University of Houston Clear Lake

EMERGENT RESPONDING:
GETTING MORE BANG FOR YOUR BUCK WHEN TEACHING VERBAL BEHAVIOR

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Verbal Behavior Clinic

OBJECTIVES

- Facts about ASD
- Define emergent verbal behavior (VB)
- Brief literature review emergent VB
- Recommendations for practice

SOME FACTS ABOUT
AUTISM SPECTRUM DISORDER (ASD)

- 1 in 68 children

- 4.5X more common in boys (1 in 42)

$17,000

$21,000

APPLIED BEHAVIOR ANALYSIS (ABA) TREATMENT

- Primary treatment - ASD

- Intensive behavioral interventions $40,000-$60,000/yr

- Cost effective treatment

CDC, 2014

SO LET'S TALK ABOUT
VERBAL BEHAVIOR (VB)

- VB programs – critical to EIBI

- VB approach
  - Functional independence: environmental variables

- Typically developing individuals - respond across verbal operants without explicit training (Skinner 1957; Taylor and Harris 1995)

MORE ON VB

- Emergent responding between verbal operants and between listener and speaker repertoires - deficient in many individuals with language delays (Guess and Baer 1973; Kelley et al. 2007; Nuzzolo-Gomez and Greer 2004)

EMERGENT VERBAL BEHAVIOR

- The emission of language (verbal behavior) that was not directly taught
  - Most of our verbal behavior
  - Example
    - Teach an infant to point to a ball when asked "Where is the ball?".
    - When presented with ball and asked "What is it?", the infant can say "ball" without direct teaching.

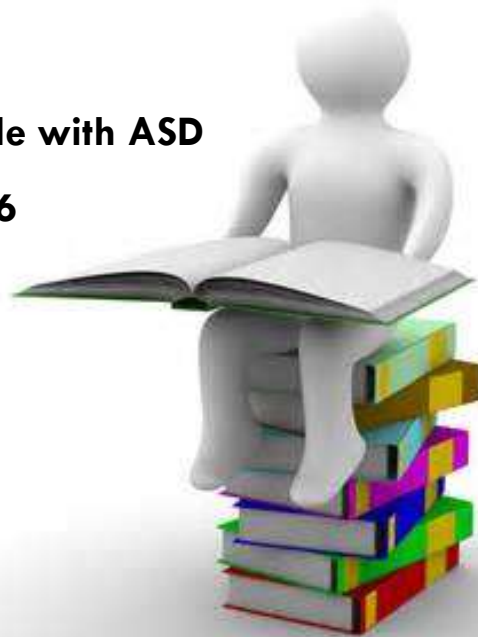## AN IMPORTANT NOTE ABOUT EMERGENCE

Type

Why

Applied

Treatment for people with ASD

Current: 2000-2016

PROMOTING EMERGENT VERBAL BEHAVIOR

- A few commonly-employed approaches
  - 1. Multiple exemplar instructions (MEI) - MET
  - 2. Sequencing of instructional programs
  - 3. Matching-to-sample (stimulus equivalence)

MULTIPLE EXEMPLAR INSTRUCTION

(MULTIPLE EXEMPLAR TRAINING)

MULTIPLE EXEMPLAR INSTRUCTION

- Definition:
  - Multiple examples using a subset of targets to produce emergent responding when presented with new targets
    - E.g., Teaching motor imitation

- Effective in producing emergent responding
  - (Fiorile, & Greer, 2007; Greer, Yuan, & Gautreaux, 2005; Nuzzolo-Gomez & Greer, 2004)

Tact (Label)

Mand (Request)

Mand (Request)

Tact (Label)

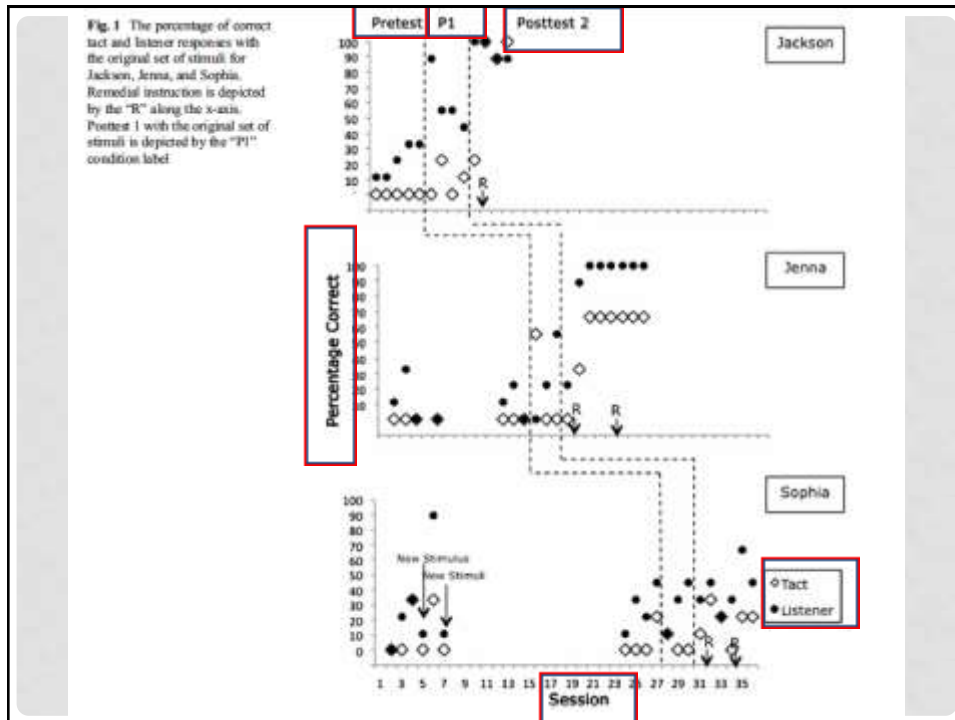|	Chips	• Mand • Tact • Mand • Tact
	Spoon	• Mand • Tact • Mand • Tact
	iPad™	• Mand • Tact • Mand • Tact

MEI LITERATURE REVIEW

A·B·A·I

Evaluating the Effectiveness of the Stimulus Pairing Observation Procedure and Multiple Exemplar Instruction on Tact and Listener Responses in Children with Autism

Brittany L. Byrne · Ruth Anne Rehfeldt ·
Angelica A. Aguirre

Table 1 Stimulus sets for each participant

Participants	Original set	MEI set 1	MEI set 2
Jackson	Ladle	Tambourine	Clarinet
	Vase	Kiwi	Valve
	Bush	Parachute	Pastry
Jenna	Rice	Taxi	Pepper
	Paint	Kiwi	Fountain
	Gum	Ax	Globe
Sophia	Cucumber	Washer	Pliers
	Colt	Freckles	Wreath
	Canoe	Ground	Plantain

Fig. 1 The percentage of correct tact and listener responses with the original set of stimuli for Jackson, Jenna, and Sophia. Remedial instruction is depicted by the "R" along the x-axis. Posttest 1 with the original set of stimuli is depicted by the "P1" condition label

Evaluating the Emergence of Reverse Intraverbals in Children with Autism

Alicia C. Allan · Jason C. Vladescu ·
April N. Kisamore · Sharon A. Reeve ·
Tina M. Sidener

Abstract Verbal behavior plays a fundamental role in the development of complex social and communication skills. Many children diagnosed with autism spectrum disorder exhibit profound deficiencies in intraverbal repertoires and the development of social relationships. Recent studies that investigated the effects of intraverbal training on the emergence of reverse intraverbals produced mixed results (e.g., Perez-Gonzalez et al., Journal of Applied Behavior Analysis 40:697–701, 2007)). In the current study, a multiple-probe design across four participants with autism was used to evaluate the effects of intraverbal training on the emergence of reverse intraverbals. Intraverbal training consisted of multiple exemplars taught concurrently, bidirectional stimulus-response teaching formats, general case analysis, reinforcement, and a constant prompt delay (CPD) procedure. Participants were trained on intraverbal targets and probes were conducted to assess emergence of untaught reverse intraverbals. Three participants demonstrated the emergence of reverse intraverbals as a result of the intraverbal training procedures. Social validity and maintenance of target responses and emergent reverse intraverbals were assessed.

Keywords Autism · Emergence · Intraverbal training · Verbal behavior

Table 1 Bidirectional teaching and probe formats for intraverbal and reverse intraverbal targets

| Intraverbals teach and probe assignments for Ray		Intraverbals teach and probe assignments for Eric	
Group A—teach (cities)	Group A—probe (teams)	Group A—teach (states)	Group A—probe (cities)
Baltimore (Ravens)	Ravens (Baltimore)	Florida (Miami)	Miami (Florida)
Carolina (Panthers)	Panthers (Carolina)	Idaho (Boise)	Boise (Idaho)
Denver (Broncos)	Broncos (Denver)	Virginia (Williamsburg)	Williamsburg (Virginia)
Oakland (Raiders)	Raiders (Oakland)	Tennessee (Chattanooga)	Chattanooga (Tennessee)
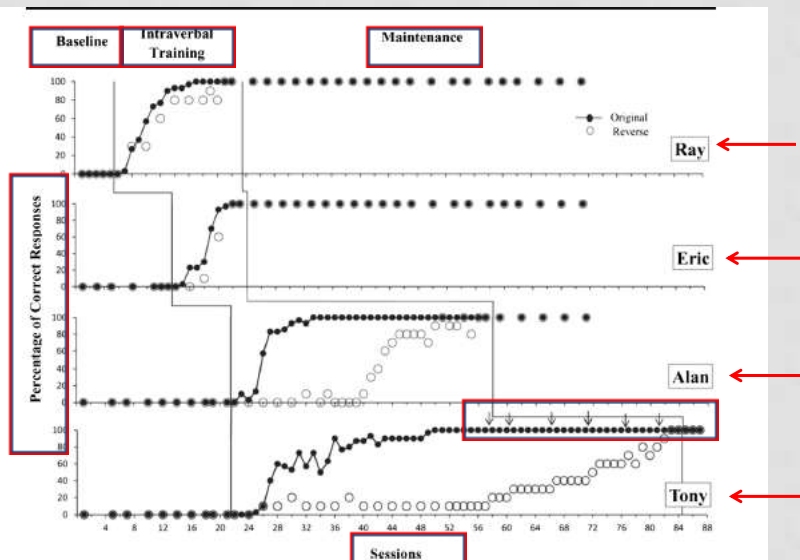
Fig. 1 Percentage of correct unprompted intraverbals and reverse intraverbals for all four participants. Each *filled data point* is computed from three presentations of ten intraverbals; each *open data point* is computed from one presentation of ten reverse intraverbals. The *small arrows in the bottom panel* indicate training of reverse intraverbals for Tony

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USING AUDIO SCRIPT FADING AND MULTIPLE-EXEMPLAR TRAINING TO INCREASE VOCAL INTERACTIONS IN CHILDREN WITH AUTISM

ELENA GARCIA-ALBEA, SHARON A. REEVE, AND KENNETH F. REEVE

CALDWELL COLLEGE

AND

KEVIN J. BROTHERS

SOMERSET HILLS LEARNING INSTITUTE

Script-fading procedures have been shown to be effective for teaching children with autism to initiate and participate in social interactions without vocal prompts from adults. In previous script and script-fading research, however, there has been no demonstration of a generalized repertoire of vocal interactions under the control of naturally occurring relevant stimuli. In this study, 4 boys with autism were taught to initiate a conversation in the presence of toys through the use of a script and script-fading procedure. Training with multiple categories and exemplars of toys was used to increase the likelihood of generalization of vocal interactions across novel toys. A multiple-probe design across participants was used to assess the effects of these procedures. The intervention successfully brought interactions by children with autism under the control of relevant stimuli in the environment. Future research pertaining to the specific implementation of these procedures (e.g., fading, script placement, participant characteristics) is discussed.

Key words: autism, multiple-exemplar training, scripts, script fading, spontaneous language

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Table 1
Toy Categories, Sample Toy Exemplars, and Sample Scripts

Category	Sample toy	Script 1	Script 2	Script 3
Vehicles	Car	Check out this car!	Look, it's red!	Cars go beep.
Instruments	Piano	I can play piano.	It's black.	Watch me hit the keys!
Balls	Soccer ball	I have the soccer ball!	It's black and white.	Let's kick it!
Action figures	Spiderman	Spiderman is so cool!	He has a web.	Watch how he climbs!
Building materials	Lego tractor	These Legos are awesome!	It's a tractor!	You can attach them.
Animals	Cow	Cool, it's a cow!	It goes to a farm.	Cows say moo.

Note. Each category consisted of four toy exemplars with three scripts assigned to each. The table depicts one exemplar toy from each category along with its scripts for illustration purposes.
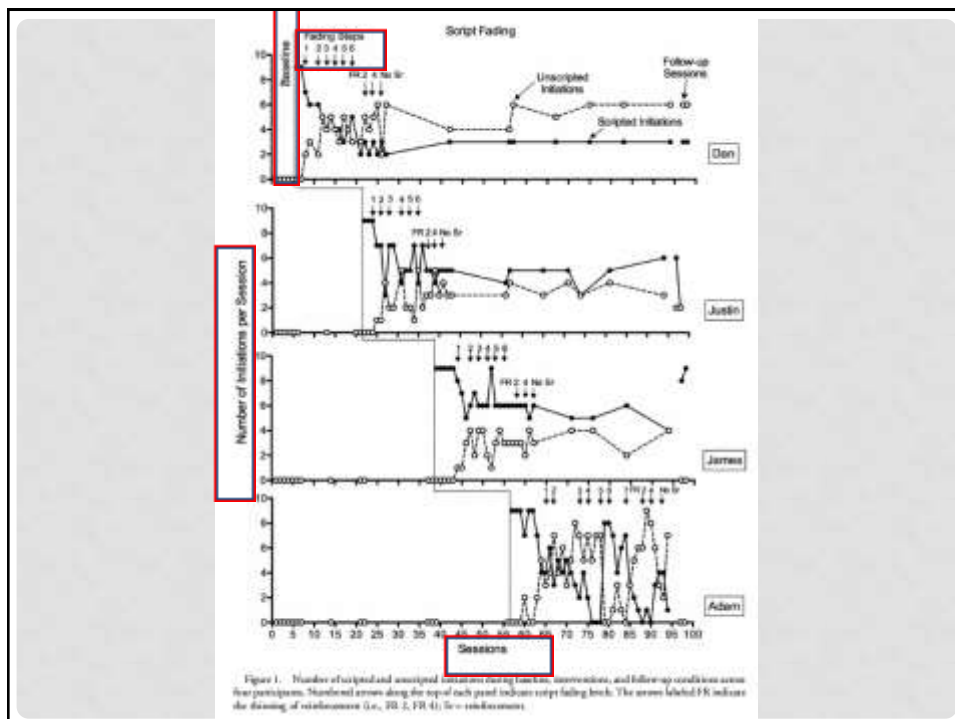
Table 3
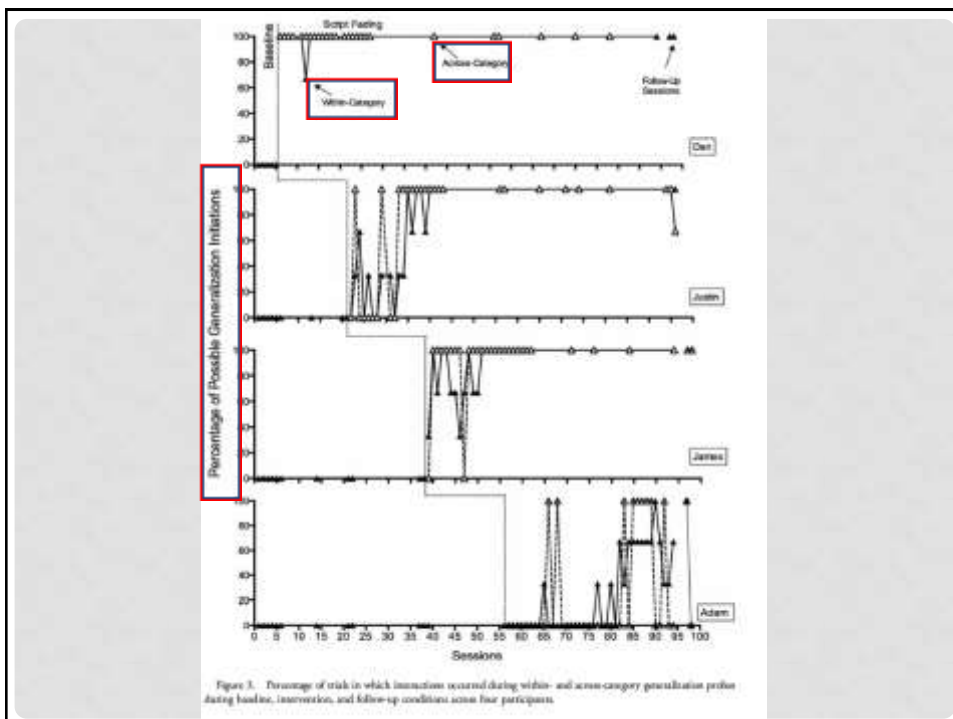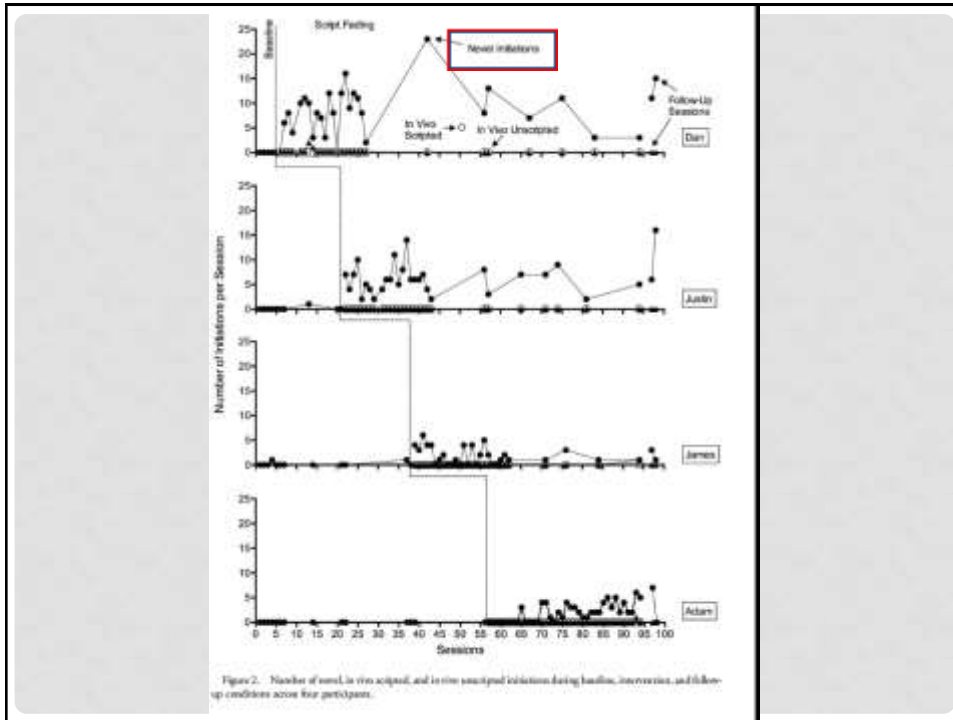Fading Levels Used During Script Fading

Fading level	Script content
0	Full script
1	Last word removed
2	Last two words removed
3	All but the first word removed
4	All but the first word removed on three animals and no script on the animals
5	All words removed from audio recorder
6	No script (i.e., recorder removed)
7[a]	No script (assistant presses recorder during prompts)

[a]Level 7 was used only for Adam.

Table 2
Names and Definitions of Three Categories of Dependent Measures

Category of interaction	Type	Definition
Initiations (vocal responses directed to the conversation partner before the partner engages in the conversation)	Scripted	Vocal response was exact match to any of the three possible scripts for that toy or category or differed only in conjunctions, articles, prepositions, or pronouns, regardless of whether scripts were full, partial, or faded.
	Unscripted	Vocal response did not match scripts presented in current session from each category (i.e., partial or full scripts) and differed from the script by more than conjunctions, articles, prepositions, or pronouns.
	Novel	Vocal response did not contain any words from the original scripts besides conjunctions, articles, prepositions, pronouns, or the toy's name.
	In vivo scripted	Vocal response that matched any statements modeled by conversation partner in prior trials, with addition that conjunctions, articles, prepositions, pronouns, or changes in verb tense were altered.
	In vivo unscripted	Vocal response similar to any statements modeled by conversation partner in prior trials and differed from model by more than conjunctions, articles, prepositions, pronouns, verb tense, or the toy's name.
Elaborations (vocal responses directed to the conversation partner after the partner engaged in the conversation)	Scripted, unscripted, novel, in vivo scripted, in vivo unscripted	Definitions are the same as those above except the vocal response occurred after the conversation partner engaged in the conversation.
	Acknowledgments	Positive verbal productions (e.g., "yeah," "okay," "yes," "sure" "cool") emitted after conversation partner made a statement.
Generalized interactions	Within category	Any interaction type that occurred in presence of novel toy drawn from teaching categories of toys.
	Across category	Any interaction type that occurred in presence of novel toy drawn from novel category of toys.

Figure 1. Number of scripted and unscripted initiations during baseline, interventions, and follow-up conditions across four participants. Numbered arrows along the top of each panel indicate script fading levels. The arrows labeled FR indicate the thinning of reinforcement (i.e., FR 2, FR 4; Re = reinforcement.

Figure 2. Number of novel, in vivo scripted, and in vivo unscripted initiations during baseline, intervention, and follow-up conditions across four participants.

Figure 3. Percentage of trials in which interactions occurred during within- and across-category generalization probes during baseline, intervention, and follow-up conditions across four participants.

Contents lists available at SciVerse ScienceDirect

Research in Autism Spectrum Disorders

Teaching children with autism to detect and respond to sarcasm

Angela Persicke [a,b], Jonathan Tarbox [a,b,*], Jennifer Ranick [a,b], Megan St. Clair [a,b]

[a] Center for Autism and Related Disorders, United States
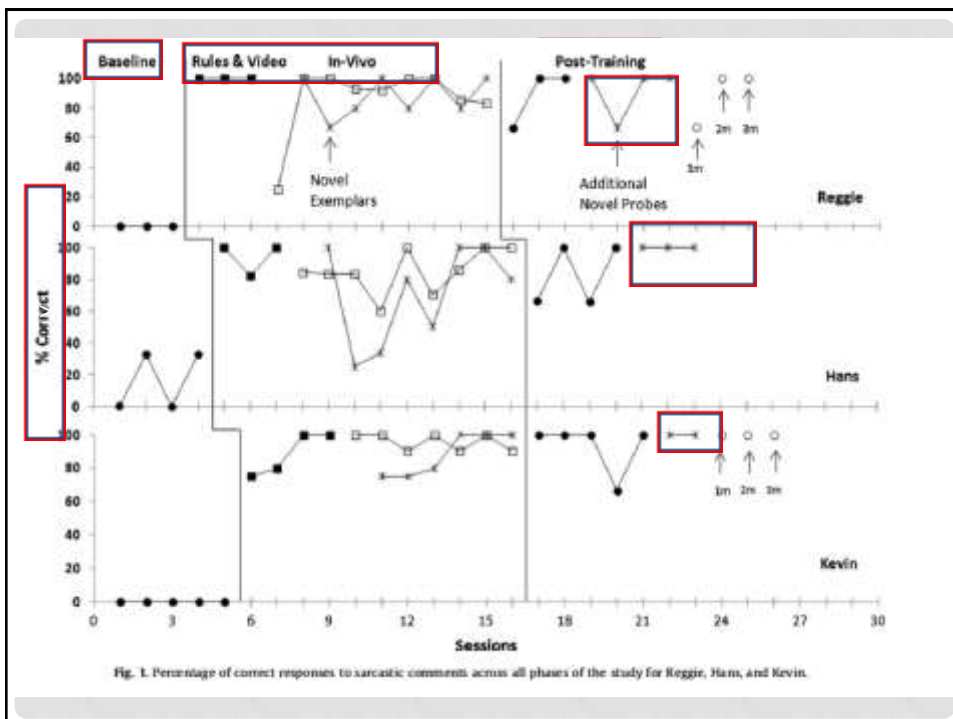[b] Autism Research Group, United States

ARTICLE INFO

ABSTRACT

Previous research has demonstrated that children with autism often have difficulty using and understanding non-literal language (e.g., irony, sarcasm, deception, humor, and metaphors). Irony and sarcasm may be especially difficult for children with autism because the meaning of an utterance is the opposite of what is stated. The current study evaluated the effectiveness of a training package, including rules and in vivo multiple exemplar training, to teach three children with autism to detect and respond appropriately to sarcastic statements. The training package was effective and generalization was obtained across novel exemplars, settings, and people.

Sarcasm can be linguistically defined as a form of non-literal language in which someone subjectively states the opposite of what is objectively known to be true in reality.

interpretation. Understanding this specific form of counterfactual, non-literal language has been found to serve significant social and communicative functions. Mainly, verbal irony and sarcasm are used to either indirectly convey attitudes and beliefs or for the purposes of generating humor (Harris & Pexman, 2003; Pexman et al., 2011). Thus, comprehension of sarcasm requires an ability to identify the social cues necessary to differentiate between the speaker's intended meaning and the literal meaning of the utterance. The ability to judge the literal meaning of a statement while simultaneously inferring the speaker's intended meaning is said to reflect an advanced understanding of other people's thoughts or intentions, i.e., perspective-taking (Uchiyama et al., 2012).

Table 1
Sample context and corresponding sarcastic and sincere comments.

Context	Sarcastic comment	Sincere comment
warm sunny day	"It's definitely going to snow today."	"It's so warm outside today."
non-preferred food item	"You would love to eat broccoli every day."	"I know you don't like broccoli."
messy room	"You didn't make a mess at all."	"This room is so messy."
preferred activity	"Playing video games is never fun."	"It's so much fun to play video games"

Fig. 1. Percentage of correct responses to sarcastic comment across all phases of the study for Reggie, Hans, and Kevin.

TEACHING CHILDREN WITH AUTISM A BASIC COMPONENT SKILL OF PERSPECTIVE-TAKING

Evelyn Gould[1], Jonathan Tarbox[2*], Denis O'Hora[3],
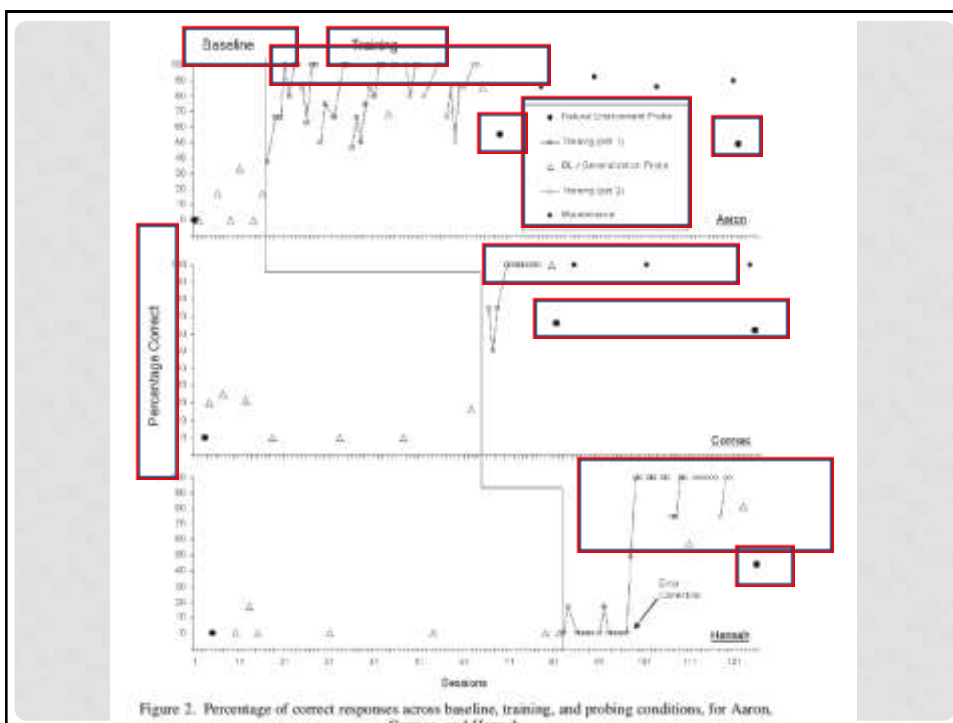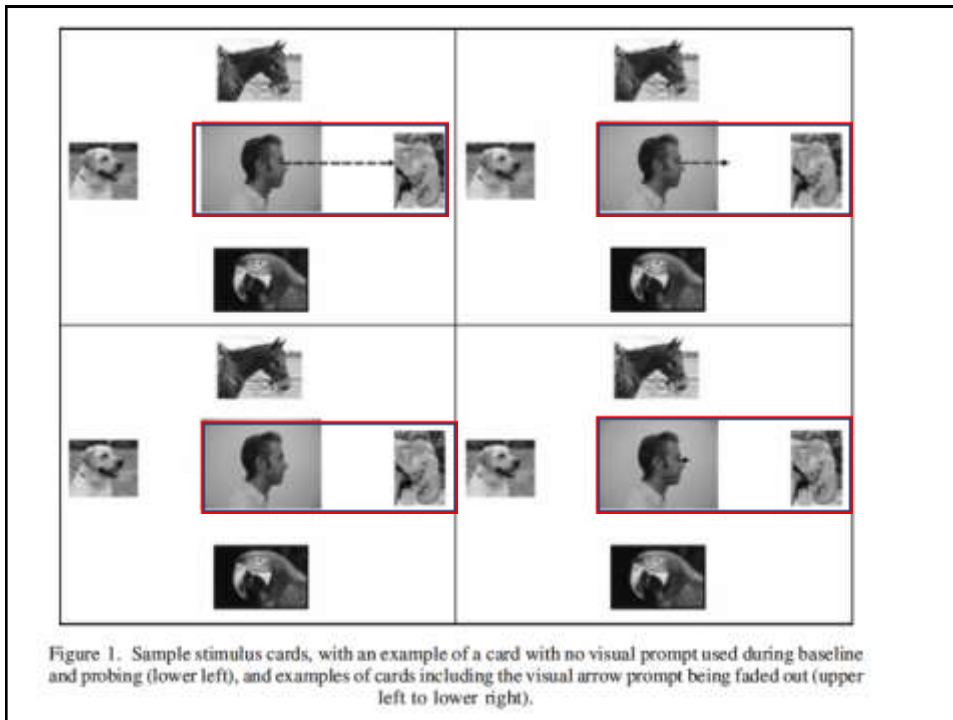Steve Noone[1] and Ryan Bergstrom[2]

[1]Bangor University, Wales, Gwynedd, UK
[2]Center for Autism and Related Disorders, Tarzana, CA, USA
[3]National University of Ireland, Galway, Ireland

Perspective-taking is an area of human functioning that is rarely studied by behavior analysts but likely entails a complex repertoire of verbal and relational behavior. Perspective-taking is generally acknowledged to be an important skill for successful social functioning and a significant amount of research has documented deficits in these skills in individuals with autism. However, little previous research has examined behavioral intervention procedures for remediating these deficits. The current study evaluated the effectiveness of a multiple exemplar training procedure for teaching three children with autism to identify what other people can see, a simple component skill of perspective-taking. All participants demonstrated generalization to novel table-top tasks but generalization to natural environment probes was less consistent. Results are discussed in terms of the behavioral history required to develop perspective-taking repertoires, as well as for the development of effective interventions. Descriptors: Perspective-taking, autism, Theory of Mind, conditional discrimination, and multiple exemplar training.
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Barnes-Holmes, & McHugh, 2004). Perspective-taking involves inferring another person's desires and beliefs, in order to interpret their behavior and predict what they will do next (Howlin, Baron-Cohen, & Hadwin, 1999; Sigman & Capps, 1997). Common human activities that are believed to involve perspective-taking include deception, empathy, self-consciousness, self-reflection, persuasion, and pretence, as well as being essential for effective communication (Howlin et al., 1999).

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Research in Autism Spectrum Disorders

Journal homepage: http://ees.elsevier.com/RASD/default.asp

Teaching children with autism to detect and respond to deceptive statements

Jennifer Ranick [a,b], Angela Persicke [a,b], Jonathan Tarbox [a,b,*], Jake A. Kornack [a,b]

[a] Autism Research Group, United States
[b] Center for Autism and Related Disorders, United States

ARTICLE INFO

ABSTRACT

Previous research has shown that children with autism often have deficits in deception, both in the ability to lie to others and in the ability to detect when they are being lied to. Additionally, children with autism are frequently the victims of bullying and difficulty with understanding deception likely makes the population more vulnerable to bullying. The purpose of this study was to teach individuals with autism to identify when others were lying to them, specifically to exclude them or to take their possessions. The treatment package consisted of multiple exemplar training, including rules, modeling, role-play, and immediate feedback. The results indicated that the procedure was effective for all three participants. Additionally, generalization was demonstrated to novel, untrained lies and to same-age peer confederates who were not involved in training.

Table 1
Examples of lies included in the study.

Lies to take an item away from the participant:
"Your mom said I could have this."
"I'm the guest so you have to give me one of your toys."
"This is mine; I brought it from home."
"You said I could have this the last time I came over."

Examples of lies to exclude participant from an activity:
"You didn't spin a four so I get to go again."
"Only people with brown hair can play this game."
"You have to be six or older to play."
"You didn't find us quick enough, so you have to count again."
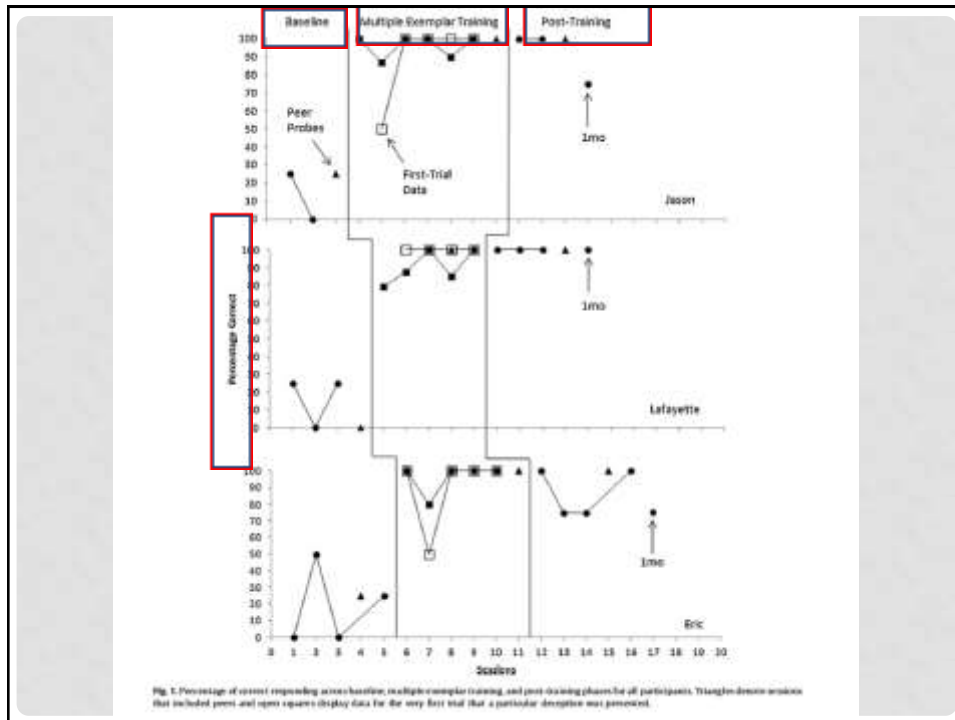
Fig. 1. Percentage of correct responding across baseline, multiple exemplar training, and post-training phases for all participants. Triangles denote sessions that included peers and open squares display data for the very first trial that a particular deception was presented.

The Effects of Observational Training on the Acquisition of Reinforcement for Listening

Tracy Reilly Lawson & Darcy Walsh

Abstract

Experiment 1 investigated the effects of observational training in a social listener reinforcement game on participants' conversational units in non-instructional settings. Experiment 2 tested the effects of multiple exemplar instruction on the development of "empathy." The participants who had reader/writer levels of verbal behavior were selected because they emitted a low number of speaker and listener exchanges with others and did not have empathy as measured in the study. In Experiment 1, data were collected on the number of sequelics, conversational units, "wh" questions, vocal approvals and vocal disapprovals during 5 minute probe sessions after meeting criterion on each objective of the listener reinforcement game. During intervention, the participants were required to engage in a speaker listener exchange through playing a yoked contingency game where they competed with the experimenter to teach several objectives including "I Spy", peer tutoring, textually responding and group instruction. Data showed that the total number of verbal interactions in non-instructional settings significantly increased for both participants. In Experiment 2 multiple exemplar instruction across questions was implemented to teach the participants empathy. The participants responded to 3 questions: "What happened?" "How does the person feel?" and "What could you do to help?" The results showed a significant increase in correct responses to empathy questions.
Keywords: autism, empathy, observational training, reinforcement for listening.

Table 8. *Stimuli used during empathy instruction*

Stimuli Used During Picture Probes	Situations Used for Real Life Probes
A boy hit by a car	A woman tripping over a chair
A woman wearing a neck brace	A woman coughing loudly
A mother and her daughter sitting together at a table and the mother is scolding the daughter who looks upset	A little boy screaming because he wants something that does not belong to him
A boy with a bandaged head	A student pulling a teacher's hair
A woman putting eye drops in her eye	A boy lying on a mat alone
A little girl with her arms folded while her parents argue in the background	A boy vomiting on the floor
A woman with her hand on her head	A student pulling on a teacher's shirt
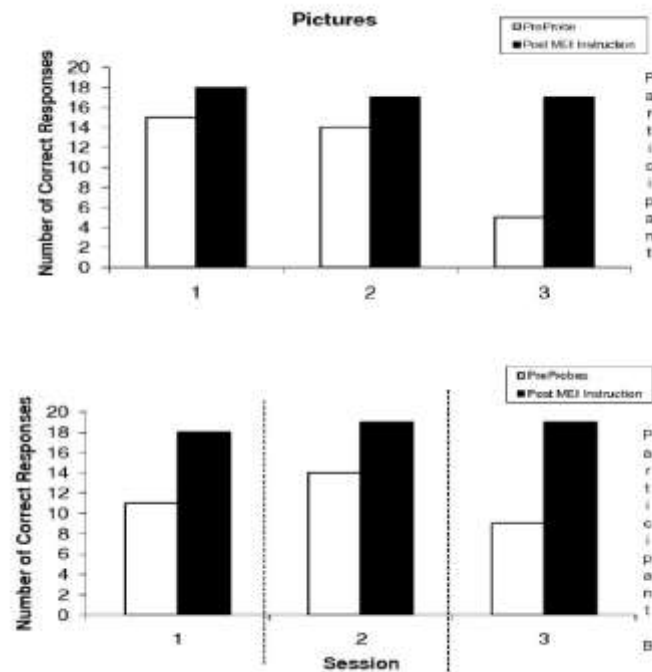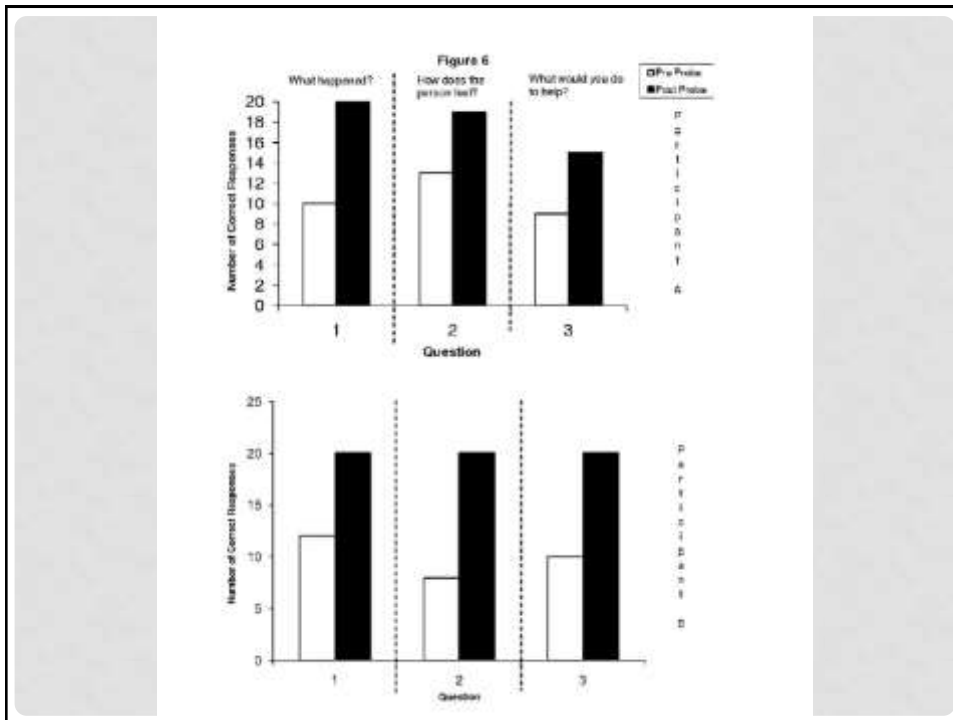
Figure 6

The Effects of Multiple Exemplar Instruction on the Relation Between Listener and Intraverbal Categorization Repertoires

Sarah A. Lechago · James E. Carr ·
April N. Kisamore · Laura L. Grow

Abstract We evaluated the effects of multiple exemplar instruction (MEI) on the relation between listener and intraverbal categorization repertoires of six typically

developing preschool-age children using a nonconcurrent multiple-probe design across participants. After failing to emit intraverbal categorization responses following listener categorization training, participants were exposed to MEI in the form of alternating response forms (listener and intraverbal) during categorization training with novel stimulus sets. For two participants for whom there was some evidence of emergent intraverbal responding, responding was variable. For the remaining four participants, 32 to 99 MEI trial blocks produced minimal improvement in responding or no emergent responding at all. The results are discussed in terms of Skinner's analysis of verbal behavior and naming theory.
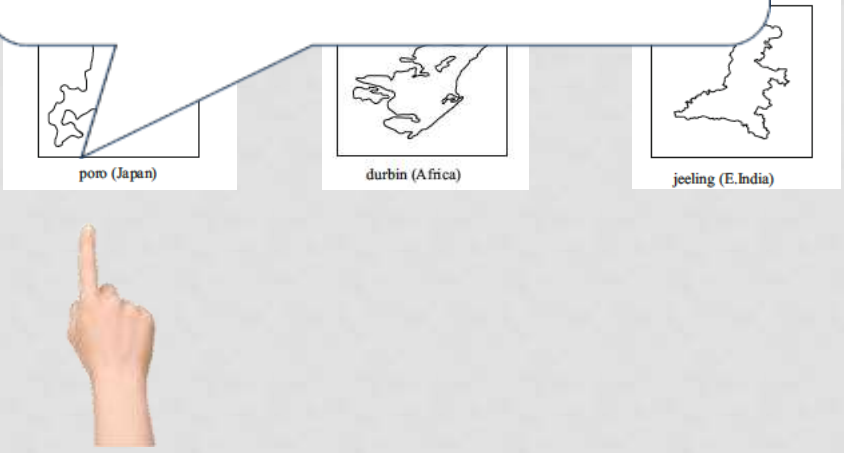
PURPOSE

- Examine whether multiple exemplar instruction (MEI) results in emergence of intraverbal categorization responding after having taught listener categorization

PARTICIPANTS AND SETTING

- 6 typically developing pre-school children
- 4 boys & 2 girls
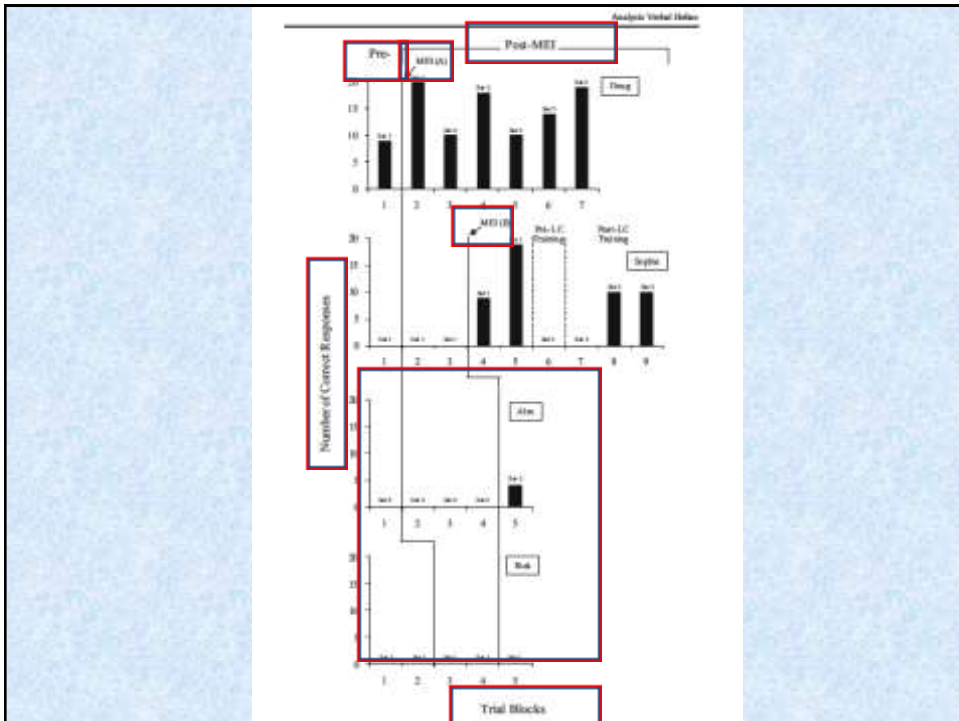- 3 yrs 10 mo − 4 yrs 7 mo

- Preschool
- Partitioned area
- Child-sized chairs and table
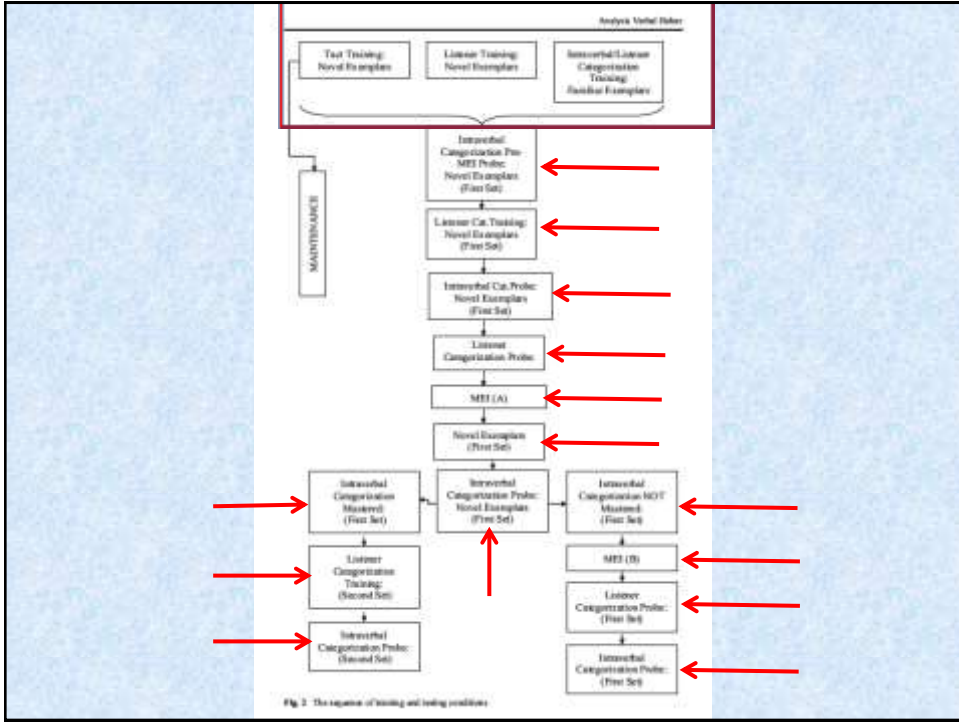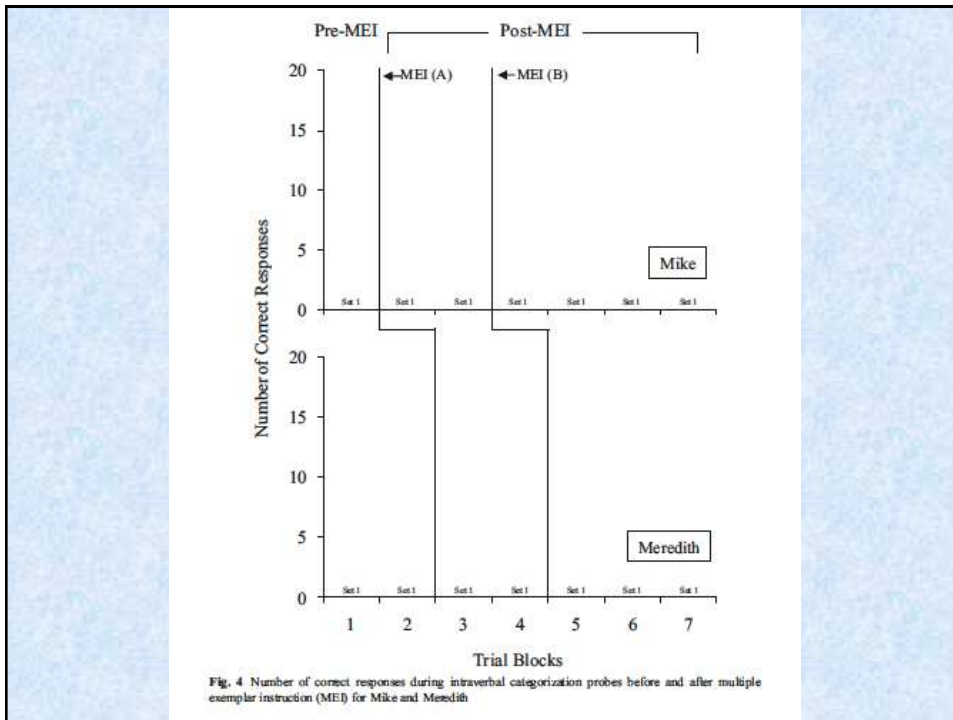
DEPENDENT VARIABLE

- Emission of untrained intraverbal categorization
  - after initial listener categorization
  - both before & after MEI

- After teaching to point to "Poro" when asked, "Which one is Japan?"
- After MEI
- Will the participant say "Japan" in response to "Poro is ____?"

Fig. 1 Three sample categories and their respective stimuli

Fig. 2. The sequence of training and testing conditions

Fig. 4 Number of correct responses during intraverbal categorization probes before and after multiple exemplar instruction (MEI) for Mike and Meredith
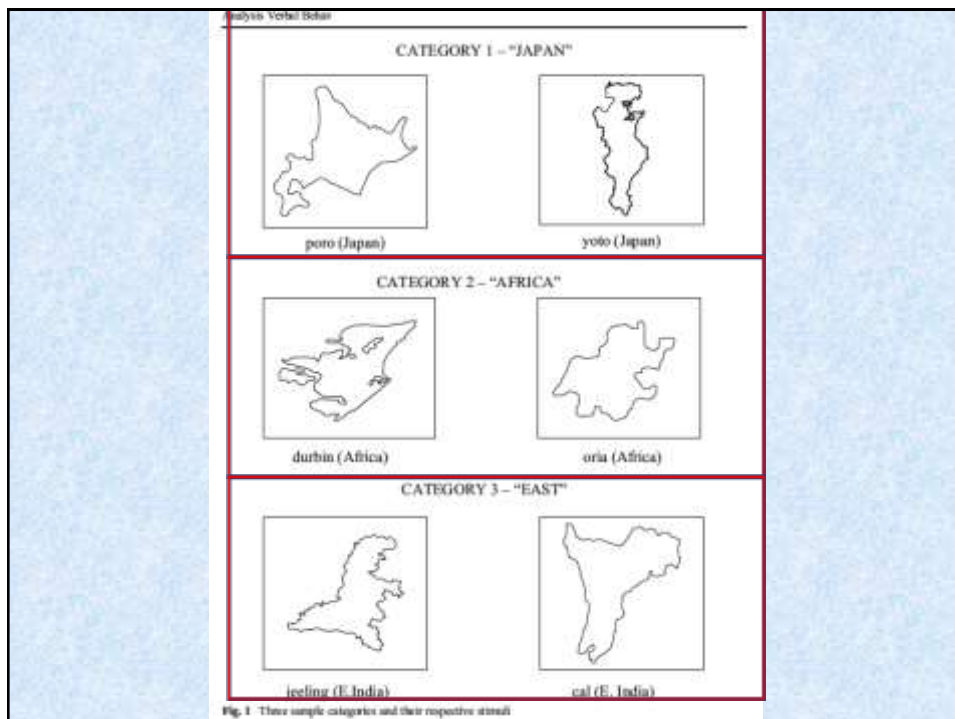
DISCUSSION

- Variable 2 participants
- **Naming Hypothesis**
  - <u>Naming:</u> responding as both a speaker & listener
    - Teach to respond to stimulus as listener
      - Respond as speaker w/o training
    - Teach to respond to stimulus as speaker
      - Responding as listener w/o training

DISCUSSION

- Sophie
  - Emergence observed (without MEI) with reverse relation:
    - Trained intraverbal (Expressive) & probed for listener (Receptive)
    - Emerging naming repertoire
    - Sequencing?

SEQUENCING

A REVIEW OF RECOMMENDATIONS FOR SEQUENCING RECEPTIVE AND EXPRESSIVE LANGUAGE INSTRUCTION

ANNA INGEBORG PETURSDOTTIR
TEXAS CHRISTIAN UNIVERSITY

AND

JAMES E. CARR
AUBURN UNIVERSITY

- **Reviewed recommendations**

- **EIBI - recommend teaching receptive before expressive** (Leaf & McEachin, 1999)
  - **Typical development**
  - **Easier to prompt receptive**

PETURSDOTTIR & CARR (2011)

- EIBI – UCLA model

- Verbal Behavior Model
  - Skinner's analysis of VB
  - (Barbera, 2007; Greer &Ross, 2008; Sundberg & Partington, 1998)

- Large-scale study with UCLA model
  - Not all recommendations research-based
  - Teaching receptive before expressive

- Review of literature

Empirical Evaluations of the Receptive-Before-Expressive Recommendation

Expressive training took fewer trials than receptive training.

Greater accuracy on receptive tests following expressive tr.

The receptive before expressive sequence took more time and trials than when expressive

Expressive tr. had a greater effect on receptive responding than receptive tr. on

The receptive-before-expressive sequence took

Variable results within and across participants, but overall greater accuracy on receptive tests following expressive tr. than on expressive tests following receptive tr.

SEQUENCING REVIEW

- No support - receptive before expressive

- Support - expressive before receptive

- Conclusions are tentative

- Additional research
  - Children with ASD

SEQUENCING LITERATURE REVIEW

A | B | A | I

An Investigation of Stimulus Pairing and Listener Training to Establish Emergent Intraverbals in Children with Autism
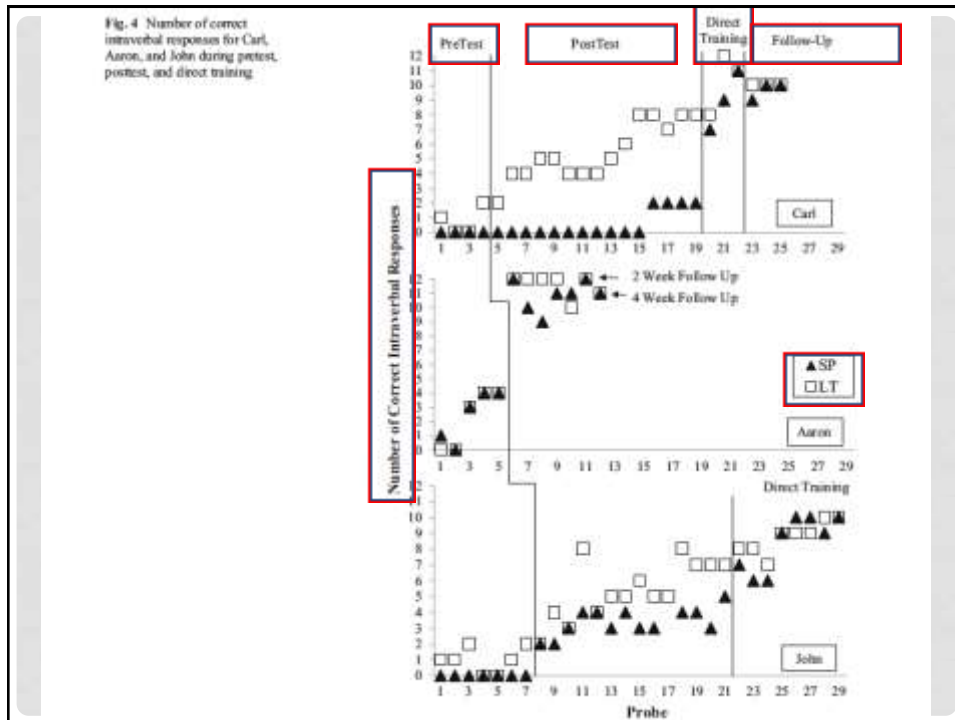
Mary Vallinger-Brown · Rocio Rosales

Table 2 Stimulus sets for Aaron

Intraverbal probe	Correct response
LT	
(1) What coin is worth 1 cent?	Penny
(2) What do you find on top of the house?	Roof
(3) What season do you pick up the leaves?	Fall
(4) What do you do when you're angry?	Yell
(5) What coin is worth 10 cents?	Dime
(6) What do you use to tell time?	Clock
SP	
(1) What do you do when you're happy?	Smile
(2) What shines in the sky in the day?	Sun
(3) What keeps food cold?	Refrigerator
(4) What season do the flowers bloom?	Spring
(5) What coin is worth 5 cents?	Nickel
(6) What coin is worth 25 cents?	Quarter

Fig. 1 Screenshot of stimulus presentation during LT

Fig. 2 Screenshot of stimulus presentation during SP (images shown in successive order)

Fig. 4 Number of correct intraverbal responses for Carl, Aaron, and John during pretest, posttest, and direct training

Research in Autism Spectrum Disorders 19 (2015) 72–81

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Journal homepage: http://ees.elsevier.com/RASD/default.asp

A further evaluation of the effects of listener training on derived categorization and speaker behavior in children with autism

Greg P. Lee, Caio F. Miguel, Emily K. Darcey, Adrienne M. Jennings
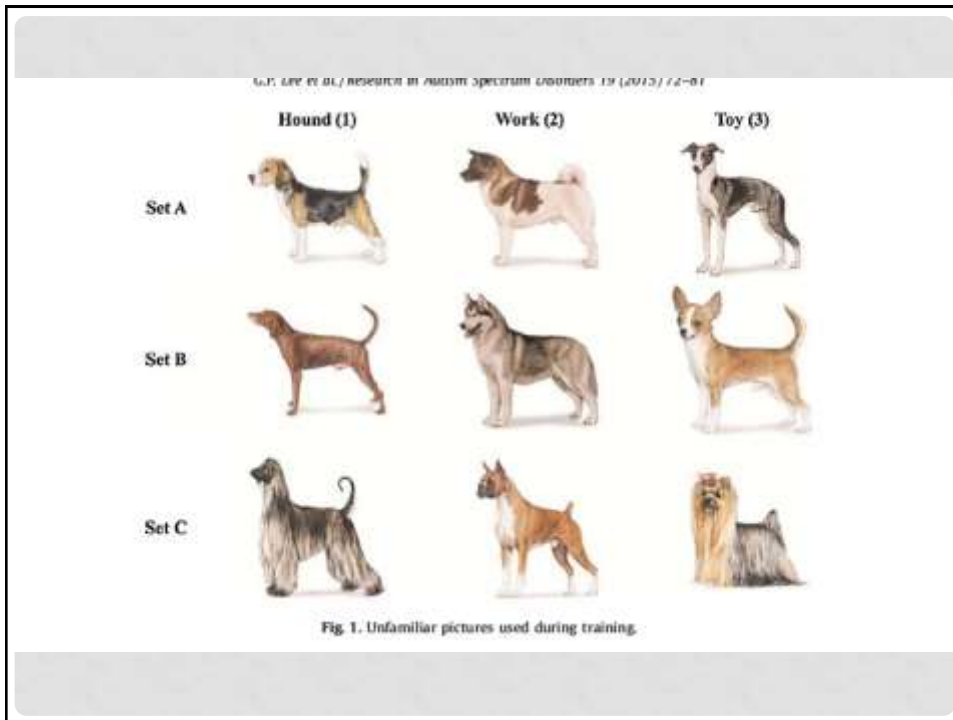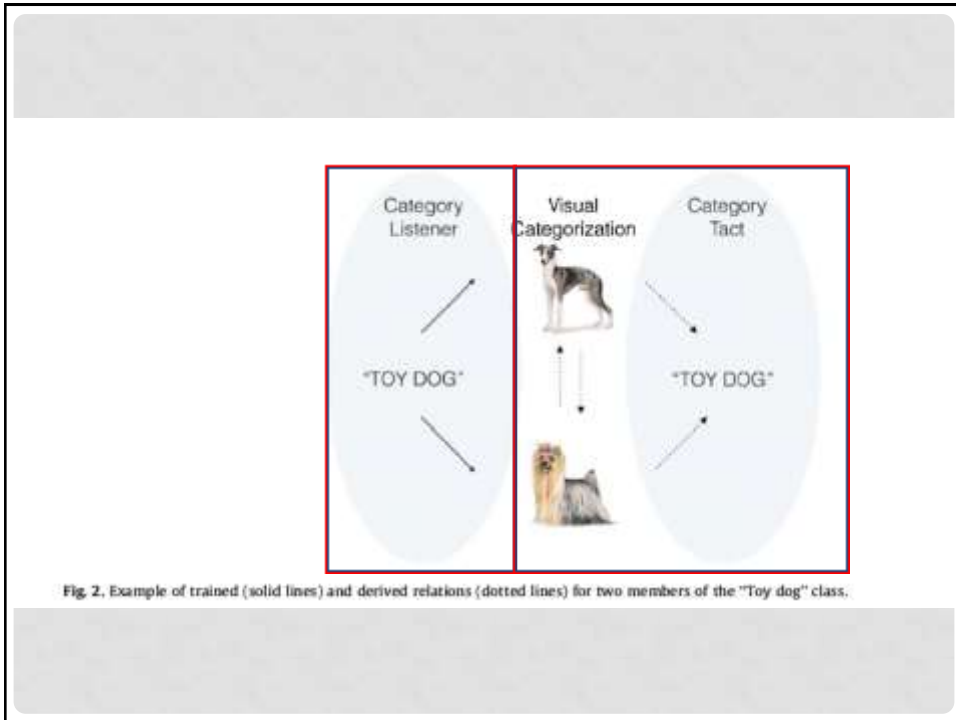
California State University, Sacramento, United States

G.P. Lee et al./Research in Autism Spectrum Disorders 19 (2015) 72–81

	Hound (1)	Work (2)	Toy (3)
Set A			
Set B			
Set C			

Fig. 1. Unfamiliar pictures used during training.

Table 1
Order of experimental conditions.

Order	Condition	Stimuli per trial	Training criterion
1	Visual Categorization Pretraining	3	2 blocks at 89%
2	Category Tact Pretraining	1	2 blocks at 89%
3	Category Listener Pretraining	3	2 blocks at 89%
4	Visual Categorization Pretest	3	N/A
5	Category Tact Pretest	1	N/A
6	Category Listener Training	3	2 blocks at 89%
7	Visual Categorization Posttest	3	N/A
8	Category Tact Posttest	1	N/A
9[*]	Category Tact Posttest 2	3	N/A
10[**]	Category Tact Training	1	2 blocks at 89%
11[**]	Visual Categorization Posttest	3	N/A

[*] Children were exposed to this condition only if they failed the previous tact posttest.
[**] Children were exposed to this condition if they fail Visual Categorization Posttest, Category Tact Posttest 1, and Category Tact Posttest 2.

Fig. 2. Example of trained (solid lines) and derived relations (dotted lines) for two members of the "Toy dog" class.

Visual categorization

Match

Category tact

What is it?

Work dog

Category listener training

Give me the toy dog

Fig. 3. The percentage of correct Category Tacts and Visual Categorizations for Charli and Marcus. Information on chronological and equivalent ages in months is included (S = speaker/expressive, L = listener/receptive).

Fig. 4. The percentage of correct Category Tacts and Visual Categorizations for Quincy and Teresa. Information on chronological and equivalent ages in months is included (S = speaker/expressive, L = listener/receptive).

7/22/2016

BRIEF REPORT

A Comparison of Intraverbal and Listener Training for Children with Autism Spectrum Disorder

Tiffany Kodak[1] · Amber R. Paden[2]

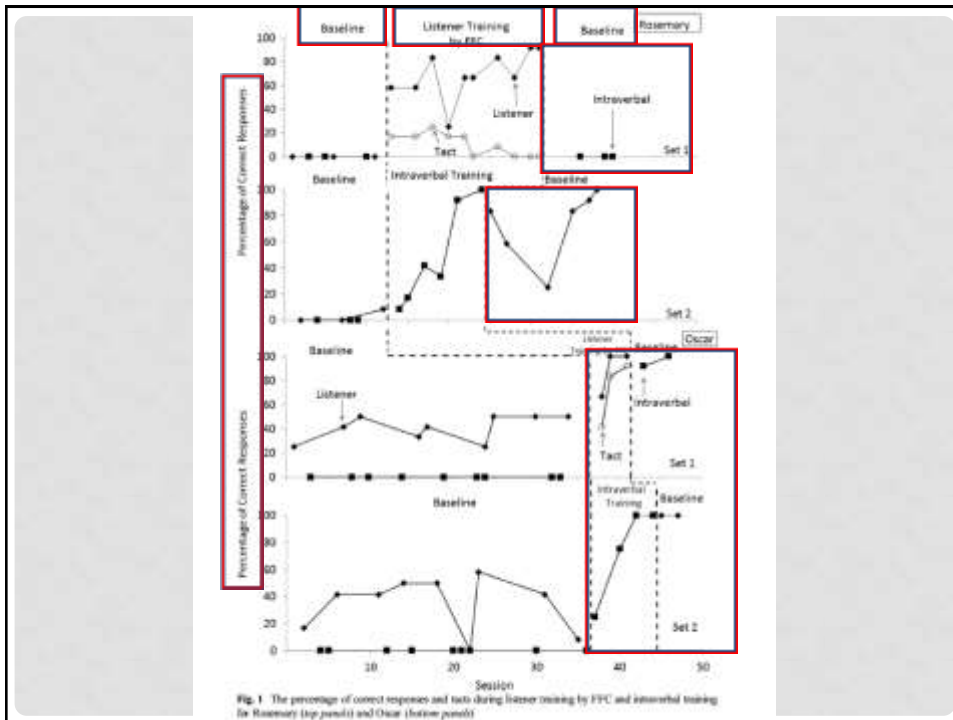**Abstract** The present investigation compared acquisition of intraverbals and listener behavior by function, feature, and class (FFC) for two children with autism spectrum disorder (ASD). We also measured tacts during listener training to evaluate whether higher levels of tacts predicted the emergence of intraverbal behavior following training. The results showed that intraverbal training required as many or fewer sessions to reach the mastery criterion than listener training by FFC, and intraverbal training consistently produced emergent listener behavior. In comparison, listener training by FFC did not consistently lead to the emergence of intraverbal behavior.

Keywords Autism spectrum disorders · Intraverbal behavior · Listener training

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Table 1 Targets for Rosemary and Oscar for stimulus sets 1 and 2

	Set 1		Set 2	
	Listener training	Response	Intraverbal training	Response
Rosemary	The person who keeps you safe is a	Policeman	The person who gives you medicine is a	Pharmacist
	The person who helps shoppers is a	Cashier	The person who tames lions is a	Trainer
	The person who checks your eyes is a	Optometrist	The person who does your nails is a	Manicurist
	The person who cleans buildings is a	Janitor	The person who builds houses is a	Carpenter
Oscar	You add with a	Calculator	You check the date with a	Calendar
	You buy things with	Money	You cook with a	Microwave
	You cover up with a	Blanket	You measure with a	Ruler
	You scoop with a	Spoon	You wash with	Soap
	You carry groceries in a	Cart	You carry things in a	Bag
	You talk to people on a	Phone	You put flowers in a	Vase

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Fig. 1 The percentage of correct responses and tacts during listener training by FFC and intraverbal training for Rosemary (top panel) and Oscar (bottom panel)

ABAI Association for Behavior Analysis International CrossMark

BRIEF REPORT

Emergent Intraverbal Forms may Occur as a Result of Listener Training for Children with Autism

Dean P. Smith[1,2] · Svein Eikeseth[2] ·
Sarah E. Fletcher[1] · Lisa Montebelli[1] ·
Holly R. Smith[1] · Jennifer C. Taylor[1]

Table 2 The six intraverbals taught as listener behavior and the two intraverbal control questions for each participant

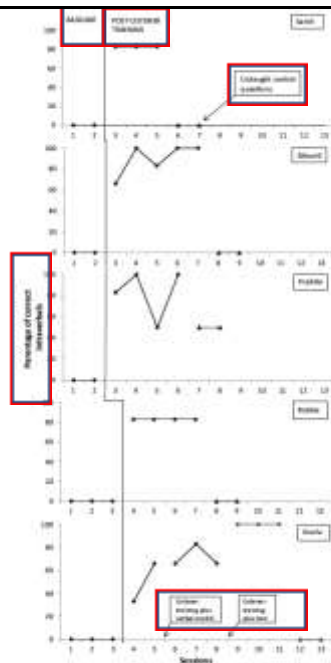| Participant	Six intraverbals taught as listener behavior	Two untaught intraverbals
Charlie	What's an animal that's grey? (elephant) What's a drink that's white? (milk) What's an animal that flies? (bird) What's a drink that's yellow? (juice) What's a food that's green? (apple) What do you kick that's round? (ball)	What's a vehicle that goes on water? (boat) What's a vehicle with two wheels? (bike)
Freddie	What's furniture that has four legs? (chair) What vehicle has an anchor? (boat) What breathes through gills? (fish) What's a food that's yellow? (banana) What's a drink that's white? (milk) What do you talk into? (telephone)	What plant has bark? (tree) What's a type of vehicle? (train)

Fig. 1 Percentages of correct intraverbals before and after listener training across participants. Response to two untaught control questions are depicted with triangular data points

Journal of
Applied Behavior
Analysis

**The effects of receptive and expressive training sequences
on the acquisition of
feature, function, and class**

Shimin Bao, Kristin T. Sweatt, Sarah A. Lechago, and Sarah Antal

University of Houston-Clear Lake

PURPOSE

• Examine the efficacy of 3 instructional training sequences for teaching feature, function, and class of objects

  • Receptive-Expressive
  • Expressive-Receptive
  • Mixed

DEPENDENT VARIABLE

- Total number of trials to the mastery criterion for expressive and receptive responding

PARTICIPANTS & SETTINGS

- Marcus - 3
- Melissa - 8
- Lizzy - 7
- ASD diagnosis

- Classroom - Marcus & Melissa
- Home - Lizzy

PRE-EXPERIMENTAL TRAINING

- MSWO - preference assessment

- Tact training - label names of pictures

Show me the one that is furniture

7/22/2016

BASELINE

- 60 pictures
- Tested expressive & receptive feature, function, or class
- 5s to respond
- Tested expressively & receptively 3 times
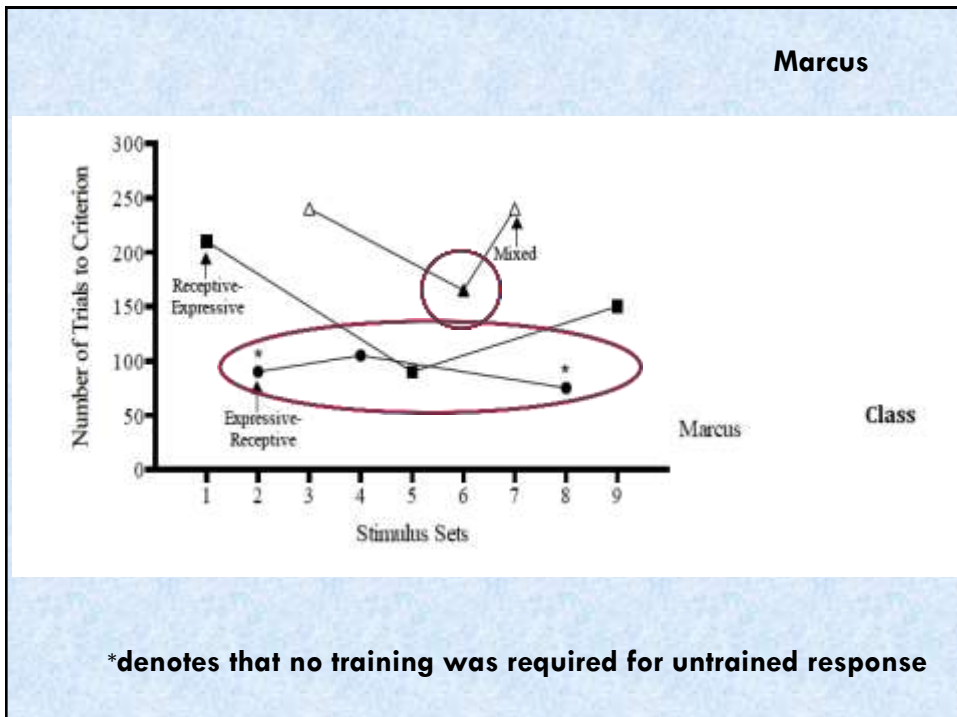
EXPRESSIVE-RECEPTIVE TRAINING SEQUENCE

- 1. Teach expressive responses
- 2. Probe - emergence of receptive responses
- 3. Train receptive responses to mastery

- **All training conditions used sets of 3 pictures**

RECEPTIVE-EXPRESSIVE TRAINING SEQUENCE

- 1. Teach receptive responses
- 2. Probe - emergence of expressive responses
- 3. Train expressive responses to mastery

MIXED TRAINING SEQUENCE

- Alternated expressive & receptive training
- 15-trial blocks

Marcus

*denotes that no training was required for untrained response

Melissa

Lizzy
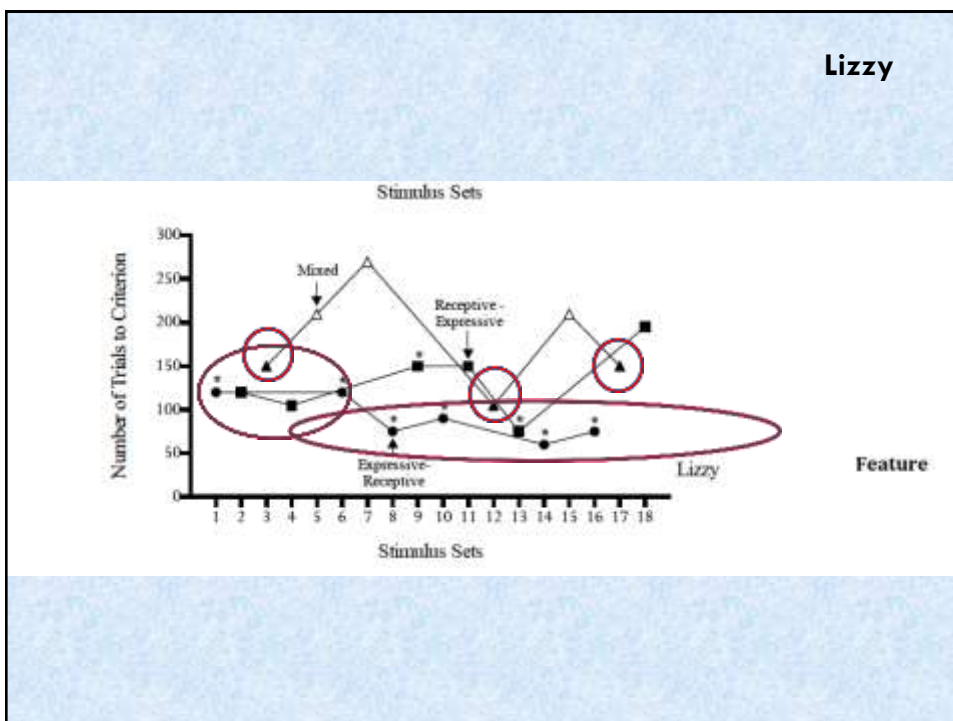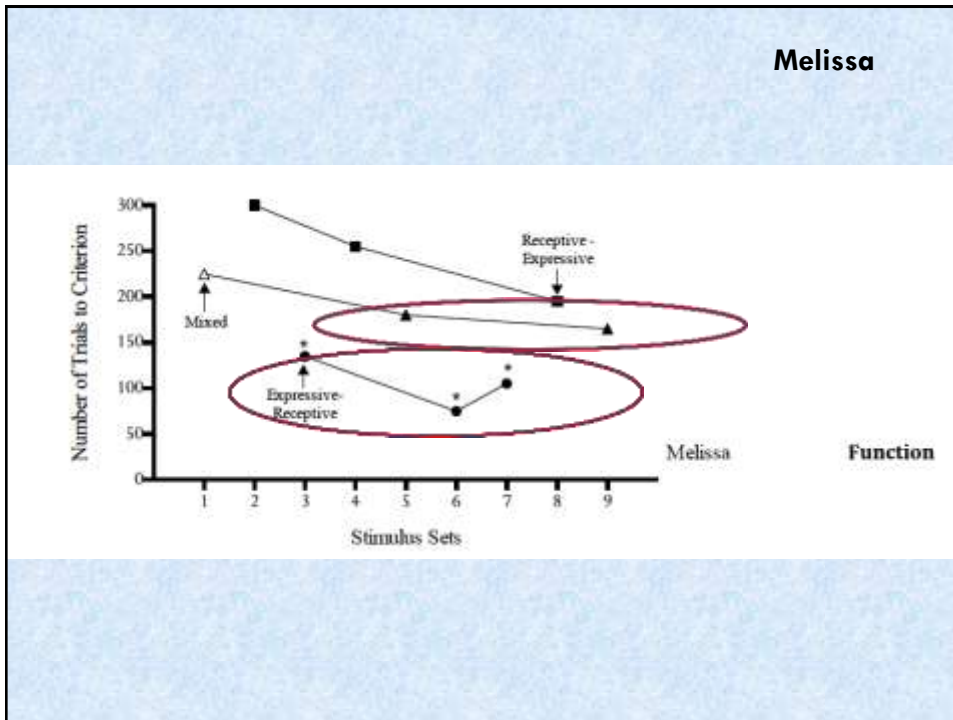
RESULTS

- Expressive-receptive: fewest trials to mastery
  - Most efficient

- Mixed condition
  - Fewer trials on sets with expressive training first
  - Trial block-by-trial block vs trial-by-trial
  - Additional research required

NAMING HYPOTHESIS

- Responding as <u>speaker and a listener</u> to the pictures
  - Expressive training trial
    - Orient to picture (rec. response) + exp. reinforced during trials
    - Correct responding during rec.

  - Receptive training trial
    - Learned to respond only rec. – pointing to picture
    - Exp. trial – no history of reinforcement for exp. responding

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THE EFFECTS OF ECHOIC RESPONDING DURING RECEPTIVE TRAINING IN TEACHING FEATURE FUNCTION AND CLASS TO CHILDREN WITH AUTISM

BAO & LECHAGO (IN PROGRESS)

PURPOSE

- Examine effects of collateral response training
  - echoic response during receptive response training
  - rate of acquisition of expressive and receptive responses
  - feature, function, and class

DEPENDENT VARIABLE

- Number of trials to mastery criterion for expressive and receptive responding for a set of 3 stimuli

PARTICIPANTS & SETTING

- 5-year-old male (Allen)
- ASD
- 2 in progress

- Daily therapy room at a research clinic

PRE-EXPERIMENTAL TRAINING

- Preference assessment

- Tact training

BASELINE

- Tested expressive & receptive (Class)
- 5s to respond
- Each picture tested expressively & receptively 3 times

EXPRESSIVE-RECEPTIVE TRAINING SEQUENCE

- Teach expressive responses
- Probe for emergence of receptive responses
- Train receptive responses to mastery

- **All training conditions used sets of 3 pictures**

RECEPTIVE-EXPRESSIVE TRAINING SEQUENCE

- Teach receptive responses
- Probe for emergence of expressive responses
- Train expressive responses to mastery

RECEPTIVE +ECHOIC-EXPRESSIVE TRAINING SEQUENCE

- Teach receptive responses + require echoic response
  - (e.g., "Touch mammal" - child points to dog and says "mammal")
- Probe for emergence of expressive responses
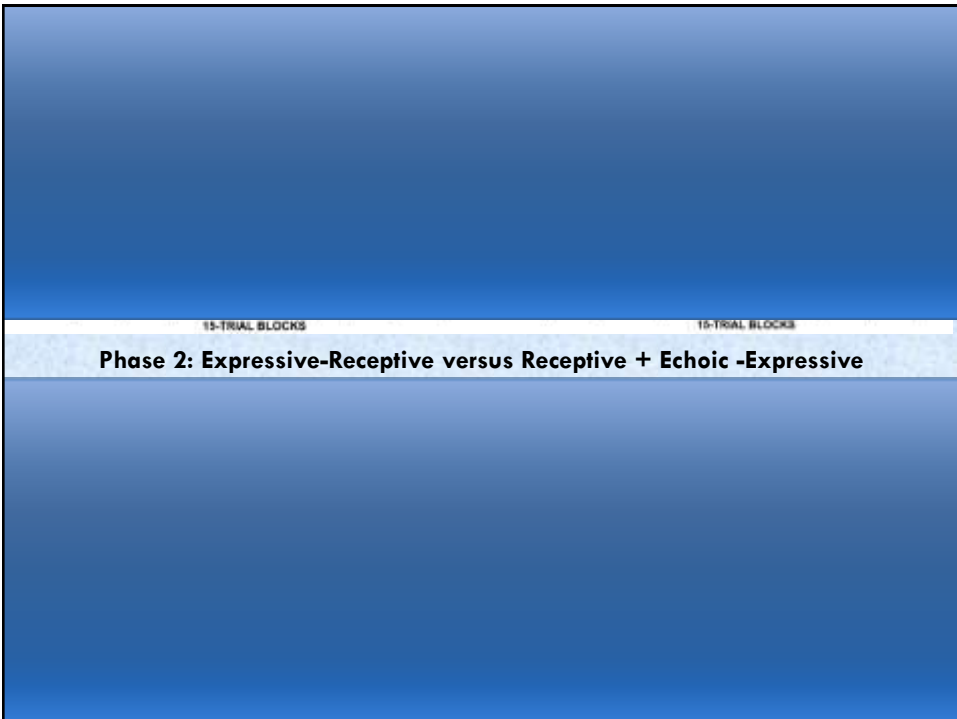- Train expressive responses until mastery

2 PHASES - COMPARISONS

- **Phase 1:** (E-R) vs. (R-E)
  - Compare expressive-receptive to receptive-expressive

- **Phase 2:** (E-R) vs. ((R+Echoic)-E)
  - Compare expressive-receptive to receptive+echoic - expressive

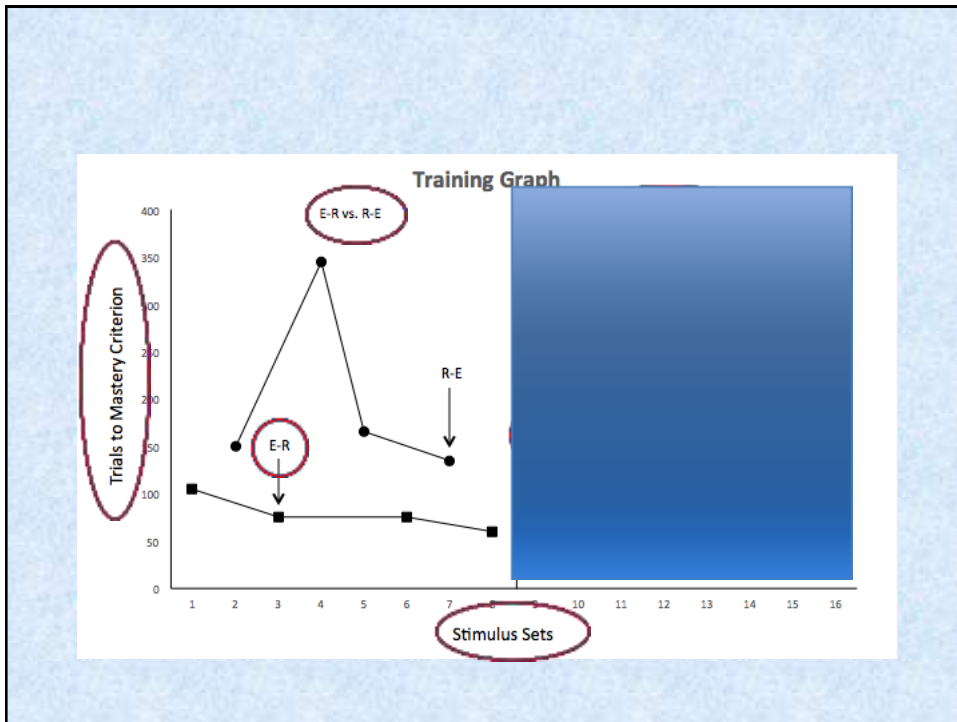**Phase 1: Expressive-Receptive versus Receptive-Expressive**

15-TRIAL BLOCKS   15-TRIAL BLOCKS

Phase 2: Expressive-Receptive versus Receptive + Echoic -Expressive

Training Graph

- **CONCLUSIONS**

- Expressive-receptive instructional sequence proves to be most efficient
- Tentative conclusions
  - Compared to receptive + echoic

MATCHING-TO-SAMPLE

STIMULUS EQUIVALENCE

STIMULUS EQUIVALENCE

- **_Definition:_** Responding to a group of physically dissimilar stimuli, similarly
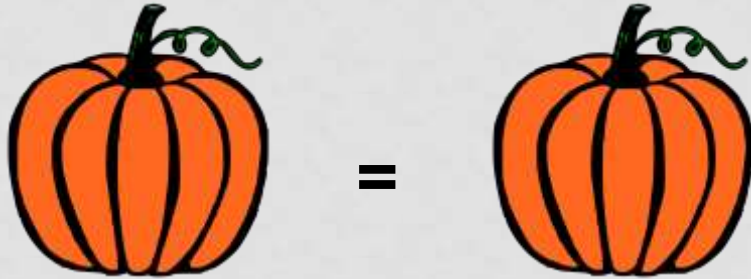 - "Equivalence Class"

DOG

"dog!"

REFLEXIVITY

- Identity matching

$$A=A, B=B, C=C$$

SYMMETRY

Pumpkin
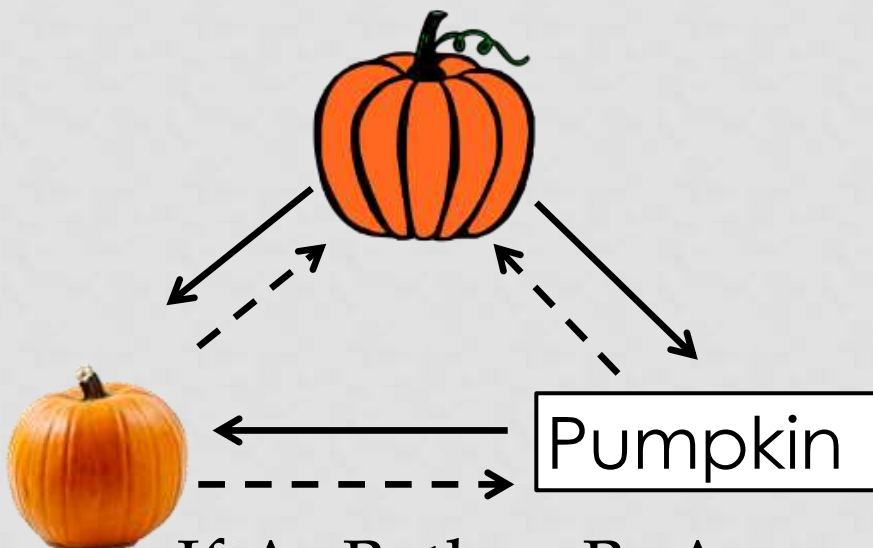
If A=B, then B=A

TRANSITIVITY

Pumpkin

If A=B, & B=C, then A=C

Direct test of equivalence

Pumpkin
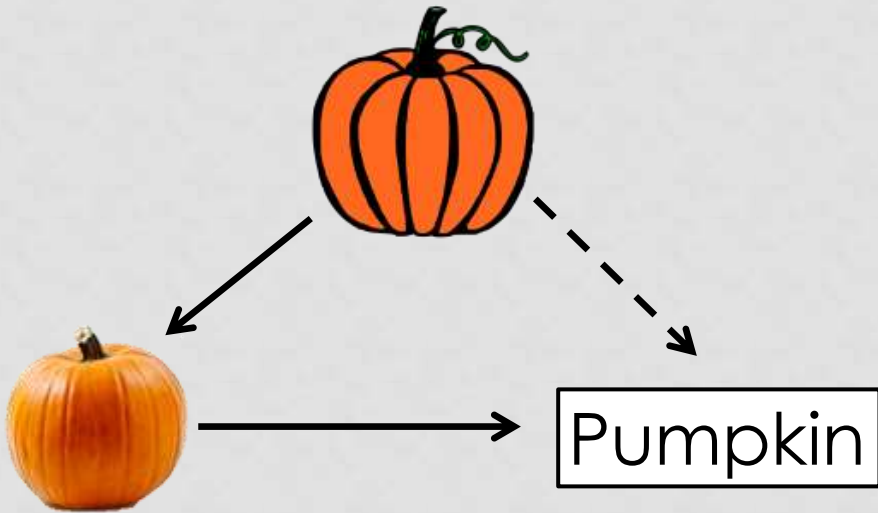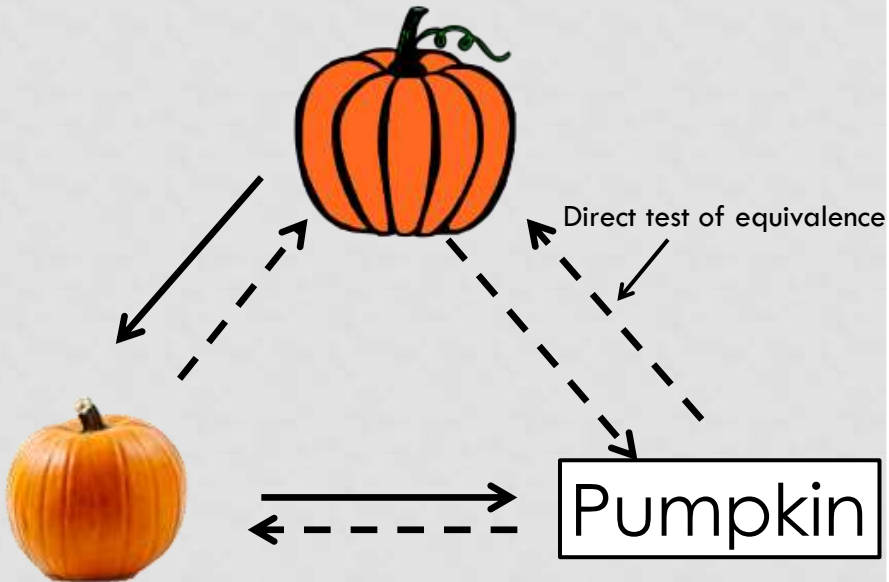
Teach 2 relations and get 4 free!

Slide 1

S

Sample stimulus

| t | r | s |

Comparison stimuli

Slide 2

MATCHING-TO-SAMPLE
LITERATURE REVIEW

Behavioral Interventions
Behav. Intervent. **18**: 279–289 (2003)
Published online in Wiley InterScience (www.interscience.wiley.com). **DOI**: 10.1002/bin.144

THE EFFECTS OF THREE STIMULUS-EQUIVALENCE TESTING CONDITIONS ON EMERGENT US GEOGRAPHY RELATIONS OF CHILDREN DIAGNOSED WITH AUTISM

Linda A. LeBlanc*, Caio F. Miguel, Anne R. Cummings,
Tina R. Goldsmith, and James E. Carr

Western Michigan University, USA

Figure 1. Sample stimulus board for B–C relation.

A – printed state names
B – map of state shape
C - printed state capitol

Figure 2. Pre-test and post-test scores for vocal test and C–A, A–C, B–A, and C–B relations presented in the order of administration with the first condition in the top panel and the third condition in the bottom panel. Data for Nick are presented in the left-hand column and data for Marty are presented in the right-hand column.
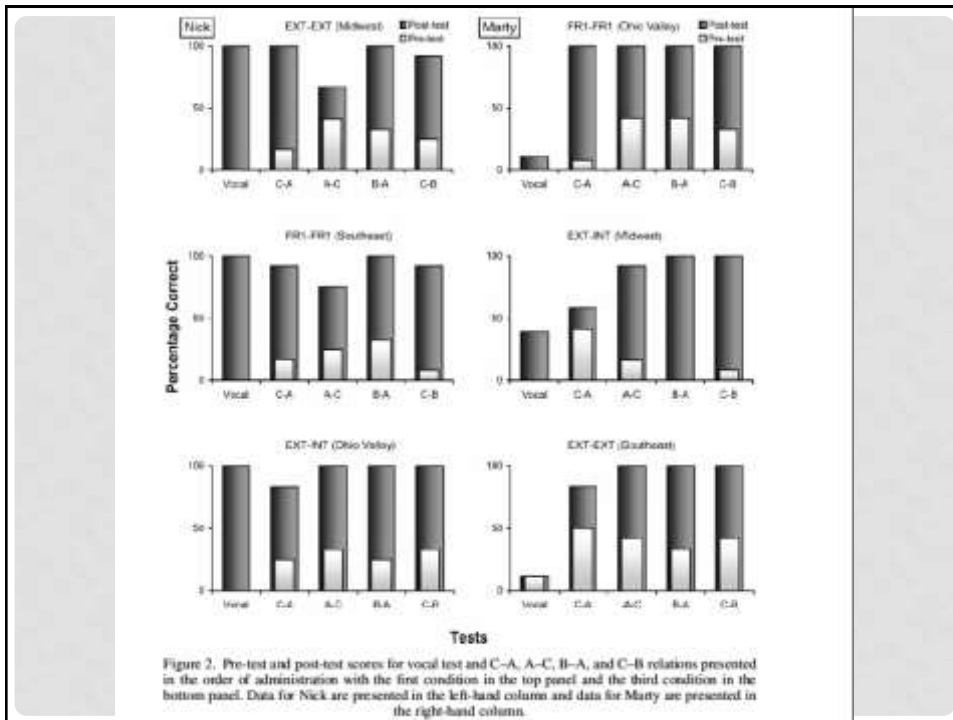
USING COMPLEX AUDITORY–VISUAL SAMPLES TO PRODUCE EMERGENT RELATIONS IN CHILDREN WITH AUTISM

NICOLE C. GROSKREUTZ AND ALLEN KARSINA

NEW ENGLAND CENTER FOR CHILDREN

CAIO F. MIGUEL

NEW ENGLAND CENTER FOR CHILDREN AND NORTHEASTERN UNIVERSITY

AND

MARK P. GROSKREUTZ

NEW ENGLAND CENTER FOR CHILDREN

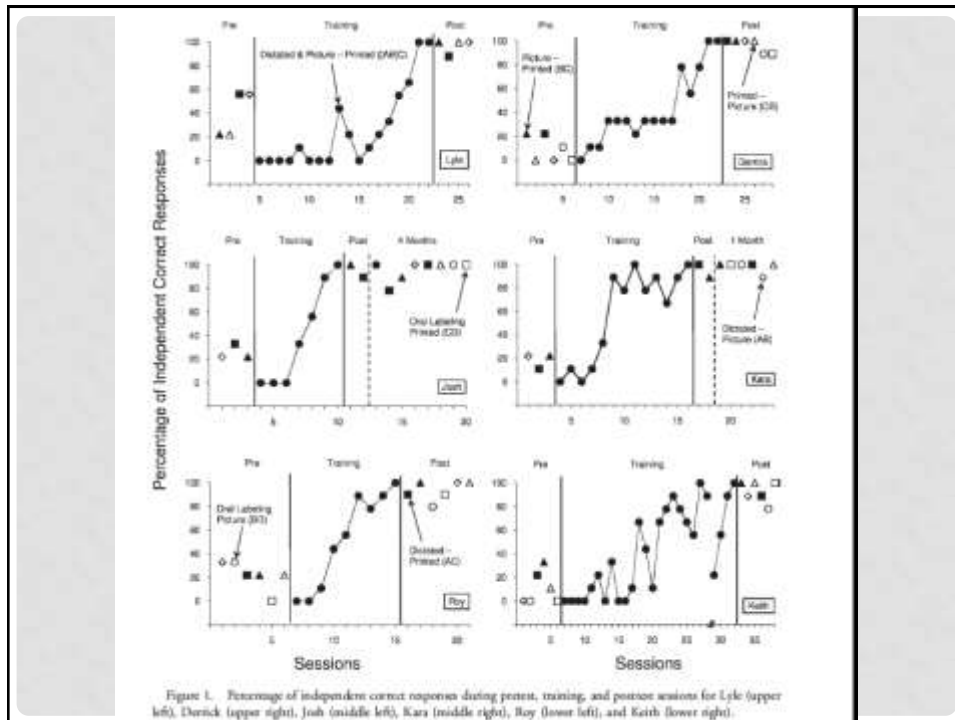Figure 1. Percentage of independent correct responses during pretest, training, and posttest sessions for Lyle (upper left), Derrick (upper right), Josh (middle left), Kara (middle right), Roy (lower left), and Keith (lower right).

Contents lists available at ScienceDirect

Research in Autism Spectrum Disorders

Journal homepage: http://ees.elsevier.com/RASD/default.asp

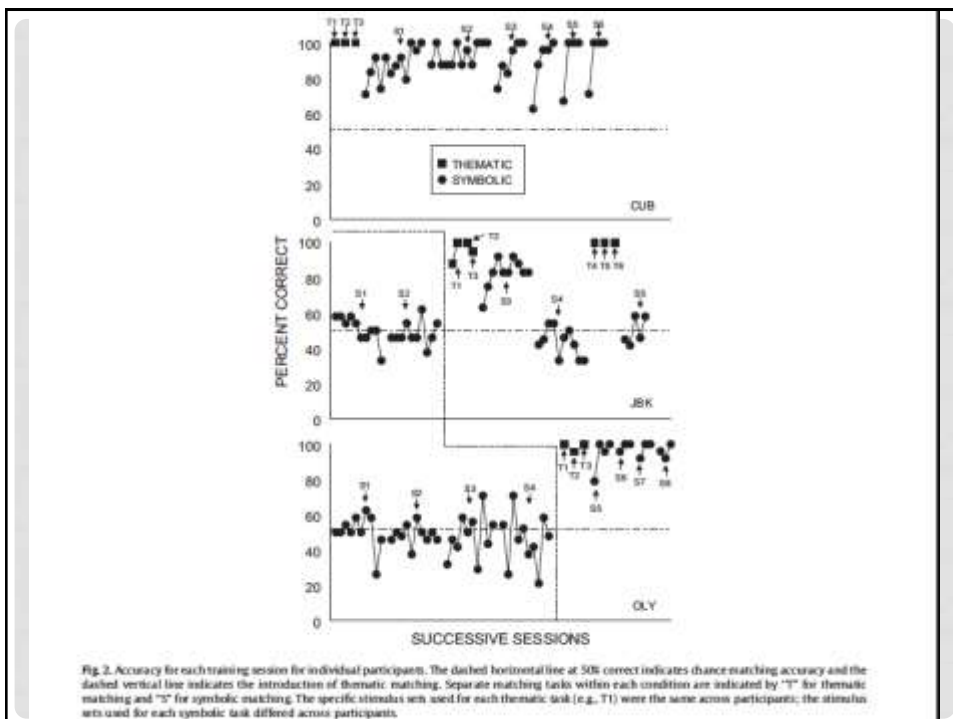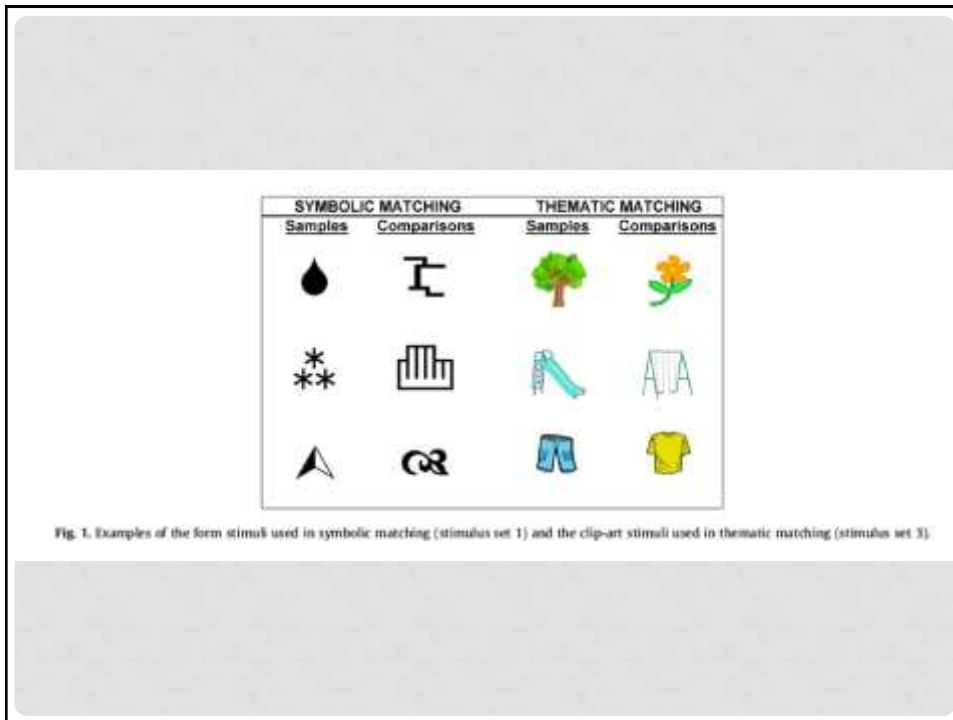## Thematic matching as remedial teaching for symbolic matching for individuals with autism spectrum disorder

Karen M. Lionello-DeNolf [a,*], Rachel Farber [a], B. Max Jones [b], William V. Dube [a]

[a] University of Massachusetts Medical School, Shriver Center, Lake Avenue North 53-301, Worcester, MA 01655, USA
[b] Curtin University, School of Psychology & Speech Pathology, GPO Box U1987, Perth, WA 6845, Australia

Fig. 1. Examples of the form stimuli used in symbolic matching (stimulus set 1) and the clip-art stimuli used in thematic matching (stimulus set 3).

Fig. 2. Accuracy for each training session for individual participants. The dashed horizontal line at 50% correct indicates chance matching accuracy and the dashed vertical line indicates the introduction of thematic matching. Separate matching tasks within each condition are indicated by "T" for thematic matching and "S" for symbolic matching. The specific stimulus sets used for each thematic task (e.g., T1) were the same across participants; the stimulus sets used for each symbolic task differed across participants.

USING CLASS-SPECIFIC COMPOUND CONSEQUENCES TO TEACH
DICTATED AND PRINTED LETTER RELATIONS TO A CHILD WITH
AUTISM

ANDRÉ A. B. VARELLA AND DEISY G. DE SOUZA

UNIVERSIDADE FEDERAL DE SÃO CARLOS, BRAZIL INSTITUTO NACIONAL DE CIÊNCIA E TECNOLOGIA SOBRE
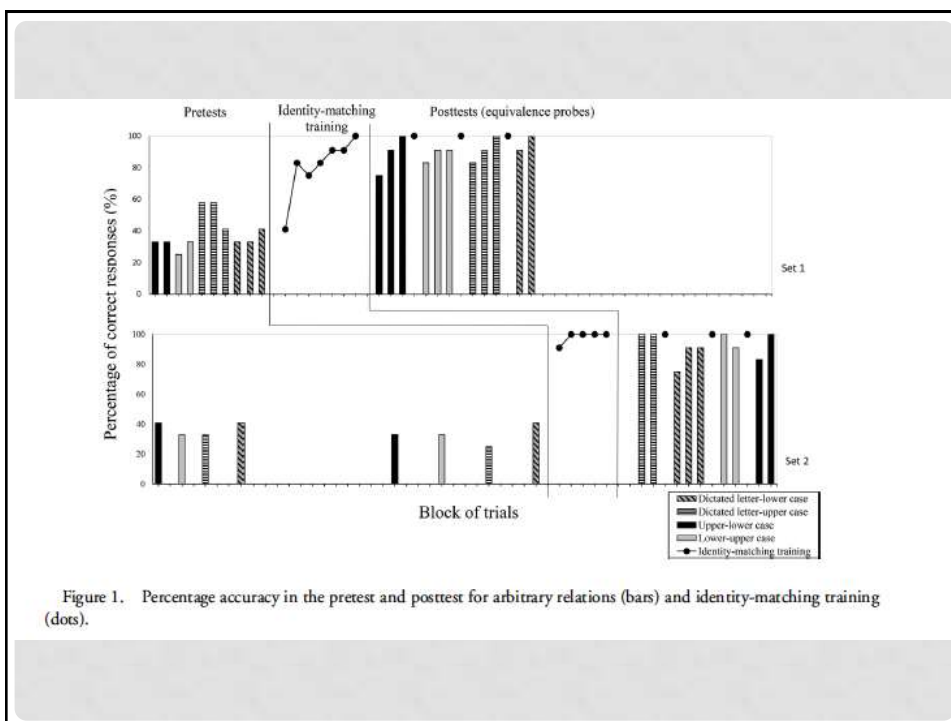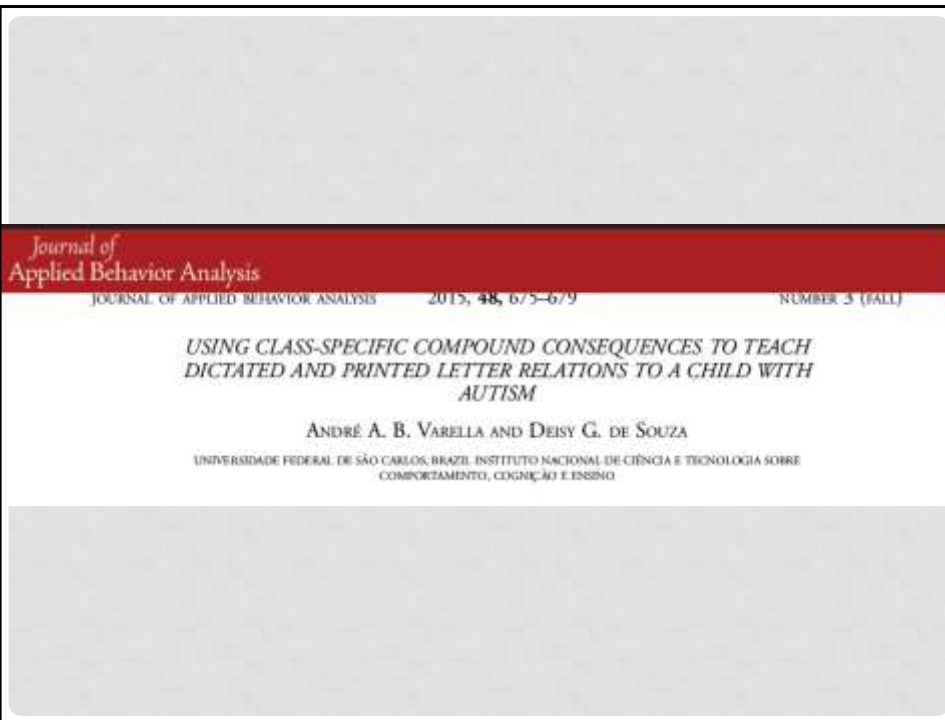COMPORTAMENTO, COGNIÇÃO E ENSINO

Figure 1. Percentage accuracy in the pretest and posttest for arbitrary relations (bars) and identity-matching training (dots).

RECOMMENDATIONS FOR PRACTICE

Consider emergence when developing programs

A STARTING POINT

- MEI - alternate responding between subset of exemplars
- Target mands first (Sundberg & Michael, 2001)
  - Benefit speaker & MO
  - 3-4 mands to mastery
  - Teach 3-4 new targets as tacts & mands simultaneously
  - Probe with new targets
    - Teach mand → tact?
    - Teach tact → mand?

  - **Remember the MO when teaching and probing mands!**

Mands

Motivating Operation (MO)

MO: play outside

MO: hungry

MO: complete an activity the requires a spoon – making a volcano

Reinforce with the item

Tacts
Item itself (physical properties)

MO for item may or may
not be present

Reinforce with a <u>different</u> item

Teach as mand

Probe to see if they can _____

TACT

Antecedents & consequences

LISTENER & TACT TRAINING

- Expressive first (Tact)
  - Probe listener

- Few tacts (5-10)
  - SPOP (stimulus pairing observation procedure) – echoic
  - If no acquisition, teach tact

- Need additional research → alternative (to vocal) communication systems

INTRAVERBAL

- Emergence of reverse intraverbal
  - Subset with both types of intraverbals (symmetrical relation)
  - E.g., Houston is in what state? → Texas
    Name a city in Texas. → Houston
  - Subset of exemplars: city→ state
  - Subset of exemplars: state→ city

SOCIAL SKILLS

- <u>General Case Analysis:</u> all possible stimulus arrangements & response options

- Scripts and script fading
  - Saying many things about a scenario or stimulus
    - (initiating conversation during play)

- Answer questions about a scenario
  - Saying many things to assess a situation
    - (teaching to offer help)

- + MEI (multiple scenarios, multiple stimuli)

- Increases chance of verbal behavior in novel situations

LISTENER AND IVB

- Start with expressive training (IVB)

- Listener training → emergence of IVB
  - Thematically unrelated – not categorization

- Categorization
  - Naming repertoire - -> Listener or IVB

- SPOB

MATCHING-TO-SAMPLE (MTS)

- Establish relationships
  - between letters (upper to lowercase)
  - sight words (pictures → printed word → vocal emission)
  - symbols for picture exchange systems
  - educationally relevant facts (states → cities→ maps → state flowers→ maps)

MTS: THINGS TO CONSIDER

Cards:

Match

Ensure your learner is paying attention to the stimuli

Thank you
Dr. Laura Grow (Cal State University – Fresno)
Assisting with MTS recommendations

Teaching Receptive Language Skills:
Recommendations for Instructors

Laura Grow
University of British Columbia

Linda LeBlanc
Trumpet Behavioral Health

Keywords: autism, developmental disabilities, early intervention, instructional strategies, listener behavior, receptive language

56   RECOMMENDATIONS FOR TEACHING RECEPTIVE LANGUAGE   *Behavior Analysis in Practice, 6(1), 56-75*

PARTING WORDS

- Always refer to the literature
  - Constantly learning new things
  - Examine participant profiles
- If procedures new territory
  - Contact a BCBA who has experience
  - Contact the corresponding author
    - LOVE IT!

Strategies for Making Regular Contact With the Scholarly Literature
James E. Carr, Ph.D., BCBA-D and
Adam M. Briggs, M.S., BCBA
Auburn University

ABSTRACT

Behavior analysts are obligated by the conventions of the academic discipline and guidelines of professional conduct to stay in close contact with the scholarly literature. However, a number of variables can interfere with this obligation. We discuss several barriers to matching the literature, accessing journal content, and making contact with the contemporary literature and provide solutions for eliminating them.
Keywords: evidence-based practice, information literacy

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