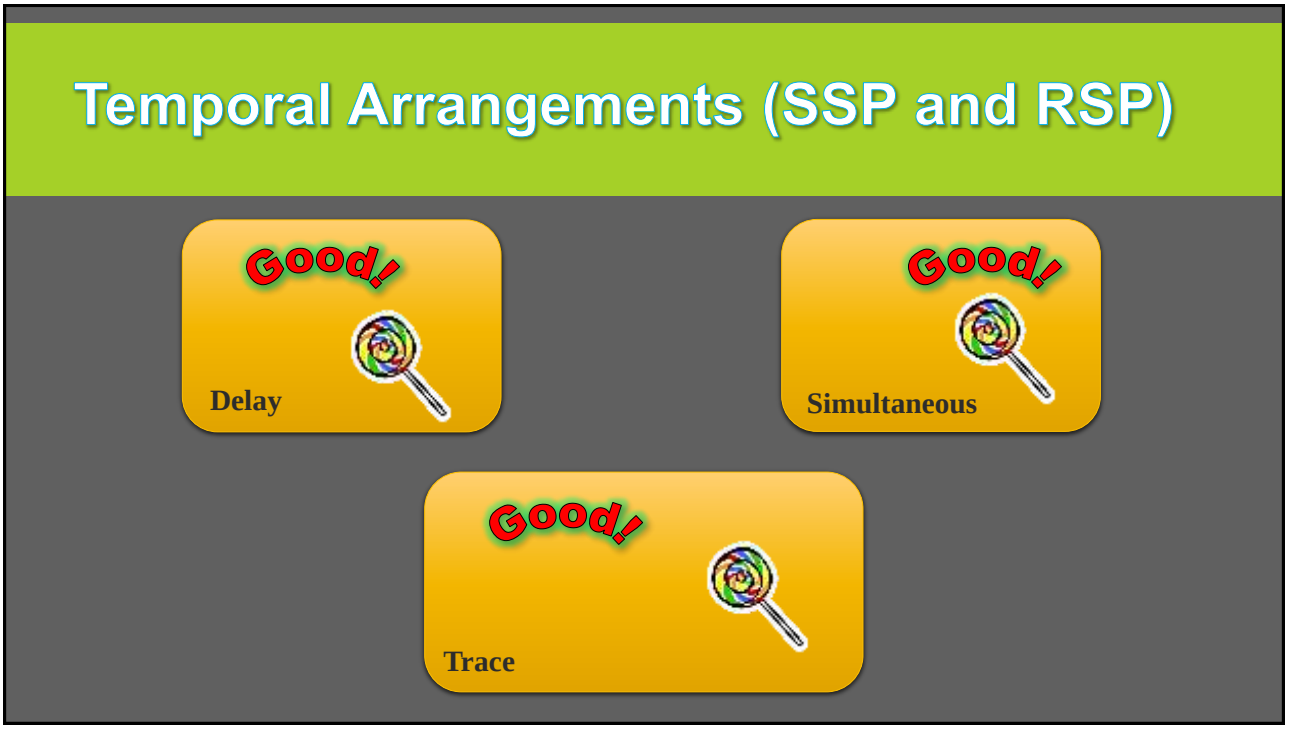
After repeated pairings … The click is then delivered as a consequence for a new response

Rat presses lever



Conditioned reinforcer


Stimulus-Stimulus Pairing
Neutral Stimulus
Good!
Reinforcer
Response-Stimulus Pairing
Response
Neutral Stimulus
Good!
Reinforcer
Discrimination Training
Neutral Stimulus
Good!
Response
Reinforcer


Temporal Arrangements (SSP and RSP)
Good!
Delay
Good!
Simultaneous
Good!
Trace

Research with Humans

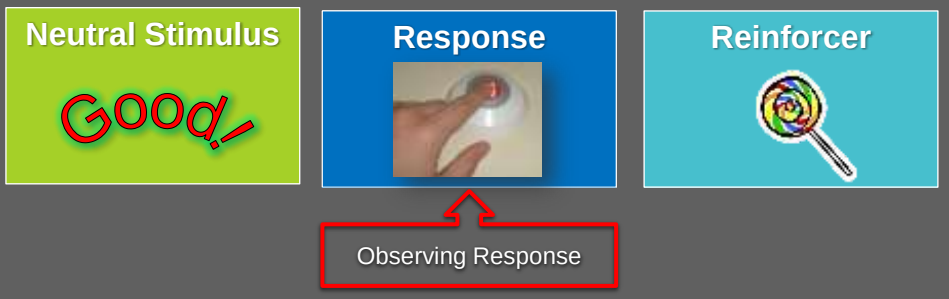
- First study demonstrating development of a conditioned reinforcer with humans:
  - Hubbard (1951) - Typically developing adults
- Most subsequent research conducted with typically developing preschoolers
  - Few studies with clinical populations
- Considerations
  - Type of pairing
    - *each time, at the same time, paired with, every time, whenever, accompanied, followed, right before, contiguous, preceded*
  - Demonstration of neutral stimulus, reinforcing stimulus, and reinforcement effect resulting from pairing

Research: Developmental Disabilities (excluding autism)

- Identified neutral stimulus, reinforcing stimulus
- Demonstrated reinforcement effect resulting from pairing
- Excluded studies on token systems/generalized conditioned reinforcers

Steinman (1968)	Birbrauer (1971)	Dozier et al. (2012)
• Children; MR • Discrimination training • Praise	• Children; MR • Delay or trace • Nonsense words	• Adults; DD • Delay or trace • S-S and R-S • Praise

Advantages of DT as a Pairing Procedure



- Number of pairings
  - SSP and RSP: arbitrary
  - DT: until discrimination is demonstrated

Research with Children with Autism

- Issues in autism may warrant different procedures
- "Stimulus overselectivity": Children with autism often respond to some parts, but not all parts, of a complex stimulus
- Lovaas, Schreibman, Koegel, and Rehm (1971)

- When parts of the stimulus were then presented alone…
  - Typically developing children responded to the complex stimulus and single stimuli similarly
  - Children with autism responded primarily to only one of the stimuli (it differed across children which one)

Research with Children with Autism

Lovaas, Freitag, Kinder, Rubenstein, Schaeffer, & Simmons (1966)

- After simultaneous pairing failed
- "Good" established as S^D for food
- Delivering "good" contingent upon lever pressing

Isaksen & Holth (2009)

- Established smiles and nods as S^Ds
- Used as reinforcers during joint attention training

Holth, Vandbakk, Finstad, Grønnerud, & Sørensen (2009)

- Compared DT to delay pairing
- Responding increased in both
- DT more responses for 5 out of 7 of the participants

- **Considerations**
  - Limited experimental control
  - Lack of reinforcer assessments (to identify neutral and reinforcing stimuli)

Behavioral Interventions
Behav. Intervent. (2014)
Published online in Wiley Online Library
(wileyonlinelibrary.com) **DOI**: 10.1002/bin.1384

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

Catherine Taylor-Santa[1], Tina M. Sidener[1]*, James E. Carr[2] and Kenneth F. Reeve[1]
[1]Department of Applied Behavior Analysis, Caldwell College, Caldwell, NJ 07006, USA
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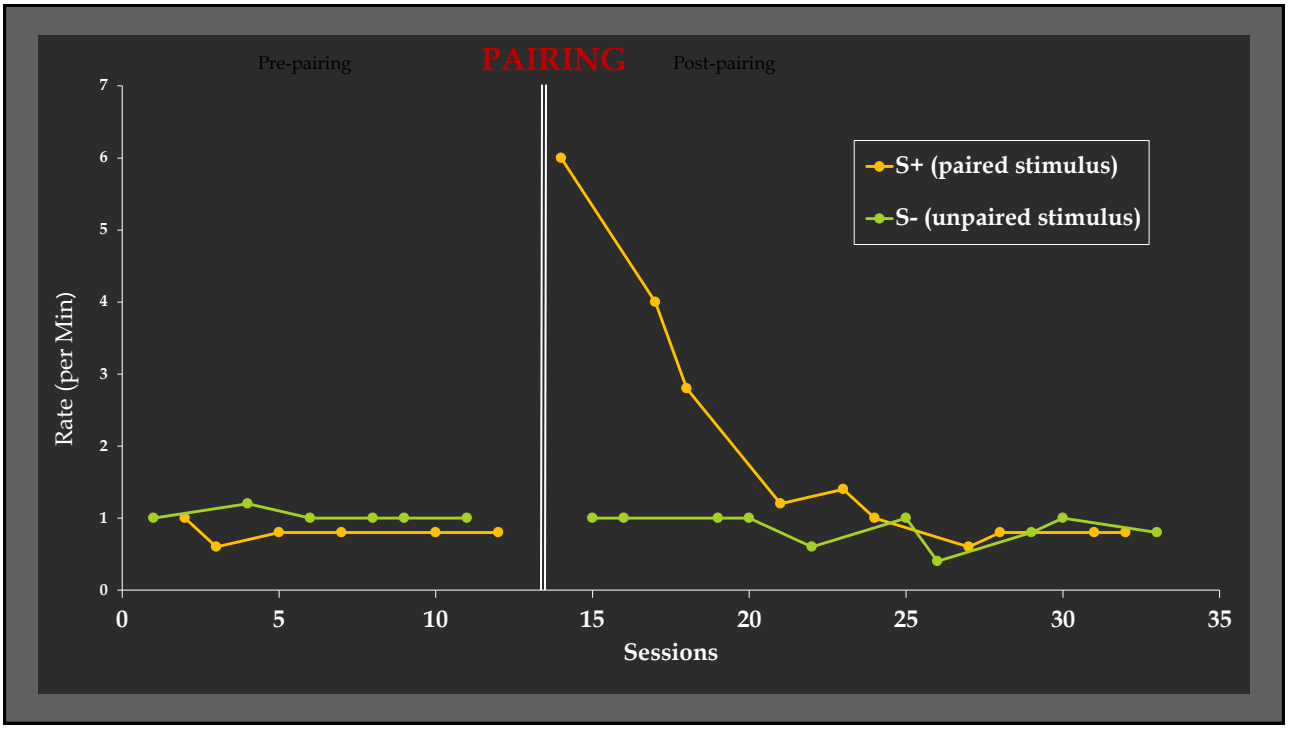
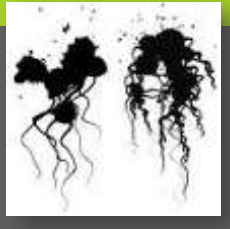
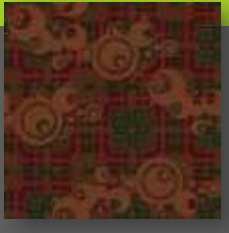
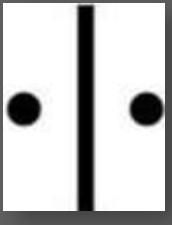
- **<u>Purpose</u>: Evaluate DT to establish conditioned reinforcers with children with autism**
- **3 boys with autism: 6**

- **Address limitations of previous research**
  - Reinforcer assessments
  - Interspersal of S^Δs
    - Enhance discrimination
    - Serve as control

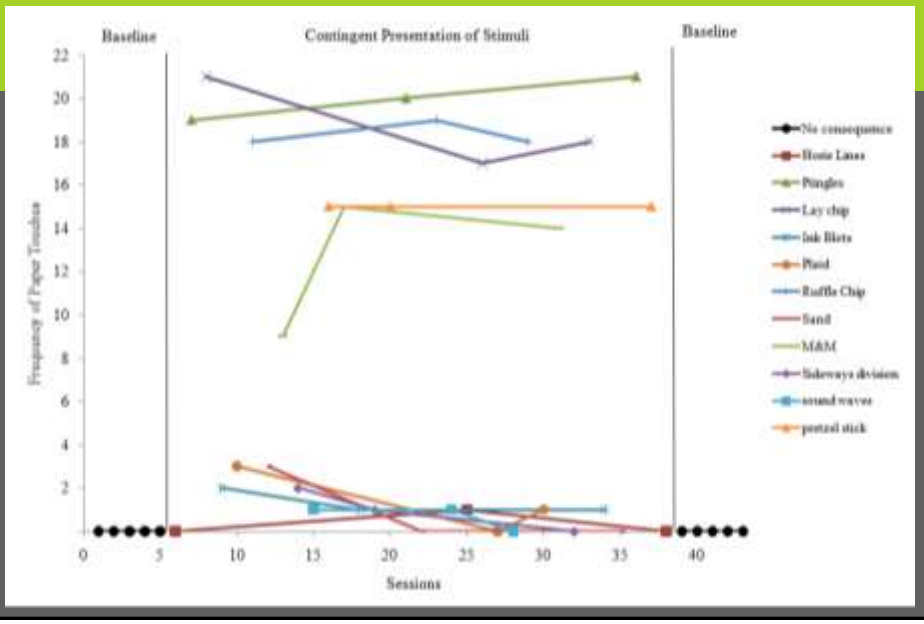

Pre-pairing
PAIRING
Post-pairing
S+ (paired stimulus)
S- (unpaired stimulus)
Rate (per Min)
Sessions
0
1
2
3
4
5
6
7
0
5
10
15
20
25
30
35

Visual Stimuli

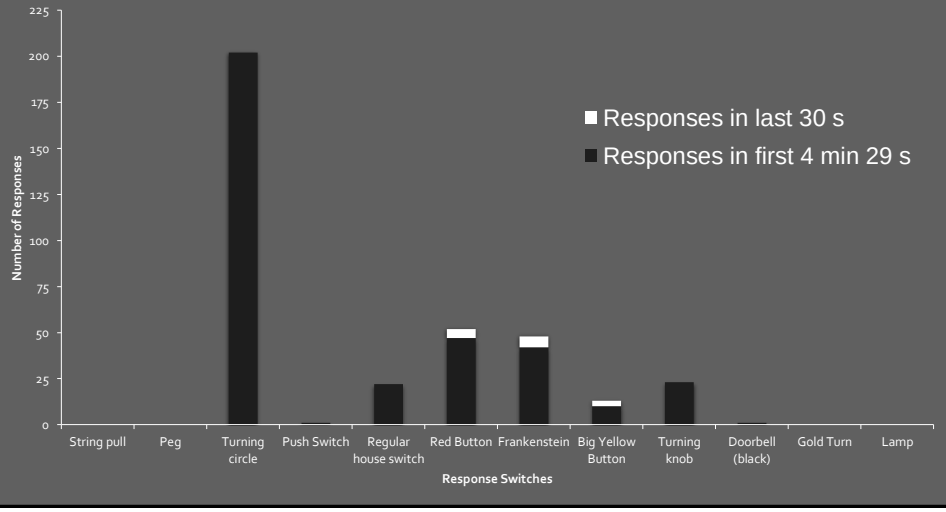




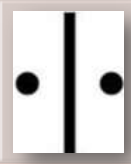



Reinforcer Assessment

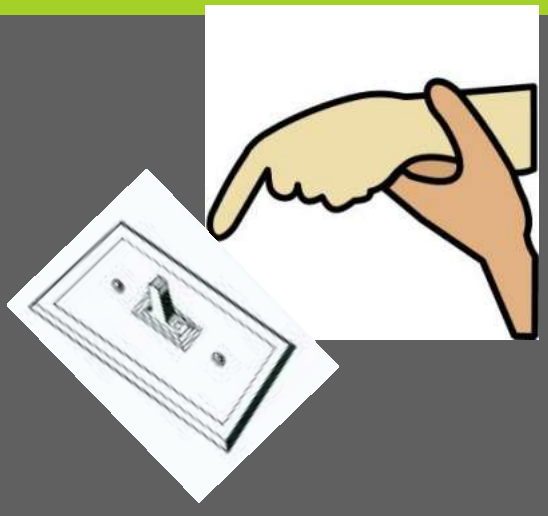


Response Assessment

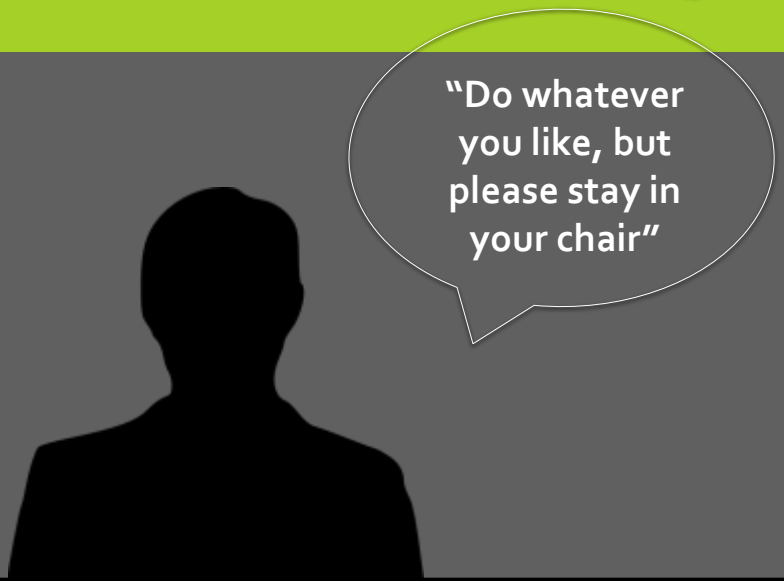


Stimulus		Response		
Type	Icon	Pre-Test	Discrimination Training	Post- Test
S^D				
S-Delta				

Pre-Pairing

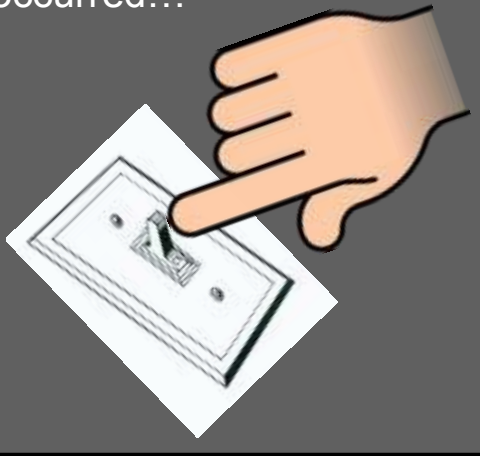


Pre-Pairing



Pre-Pairing

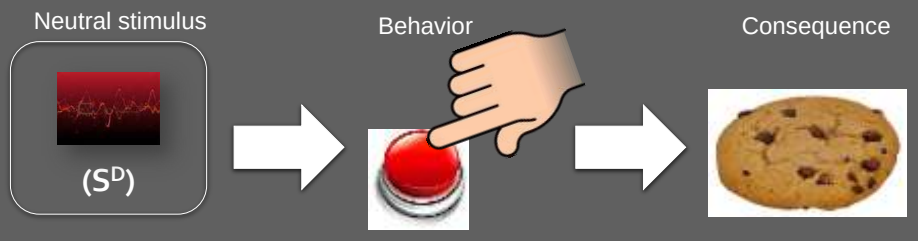
If responding occurred…



Post-pairing was identical to pre-pairing

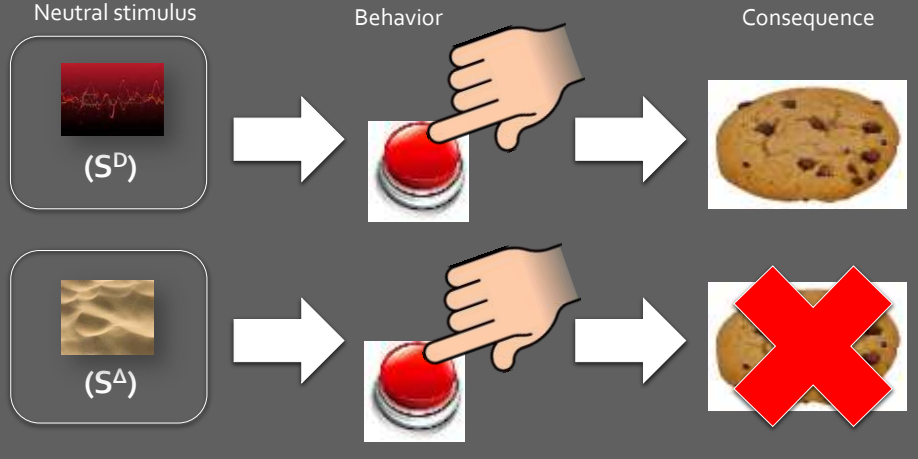
Discrimination Training

Phase 1



Discrimination Training

Phase 2



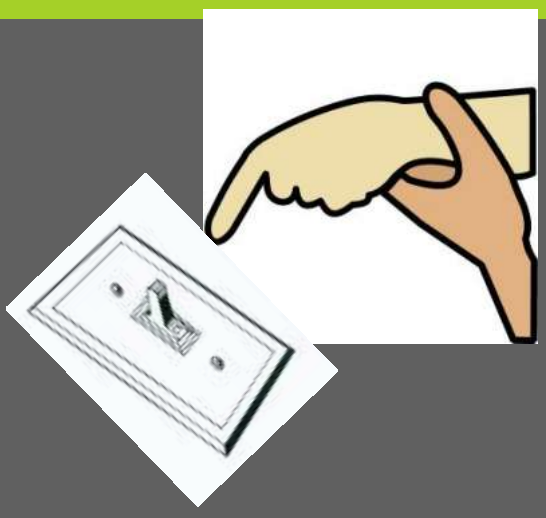
A DISCRIMINATION TRAINING PROCEDURE TO ESTABLISH PRAISE AS A CONDITIONED REINFORCER FOR CHILDREN WITH AUTISM

Erin L. Sainsbury, M.A., BCBA
Tina M. Sidener, Ph.D., BCBA-D
Kenneth F. Reeve, Ph.D., BCBA-D
Catherine Taylor-Santa, M.A., BCBA
David Sidener, Ph.D., BCBA-D

Purpose

- Systematically replicated Taylor-Santa et al. (2014)
- Evaluated DT to establish praise statements as conditioned reinforcers
- 3 boys with autism (11-15 yrs old)
  - Praise did not appear to function as a reinforcer
- Bluetooth® speaker behind participant, remotely controlled

Pre-and Post-pairing



S^D or S^Δ played

A Comparison of Pairing Procedures to Establish Visual Stimuli as Reinforcers for Adolescents with Autism

Christina Slaten, M.A.

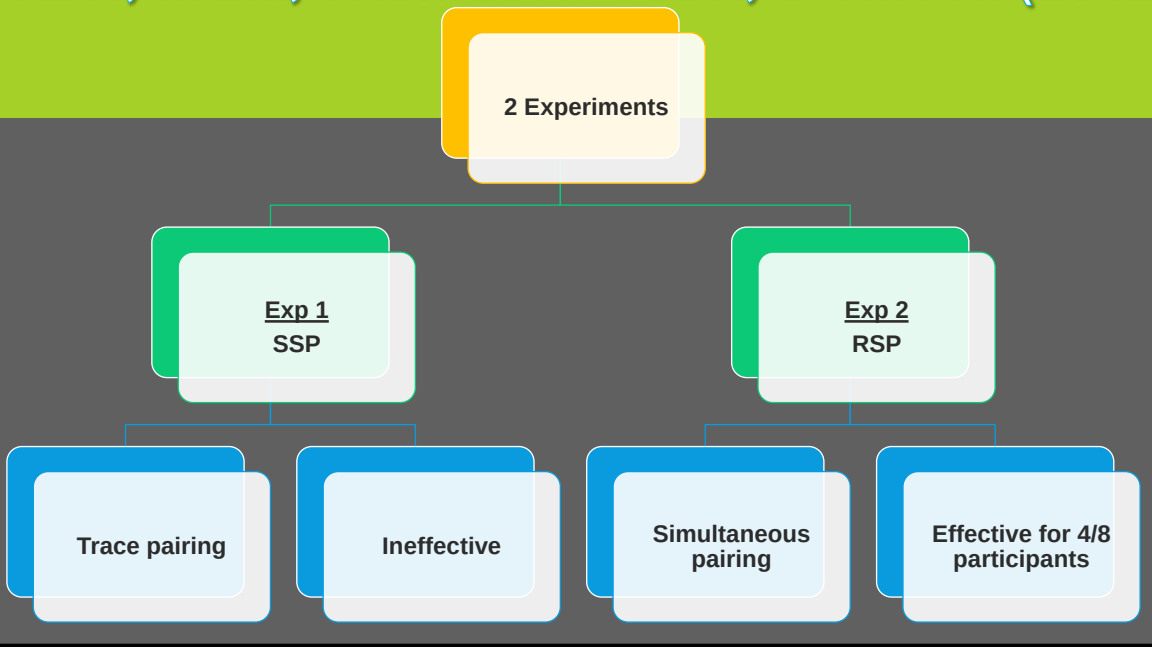
Tina M. Sidener, Ph.D., BCBA-D

Catherine Taylor-Santa, MA, BCBA

Kenneth Reeve, Ph.D., BCBA-D

Danielle Gureghian, Ph.D., BCBA-D

Dozier, Iwata, Thomason-Sassi, & Wilson (2012)



Considerations

Different participants in each experiment

Praise statements

- 10 of various lengths
- Variations in presentation?

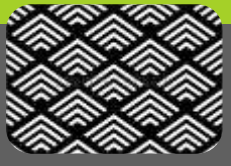
Same response during pairing and post-pairing

Did not incorporate an S-

Purpose

- Compare the effectiveness of STIMULUS-STIMULUS PAIRING (SSP) and RESPONSE-STIMULUS PAIRING (RSP)
- Replicated some aspects of Dozier et al. (2012)
- Adolescents with ASD
  - George & Andy: 12 yo
  - Chad & Todd: 15 yo
- Address previous research
  - Different response during pairing and post-pairing
  - Interspersal of S- trials
  - Conditions counterbalanced

Visual Stimuli

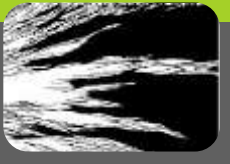


Diamonds

Squares

Radius

Tree



Flames

Wave

Blinds

Flowers

Lines

Programming for Stimulus Generalization to Conditioned Reinforcers with Children with Autism

Benjamin D. Rhodes

Tina M. Sidener

Ken F. Reeve

James E. Carr

Catherine Taylor-Santa

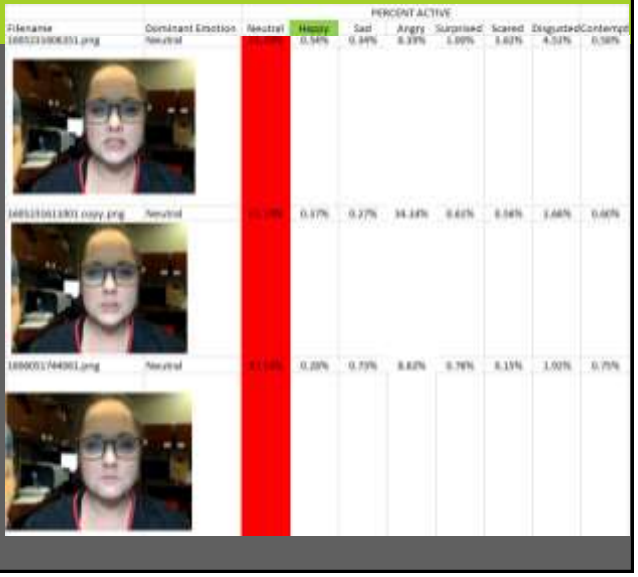
Purpose

- **Evaluate multiple exemplar training during discrimination training on generalization to novel stimuli**
  - 2 S^Ds and 2 S^Δs during DT
  - Probe generalization to stimulus similar to the S^Ds

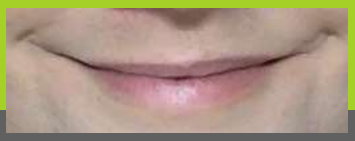
Noldus

FaceReader™

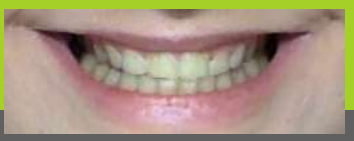
http://www.noldus.com/human-behavior-research/products/facereader



SD 1- Happy (82.43%)



SD 2- Happy (91.26%)



Generalization- Happy (91.08%)

S-delta 1- Neutral (87.54%)

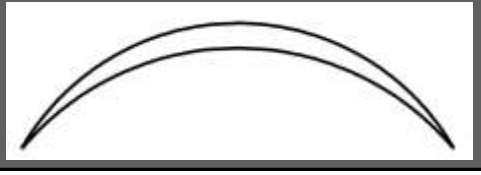
S-delta 2- Neutral (81.39%)

SD 1

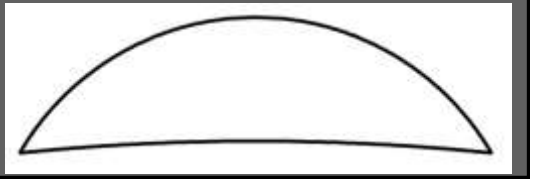
SD 2

Generalization

S-delta 1



S-delta 2



Conclusions

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