Examining Preference for Teaching Procedures and Social Interactions in Children with ASD: Results of Two Recent Studies

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Overview

- Preference in children with ASD
- Introduction to preference
  - Why it matters
  - Methods for evaluating preference
- Two studies
  - Preference for instructional strategies
  - Preference for social interactions
- General Discussion
  - Implications for practice and future research

Preference in ASD Intervention

- Teaching new skills
- Principle of reinforcement
  - Produces an increase in behaviour
- Effective reinforcers/rewards are critical
  - Effective and efficient interventions

Methods of Assessing Preference

- Indirect methods
  - Purpose: Identifying stimuli for inclusion in a preference assessment (Fisher et al., 1996)
- Structured preference assessments
  - Purpose: Identify a hierarchy of preferred items (Hagopian, Long, & Rush, 2004)
- Reinforcer assessments
  - Purpose: Directly assess whether items function as reinforcers (Hagopian et al., 2004)

Structured Preference Assessments

- Systematic presentation of stimuli
- Types of assessments (Hagopian et al., 2004)
  - Selection/approach-based
  - Engagement/duration-based
- Selection/approach-based
  - Stimuli are presented in pairs or an array
  - Selection/approach is measured
- Engagement/duration-based
  - A single item, or multiple items presented
  - Duration of engagement is measured

Variations on Preference Assessments

- Picture-based preference assessments (e.g., Groskreutz & Graff, 2009)
  - Toys and activities too large or interactive to present using other methods
- Video-based preference assessments (e.g., Brodhead, Abston, Mates, & Abel, 2017)
  - Toys and activities that cannot be presented in other preference assessment formats
  - Social interactions, locations
- Concurrent-chains assessment (Hanley, 2010)
  - Preference for interventions, instructional strategies

Selecting a Method to Assess Preference

- Indirect assessments vs. structured preference assessments
- Selecting a structured preference assessment
  - Indications and contraindications
  - Client characteristics
  - Characteristics of the stimuli under assessment
  - Assessment setting
  - Karsten, Carr, & Lepper (2011)

Resources

- Karsten, Carr, & Lepper (2011)
  - A practitioner model for identifying preferred stimuli
- WMICH Practitioner resources – Stimulus Preference Assessments:
  - https://wmich.edu/autism/stimulus-preference
  - Dr. DeLeon
- CIRCA Presentations
  - Past events: Dr. Grow's presentation on stimulus preference assessments
  - Past events: Dr. Frewing's presentation on some applications of preference assessments in practice

A Comparison of Different Reinforcement Contingencies During Skill Acquisition

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Skill Acquisition Procedures

- Effective skill acquisition procedures
  - Based on the principles of learning
    - Cohen, Amerine-Dickens, & Smith, 2006; Eldevik, Eikeseth, Jahr, & Smith, 2006; Howard, Sparkman, & Cohen, 2005; Lovaas, 1987; National Autism Center, 2009, 2015
- Preferences for skill acquisition procedures
  - Carr, Austin, Britton, Kellum, & Bailey, 1999; Ledford, Hall, Conder, & Lane, 2016; Snodgrass, Chung, Meadan, & Halle, 2018

Learner Preference

- Preference for skill acquisition procedures
  - Instructional formats (Brower-Breitwieser et al., 2008; Geiger et al., 2012)
  - Prompting strategies (Ingvarsson & Le, 2011; Leaf et al., 2010)
  - Error correction procedures (Kodak et al., 2016)
  - Reinforcer magnitude (Paden & Kodak, 2015)
- Reinforcement contingencies during skill acquisition

Reinforcement Contingencies During Skill Acquisition

- Differential reinforcement in skill acquisition (Johnson, Vladescu, Kodak, & Sidener, 2017; Vladescu & Kodak, 2010)
  - Quality
  - Magnitude
  - Schedule
- Nondifferential reinforcement

Reinforcement Contingencies During Skill Acquisition

- Evaluations of DR and NDR have yielded idiosyncratic results
  - E.g., Boudreau, Vladescu, Kodak, Argott, & Kisamore (2015)

Purpose

- Evaluate participant preference
  - Differential reinforcement
  - Nondifferential reinforcement
  - Extinction
- Effectiveness and efficiency

General Method

- Participants
  - Jeffery, 13-year-old boy
  - Davie, 8-year-old boy
  - Autism Spectrum Disorder
  - Attention Deficit Hyperactivity Disorder (Davie)
- Setting
  - A room in the participant's home

Pre-experimental Assessments

BLAF
(Sundberg & Partington, 1998)

QABF
(Paclawskyj et al., 2000)

Preference Assessment
Reinforcer Assessment

Preference Assessment

Preference Assessment

General Method

- Three to six days per week
- Four to six, 3- to 6-min sessions per visit
- Two types of sessions
  - Instructional sessions
  - Preference probes
- Six teaching sessions, one preference probe

Experimental Design

- Adapted alternating treatments design (Sindelar, Rosenberg, & Wilson, 1985)
- Embedded within a concurrent multiple-probe design across training sets (Horner & Baer, 1978)

Measurement

- Instructional sessions
  - Independent and prompted correct responses
  - Session duration
- Preference probe sessions
  - Selection
  - Cumulative number of selections

Interobserver Agreement and Treatment Fidelity

- Interobserver agreement (IOA)
  - At least 33.3% of instructional sessions and preference probes
  - IOA averaged 98 % or higher for both participants
- Treatment fidelity
  - At least 33.3% of all sessions
  - Averaged 98% or higher for both participants

Three Evaluations

- Taught three skills to each participant
  - Tacting/labelling periodic table elements
  - National animals
  - Tacting/labelling state map outlines
- Counterbalanced the order of the evaluations

Training Sets

- One training set assigned to each condition
  - Preference evaluation – DR, NDR, EXT
  - Treatment evaluation – DR, NDR, EXT
- Training sets were equated for difficulty

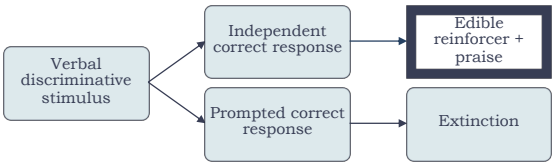
Baseline

- Discriminative stimulus (instruction/question)
- 5 s to respond
- No programmed consequences

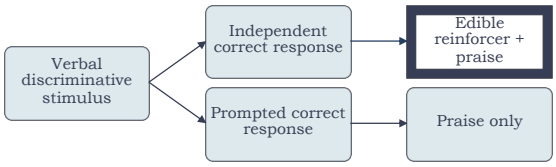
Experimental Conditions

- All conditions
  - Discriminative stimulus (instruction/question)
  - 5-s constant prompt delay
  - T-shirt, poster board, verbal description of condition
- Conditions
  - Differential Reinforcement
  - Nondifferential Reinforcement
  - Extinction
  - Preference Probes

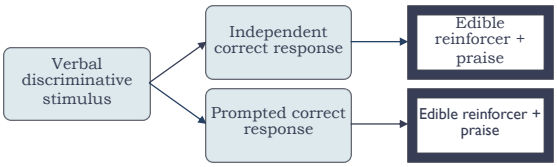
Differential Reinforcement by Schedule



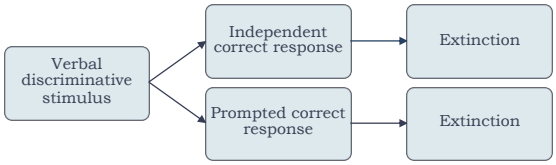
Differential Reinforcement by Quality (Jeffery Only)



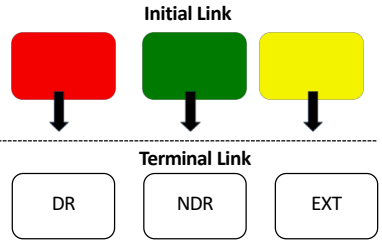
Nondifferential Reinforcement



Extinction



Concurrent Chains Assessment



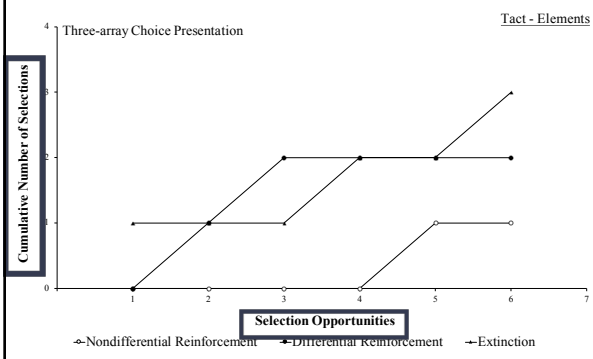
Verbal Choice Presentation

- Verbal choice presentation (Jeffery only)
  - Verbal description of reinforcement contingencies
  - "What color do you want to do?"

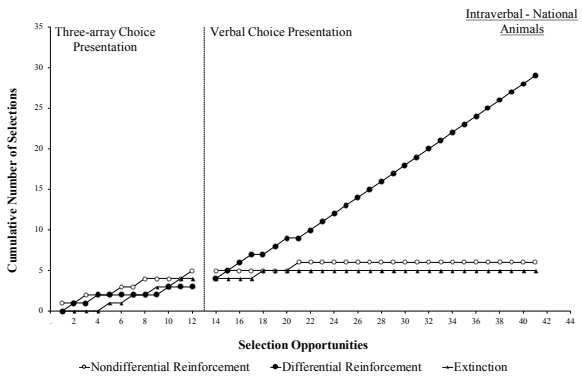
Follow-up Probes

- 3 weeks
- Procedures identical to baseline

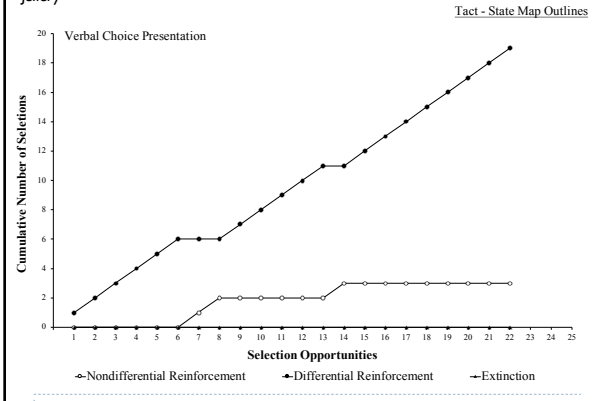
Jeffery



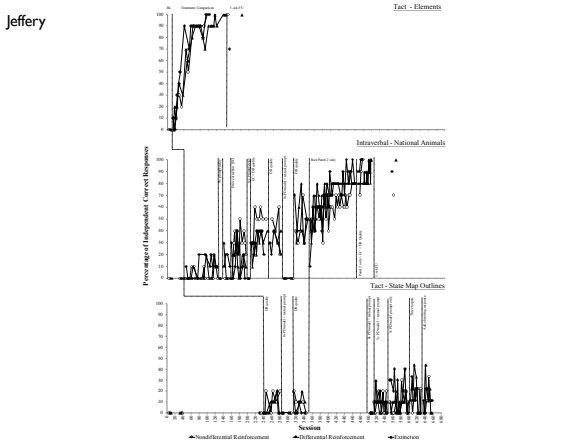
Jeffery



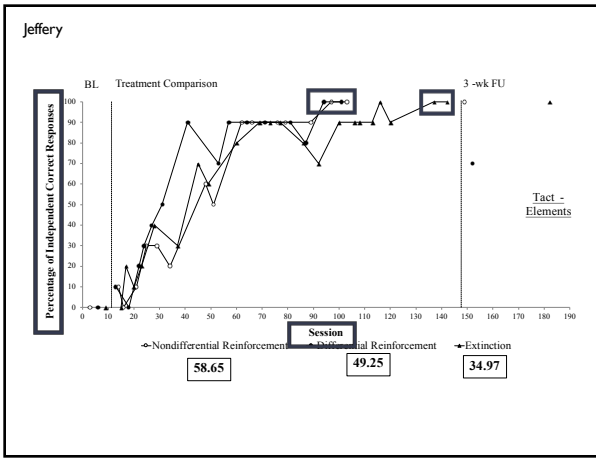
Jeffery



Jeffery



Jeffery



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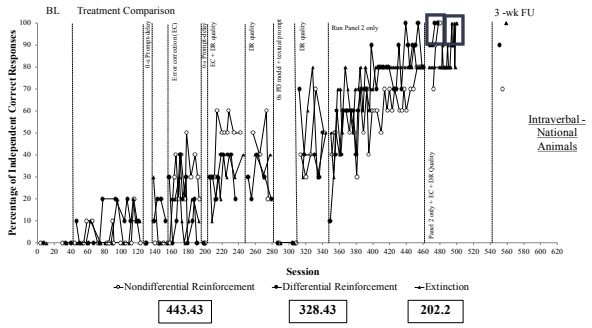
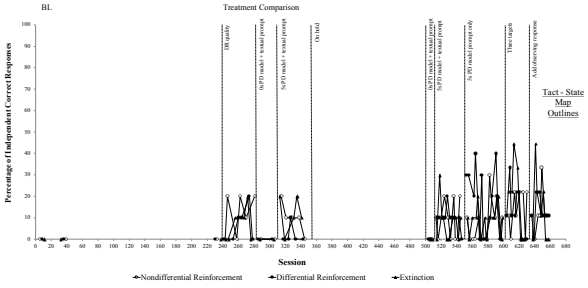
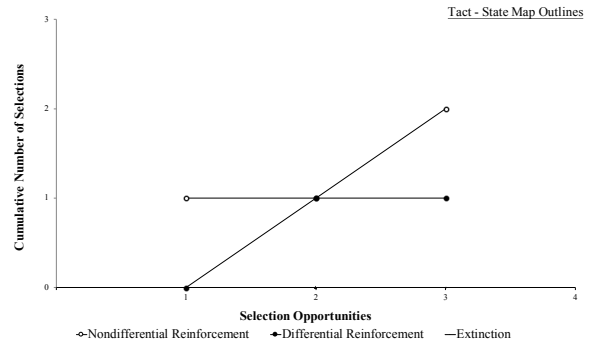


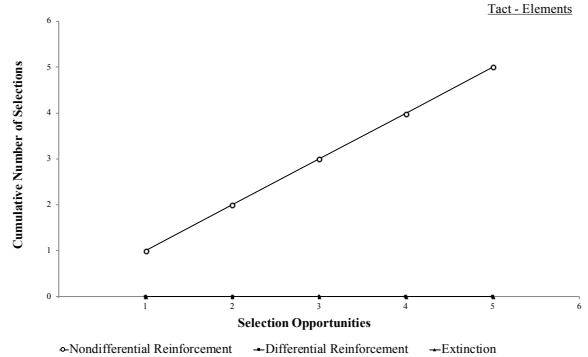
Jeffery



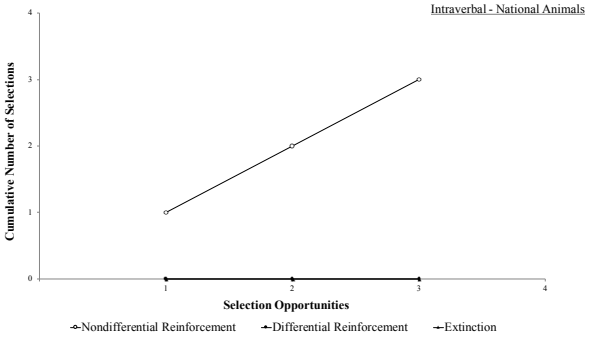
Davie



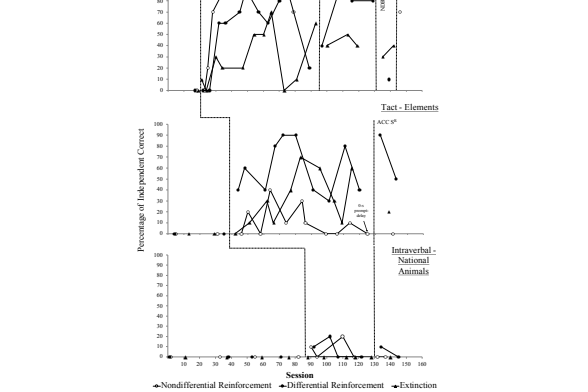
Davie

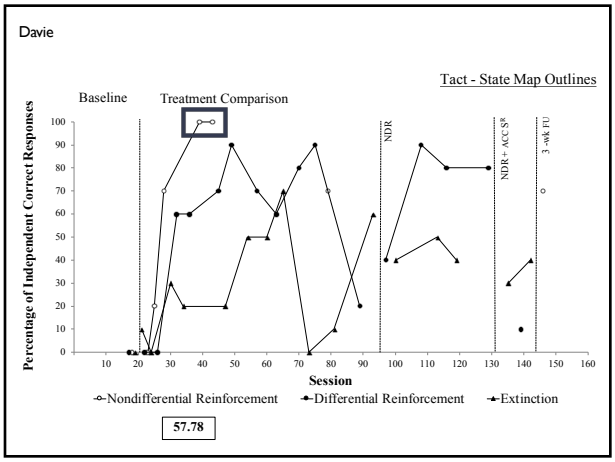


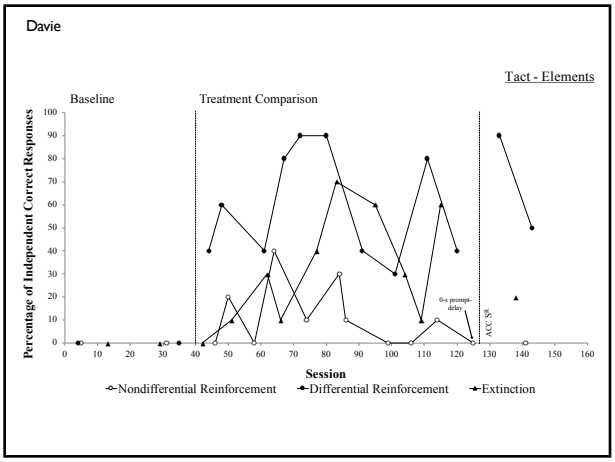
Davie

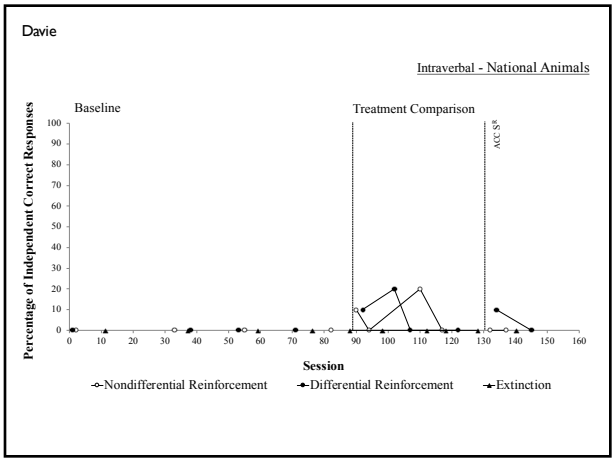


Davie









Davie - Problem Behavior

Skill	Nondifferential Reinforcement	Differential Reinforcement	Extinction
Tact map outlines	10.69	16.67	21.81
Tact periodic table elements	8.82	10.83	18.89
Intraverbal responding for national animals	23.33	37.14	30
Mean percentage across panels	13.60	19.03	23.33

Preference Findings

- Clear preference
- Most efficient and most preferred
  - Same procedure for three of four evaluations
- Stable preferences
  - Specific verses general preference

Skill Acquisition Findings

- Jeffery - Similarly effective, varied efficiency
- Davie - Varied effectiveness
- Similar results to prior studies (Boudreau et al., 2015; Cividini-Motta & Ahearn, 2013; Fiske et al., 2014; Hausman et al., 2014)

Unexpected Findings

- Skill acquisition in extinction
- Constant prompt-delay

Limitations

- Verbal choice presentation
- Incomplete data in the third panel
  - Jeffery – Lack of acquisition
  - Davie – Problem behavior

Contributions

- Evaluation of learner preference
- Prompting held constant across conditions
- Replication across at least two skills

A Comparison of Response-Contingent Stimulus Pairing and Operant Discrimination Training to Establish Vocal Stimuli as Reinforcers

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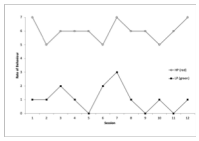
Reinforcer Identification

Interview

Preference Assessment



Reinforcer Assessment

How do we establish new reinforcers?

- Guidelines in early intervention manuals (e.g., Greer & Ross, 2008; Leaf & McEachin, 1999; Lovaas, 2003)
  - Pair neutral/unconditioned stimulus with known reinforcer
  - What if pairing alone is ineffective?

Conditioning Procedures

Respondent conditioning

- Stimulus-stimulus pairing (SSP)
- Response-contingent stimulus pairing (RCSP)

Operant conditioning

- Operant discrimination training (ODT)

Stimulus-Stimulus Pairing (SSP)

Test stimulus for reinforcer effects

↓

Pair neutral stimulus with reinforcer(s)

↓

Test stimulus for reinforcer effects

Response-Contingent Stimulus Pairing (RCSP)

Test stimulus for reinforcer effects

↓

Target response

↓

Pair neutral stimulus with reinforcer(s)

↓

Test stimulus for reinforcer effects

Respondent Conditioning - Considerations

- Response-contingent vs. response-independent stimulus-stimulus pairing (Dozier et al., 2012)
- Temporal ordering of neutral stimulus and reinforcer (Shillingsburg et al., 2015)
- Number of reinforcers (Moher et al., 2008)
- Category of reinforcers (Shillingsburg et al., 2015)
- Number of pairings (Miliotis et al., 2012)

Operant Discrimination Training

Test stimulus for reinforcer effects

↓

Establish neutral stimulus as an S^D

↓

Test S^D for reinforcer effects

Operant Discrimination Training - Considerations

- Number of reinforcers (Shillingsburg et al., 2015)
- Category of reinforcers (Shillingsburg et al., 2015)
- Inclusion of an S^Δ (Esch et al., 2009)

Conditioning Procedures – Summary

- RCSP more effective than SSP (Dozier et al., 2012)
- ODT more effective than SSP (Holth et al., 2009)
- ODT more preferred than SSP (Lepper et al., 2013)

Purpose

- To compare the relative effectiveness of RCSP and ODT to condition vocal stimuli as reinforcers

Participants and Setting

- Five individuals diagnosed with ASD
  - Aged 6- to 12-years-old
- Conducted at summer camp, daycare, library, or participants' homes

Experimental Design

- Adapted alternating treatments design (AATD; Sindelar, Rosenberg, & Wilson, 1985)
- Vocal stimuli equated across conditions
- Equated session length

Dependent Variables

- Baseline, RCSP, ODT
  - Percentage of trials with a target response
- Reinforcer probes
  - Session duration, response frequency, rate of responding
- Number of sessions to mastery

Interobserver Agreement and Procedural integrity

- Min 33.3% of conditioning sessions and reinforcer probes

Pre-experimental Assessments

- Reinforcer identification
  - Reinforcer assessment for edible stimuli
  - Reinforcer assessment for vocal stimuli
- Response assessment
- Preference assessment for colours

Reinforcer Identification

Description	Objective	Duration
Structured interview	Identify 8 to 16 preferred edible stimuli	20-45 min
Paired-stimulus preference assessment	Identify four to seven potential reinforcers	15-30 min
Reinforcer assessment of edible stimuli	Identify three reinforcers for use in conditioning sessions	15-35 min

Additional Assessments

Description	Objective	Duration
Reinforcer assessment of vocal stimuli	Identify four neutral vocal stimuli and provide baseline	30-75 min
Response assessment	Identify five low-rate responses	15-40 min
Stimulus preference assessment for colours	Identify three colours for use in experimental conditions	10 min

Experimental Procedures

- Experimental conditions
  - Baseline
  - RCSP
  - ODT
- Reinforcer probes after every four sessions
- Seven to sixteen sessions per day, three to five days per week

Baseline

- 5 trials
- Timing of presentation of response materials yoked to previous ODT session
- Vocal stimulus delivered for target response
- Response materials removed after 5 s of no responding

Response-Contingent Stimulus Pairing

- 5 trials
- Timing of presentation of response materials yoked to previous ODT session
- Vocal stimulus and edible reinforcer delivered for target response
- Experimenter prompted response after 5 s of no responding
  - Vocal stimulus and edible reinforcer

Operant Discrimination Training

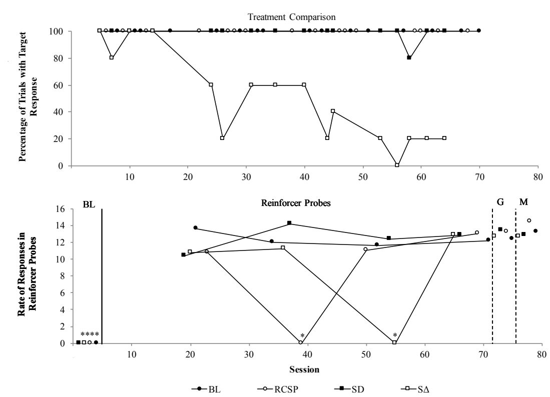
- 5 S^D trials and 5 S^Δ trials
- S^D trials
  - Deliver S^D one time and present response materials
  - Edible reinforcer delivered for target response
  - Experimenter will prompt a response after 5 s of no responding
- S^Δ trials
  - Deliver S^Δ one time and present response materials
  - Block attempted responses
  - No reinforcer

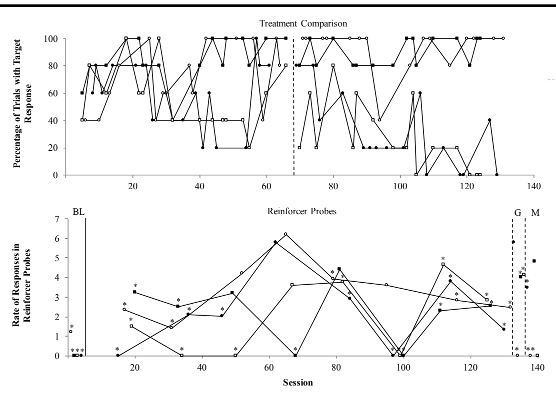
Error Correction

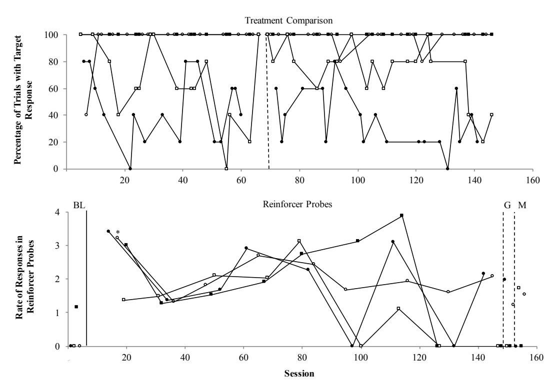
- Implemented after session 68 in baseline and ODT conditions
- Purpose: to decrease responding during baseline and S^Δ trials

Reinforcer Probes

- Reinforcer probe after every four sessions
- Purpose: test if stimulus established as a reinforcer
- Generalization probes
- Maintenance probes







Mean Session Duration and Response Frequency During Reinforcer Probes

	BL		RCSP		S^D		S^Δ	
	Duration	Freq	Duration	Freq	Duration	Freq	Duration	Freq
Ichiro	261.43 (30-300)	53.37 (0-68)	222.86 (30-300)	44.57 (0-72)	261.43 (30-300)	54.29 (0-71)	222.86 (30-300)	42.86 (0-64)
Sam	185.29 (30-300)	27 (0-50)	198.71 (30-300)	30.86 (0-49)	227.14 (30-300)	32.43 (0-53)	118.5 (30-300)	14.83 (0-45)
Isabella	99.64 (30-300)	7.7 (0-29)	164 (30-300)	10.8 (0-31)	152 (30-300)	9.4 (0-24)	107.55 (30-300)	6.6 (0-19)
Lucas	54.33 (30-101)	1.67 (0-4)	77.92 (30-300)	3 (0-16)	66.67 (30-161)	2.5 (0-8)	43 (30-77)	1 (0-4)
Matteo	77.11 (30-185)	2.78 (0-9)	41.66 (30-87)	1 (0-5)	86 (30-195)	4 (0-12)	109.67 (30-297)	5.33 (0-21)

Discussion

- Compared RCSP and ODT
- RCSP effective to condition vocal stimuli
- ODT effective to condition vocal stimuli
- Addressed limitations in previous studies
- Equated session length

Unexpected Findings

- Ichiro: undifferentiated responding
- Matteo: high responding during reinforcer probes for S^Δ
- All participants: initially undifferentiated responding

Limitations

- Undifferentiated responding for Ichiro and Sam
- Experimenter familiar to three participants
- Experimenter present during generalization probes

Implications for Practice

- Importance of developing effective conditioning procedures
- RCSP in applied settings
  - Mastery criterion met quickly in RCSP
  - Easy to implement
  - Embed trials throughout a learner's day

General Discussion

- Effective reinforcers are critical in intervention programs
  - The principle of reinforcement
  - Effective and efficient instruction
- Evaluating preference for teaching procedures
  - Correspondence between preference and effectiveness

Future Research

- Expand participant selection criteria
- Evaluate whether evaluations predict preference during instruction for other skills
- Evaluate long-term effects of conditioning procedures
- Measure effects of conditioning procedures on unconditioned stimuli

Conclusions

- Powerful reinforcers = optimal learning
  - Positive learning environment
- Affects every aspect of a learner's program
- Importance of effective conditioning procedures

Thank You!

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