



- Alison Betz
- Katie Nicholson
- Jeanine Tanz
- Justine Henry
- Becky Werle
- Ali Wiegand
- Andrew Morgan
- Scott Center staff



1. Typical vs. delayed development
2. Symptoms of ASD
3. ABA for young children
4. Effective procedures
5. Efficiency procedures



Learning Objectives

www.thescottcenter.org
(321) 674-8106 ext. 1

- Much of this information might be review
 - *But hopefully it will be presented in a useful and slightly different context*
- Please ask questions as they arise
- Feel free to share related education, training, or applied experiences



www.thescottcenter.org
(321) 674-8106 ext. 1

A term describing organized
patterns of characteristic behaviors

(Novak & Pelaez, 2010)



Autism

www.thescottcenter.org
(321) 674-8106 ext. 1

Behavior: *anything a person says or does*

- Latency
- Duration
- Frequency
- Topography (form)
- Magnitude (intensity)



www.thescottcenter.org
(321) 674-8106 ext. 1

By 1 – 4 months:

- Fixating and tracking (to 180° by 4-m)
- Identifying faces

By 5 to 8 months:

- Localizing alternate objects
- Hand regard, near/far
- Simple imitation skills



www.thescottcenter.org
The Scott Center
for Autism Treatment

www.thescottcenter.org
(321) 674-8106 ext. 1

By 12 months: Object permanence

By 18 months: Cause-effect play



www.thescottcenter.org
The Scott Center
for Autism Treatment

www.thescottcenter.org
(321) 674-8106 ext. 1

By age 2 years:

- Goal-directed play
- Object permanence is completely intact
- Uses objects appropriately
- Attends to pictures in a book
- Simple puzzles and shape discrimination
- Matching/nesting/sorting
- Representational play
- Imitation skills are refined



Problem Solving

www.thescottcenter.org
(321) 674-8106 ext. 1

- Attention span increases from 15 minutes at 3 years (1 hour at 6 yrs)
- Selective attention increases
- Age 4 + Increased ability to plan and carry out systematic perceptual searches
- By the end of the preschool years, children are easier to teach, interview, test because they can follow directions, sustain attention to a group task, less distractible, more self control



Attention

www.thescottcenter.org
(321) 674-8106 ext. 1

By age 2: Rote counting

By age 3: Give you 3 of something

By 3 to 5:

- 1:1 correspondence
- Identifies number & order
- Before/after, describe past events, anticipate & plan for future events
- Describe order or sequence of things, passage of time and how it is measured
- Understands units of time/ seconds, numbers, months, years



Pre-Academic (Numbers)

www.thescottcenter.org
(321) 674-8106 ext. 1

- Receptive vs. Expressive (cognitive)
- Speech vs. language
- Phonology
- Syntax
- Morphology
- Pragmatics



Language Development

www.thescottcenter.org
(321) 674-8106 ext. 1

- First six months, universal 'babbling'
- With increasing age, range of sounds becomes those produced by familiar adults
- By 8 months, infant uses sounds for interpersonal and personal functions



Language in Infancy

www.thescottcenter.org
(321) 674-8106 ext. 1

- At 4 months, uses sounds to attract attention of another, hands are used for reaching, swiping
- At 9-10 months uses sounds and gestures in a communicative way
- Meaningful speech begins at 12 months



www.thescottcenter.org
(321) 674-8106 ext. 1

11 Months

14 Months



www.thescottcenter.org
(321) 674-8106 ext. 1

- 10-20 words
- Combines two words (e.g., all gone)
- Follows simple commands
- Points to body parts



18 months

www.thescottcenter.org
(321) 674-8106 ext. 1

24 months

- 300 words, MLU 2 – 3 words
- Asks questions, refers to self by name
- Forms plurals & names pictures
- Simple questions/commands
- Uses pronouns

30 months

- 450 words, uses past tense
- Simple size concepts
- Combines nouns & verbs



www.thescottcenter.org
(321) 674-8106 ext. 1

- Vocabulary of 1000+ words
- Tells a simple story
- Produce m, n, ng, p, f, h, w
- Sing songs
- Names 1 color
- Practices talking to self, knows last name, gender, name of street, nursery rhymes



36 months - Advanced

www.thescottcenter.org
(321) 674-8106 ext. 1



Early Identification

www.thescottcenter.org
(321) 674-8106 ext. 1

1 in 68 children will be diagnosed with autism

- Rise in autism means a rise in the demand for effective treatment
- Early Intervention is a huge break through in autism treatments
- A small population of children with autism fails to develop language
- A procedure to induce vocalizations is warranted



Background

www.thescottcenter.org
(321) 674-8106 ext. 1

Previously	NOW
Rare	Common
Intellectual Disability	ID in minority
Rarely traceable (biology)	Traceable to biological causes
Narrow Range	Wide range of severity
Exclusive of other disorders	Comorbidity
3 Domains	2 Domains

 **Diagnosis: Evolving** www.thescottcenter.org
(321) 674-8106 ext. 1

- Hundreds of possible patterns
- Behavioral systems approach: “hidden deficits and hidden skills”
- Description of behaviors with consistent and organized patterns of behavior

 **Diagnosis** www.thescottcenter.org
(321) 674-8106 ext. 1

- Direct observation: currently only consistent way to identify.
 - Use of commercially available protocols to structure context.
 - Naturalistic observation, compare to criteria
 - Reports of other's behavioral observation



Best Evidence

www.thescottcenter.org
(321) 674-8106 ext. 1

- Research: Prospective and retrospective observation (Zwaigenbaum, Bryson, & Garond 2013)
 - Prospective: Standardized measures early in development and over time.
 - Retrospective: Interviews with parents, analysis of videos of children with diagnosis.
- Subtle group differences
 - Reduced “spontaneous” social orienting (Bhat, Galloway, Landa, 2010)
 - Reduced social ‘liveliness’ during parent-child interaction (Wan et al., 2012)



Infants & Toddlers

www.thescottcenter.org
(321) 674-8106 ext. 1



Subtle Differences

www.thescottcenter.org
(321) 674-8106 ext. 1

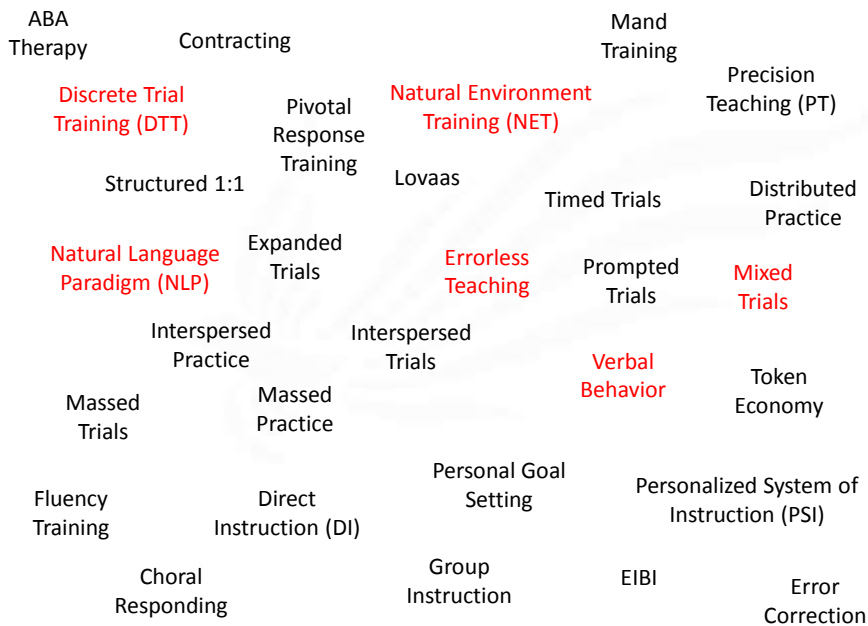
- 12 - 14 months: Detect behaviors consistent with ASD
- 12 - 24 months: Better discrimination between ASD, DD, and TD
- May not emerge until 24 months
- Evidence for accuracy and stability at 24 months
- Considerable variability in early presentation



www.thescottcenter.org
(321) 674-8106 ext. 1

PURPOSE: to return to a developmental trajectory that is age-appropriate

- Goal-based
- Individually-based
- Imitation, basic verbal behavior, vocal behavior training, pre-academic skill development
- Includes parent, teacher etc. training



- Focused ABA: treatment for a limited number of targets
- Comprehensive ABA: multiple targets across all developmental domains

Retrieved from: http://www.bacb.com/Downloadfiles/ABA_Guidelines_for_ASD.pdf



Definitions

www.thescottcenter.org
(321) 674-8106 ext. 1

- Important (focus on behavioral cusps)
- Conceptually systematic
- Build on previously mastered skills
- Facilitate generalization
- Consistent with what is known about child growth and development (when appropriate)
- Scientific understanding of teaching and learning (evidence-based)
- Representative of instructional strategies and activities to meet the needs of students with varying abilities and needs



Considerations

www.thescottcenter.org
(321) 674-8106 ext. 1

- Provide multiple learning opportunities in short amount of time
 - Addresses learners who need many trials to learn a new skill; can be 100's or 1000's
- Designed as a first step, not the entire intervention
 - Learned behavior must then be taught in other contexts (generalization)
 - The ease of this step varies greatly across learners
 - The time it takes varies greatly across learners



Discrete trial training

www.thescottcenter.org
(321) 674-8106 ext. 1



VIDEO: "E" 22 months

www.thescottcenter.org
(321) 674-8106 ext. 1

- Discrimination teaching procedures
- Eliminate or minimize incorrect responding
- Stimulus fading]
- Differential reinforcement



Errorless Strategies

www.thescottcenter.org
(321) 674-8106 ext. 1

Additional cues that facilitate the correct response. Including:

- Physical: guidance to perform a response
- Spatial: arranging materials to highlight correct response
- Visual: additional cues for correct response (e.g., colors)
- Model: demonstrating correct response
- Verbal: extra instructions/directions



Prompting

www.thescottcenter.org
(321) 674-8106 ext. 1



- Interrupt (if possible) & redirect
- Re-present with prompt
- Re-test (independent opportunity)



Error Correction

www.thescottcenter.org
(321) 674-8106 ext. 1

Child demonstrates a skill or behavior in a context different from the one in which it was learned

1. New adult, caregiver, or peer(s)
2. Different locations
3. Different materials
4. Different times



Generalization

www.thescottcenter.org
(321) 674-8106 ext. 1

- Generalization is necessary to make sure we do not need to teach every behavior in every context
- Generalization does not automatically happen with most learners
- Need to plan for generalization when designing instruction
- By planning for generalization, learners will be more likely to be successful in a variety of situations



www.thescottcenter.org
(321) 674-8106 ext. 1

- Planning for generalization:
 - When, with whom, where, how often?
- Key strategies
 - Multiple exemplars (MET)
 - A variety of teachers and paras
 - Several relevant situations
 - Probe to see if skill has generalized
 - Pre-arrangement of stimuli



www.thescottcenter.org
(321) 674-8106 ext. 1

- People, things, or occurrences in a given setting that *signal* what to do
- These are all the things in the environment that we want learners to respond to
- Simple and Conditional discriminations



Naturalistic Cues

www.thescottcenter.org
(321) 674-8106 ext. 1

- Responding appropriately to natural cues is the goal of treatment
- The challenge is to teach in such a way that learners will acquire new skills
 - May need to use prompts and teach prerequisite skills before the target behavior occurs
 - Need to teach learner to perform target behavior in response to natural cues and situations; fade reinforcement



www.thescottcenter.org
(321) 674-8106 ext. 1

- Many learners with developmental disabilities do not readily learn to respond to natural cues
- Need to take into account aspects of:
 - Prompting: support natural cues with additional stimuli
 - Fading: Plan to reduce cues
 - Generalization: New learning without direct teaching



Challenge

www.thescottcenter.org
(321) 674-8106 ext. 1

- Independence must be the goal from the outset
- Need to plan AT THE BEGINNING for how a successful intervention can be easily withdrawn

Including:

- teaching procedures
- extra materials
- extra time
- extra staff



Independence

www.thescottcenter.org
(321) 674-8106 ext. 1

- Identifying learners who are not making adequate progress
- Design goals and supports using prompts that may be faded and facilitating generalization from the beginning



Key to Success

www.thescottcenter.org
(321) 674-8106 ext. 1

Pulling it all together:

Selecting Targets for Skill Acquisition in an Early
Intensive Behavioral Intervention



www.thescottcenter.org
(321) 674-8106 ext. 1

- **Domain: the operant and level of the skill**
 - Tact, Echoic, Intraverbal, Imitation, Mand, Play, Social, Listener ID, etc.
- **Program: the skill that is being taught within in the domain**
 - Tact: common objects, adjectives, emotions
 - Mand: items present, information, manding assistance, cessation
 - Intraverbals: simple fill-ins, personal information, answering “wh” questions



Refresher

www.thescottcenter.org
(321) 674-8106 ext. 1

Target: a *specific task* being taught within the specified program

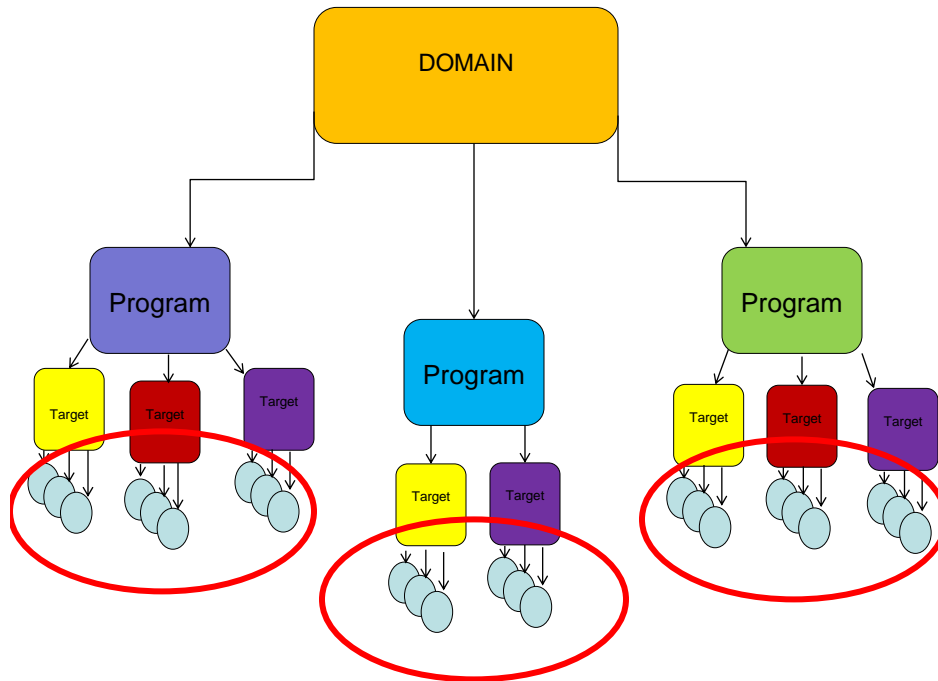
- Objects: apple, house, car, dog, bubbles
- Requests: apple, car, dog, bubbles
- Echoics: baba, dog, car

Exemplar: *different samples* of each target

- Apple: red, green, cut up, apple with bite
- Bubbles: in the container, in the air, being blown by a machine, different wants



www.thescottcenter.org
(321) 674-8106 ext. 1



What to teach
SELECTING TARGETS

Selecting Targets: Top 25 words for 2 year old

Mommy	Daddy	Cat	Ball
Baby	Milk	Nose	Eye
Juice	Hello	Banana	Cookie
Bye-bye	Yes	Car	Hot
No	Bath	Thank you	Book
Shoe	Hat	More	All gone



www.thescottcenter.org
The Scott Center
for Autism Treatment

www.thescottcenter.org
(321) 674-8106 ext. 1

Is it appropriate to teach a 3 year old to tact...

- A shoe?
- A cow?
- A razor?
- A can opener?

What about a 12 year old?

Is it appropriate for him to be sitting knee to knee with a 1:1 therapist?



www.thescottcenter.org
The Scott Center
for Autism Treatment

www.thescottcenter.org
(321) 674-8106 ext. 1

- Functional
 - Teaching things encountered in everyday context
 - Culturally appropriate
 - Age appropriate
 - Or skills that support functional skills



www.scottcenter.org
The Scott Center
for Autism Treatment

www.thescottcenter.org
(321) 674-8106 ext. 1

- Imitation
 - Skills that may facilitate daily activities
 - Skills are typically learned via imitation
 - Conditions that someone learns to imitate
 - History of imitation in one context, *should* learn to imitate in similar contexts in the future



www.scottcenter.org
The Scott Center
for Autism Treatment

www.thescottcenter.org
(321) 674-8106 ext. 1

- Following Instructions
 - Common instructions outside of session
 - Other settings
- Conditional Discrimination (Receptive)
 - “Need” to know, safety



www.thescottcenter.org
(321) 674-8106 ext. 1

Skill that brings child’s behavior into contact with *new contingencies* that have far-reaching consequences

- Walking, talking, joint attention
- Imitation, scanning
- Verbal behavior



Behavioral Cusps

www.thescottcenter.org
(321) 674-8106 ext. 1

- Work on targets across operants
- Select targets that can be incorporated into more than just one operant
- Baseline across operants
- Introduce a set of targets, probe to determine extent of generalization



Considerations

www.thescottcenter.org
(321) 674-8106 ext. 1

- Choose 1 program for 1 client
- Pick 1 current target
- What other programs is that (or has that been) a target?
- If not many, how could you add it to other programs?
 - Which ones and how?



Multiple Operants

www.thescottcenter.org
(321) 674-8106 ext. 1

- Parent input/priority
- Culture, religion
- Pre-requisite skills
- Other targets



Final Thoughts

www.thescottcenter.org
(321) 674-8106 ext. 1

What to Teach

SELECTING/CREATING TASK STIMULI



www.thescottcenter.org
(321) 674-8106 ext. 1

- Based on individual skill level, but keep in mind:
 - Complexity of stimulus
 - ‘Noise’ (stimulus; background)
 - Relevance



www.thescottcenter.org
(321) 674-8106 ext. 1



www.thescottcenter.org
(321) 674-8106 ext. 1



 **The Scott Center**
for Autism Treatment

www.thescottcenter.org
(321) 674-8106 ext. 1



 **The Scott Center**
for Autism Treatment

www.thescottcenter.org
(321) 674-8106 ext. 1



www.thescottcenter.org
(321) 674-8106 ext. 1



www.thescottcenter.org
(321) 674-8106 ext. 1



www.thescottcenter.org
(321) 674-8106 ext. 1



www.thescottcenter.org
(321) 674-8106 ext. 1

What to Teach

DISTRACTORS AND OTHER TARGETS



www.thescottcenter.org
(321) 674-8106 ext. 1

- Options for distracters:
 - Mastered targets
 - Non-target distracters
 - Other targets
- What are the advantages
- Disadvantages



Conditional Discrimination

www.thescottcenter.org
(321) 674-8106 ext. 1



 **Exclusionary Training** www.thescottcenter.org
(321) 674-8106 ext. 1

Simple discrimination...



 **Non-targets** www.thescottcenter.org
(321) 674-8106 ext. 1

Conditional discrimination...



 **Targets** www.thescottcenter.org
(321) 674-8106 ext. 1



 www.thescottcenter.org
(321) 674-8106 ext. 1

- How are you?
- How old are you?
- What's your name?
- What's your mom's name?
- Touch "k"
- Touch "q"



Auditory Stimuli

www.thescottcenter.org
(321) 674-8106 ext. 1

- Brown, F. J., Peace, N., & Parsons, R. (2009)
- About 3-5 exemplars, up to 7
- Vary by:
 - Viewpoint
 - Irrelevant stimuli
 - Partial vs. full picture



Train Sufficient Exemplars

www.thescottcenter.org
(321) 674-8106 ext. 1





 **The Scott Center**
for Autism Treatment

www.thescottcenter.org
(321) 674-8106 ext. 1



 **The Scott Center**
for Autism Treatment

www.thescottcenter.org
(321) 674-8106 ext. 1



Less Studied Teaching Procedures

PRE-ARRANGED SEQUENCES

- Multiple Exemplar Training
- Matrix Training
- Instructive Feedback
- Stimulus Equivalence Paradigm



Less Studied Procedures

www.thescottcenter.org
(321) 674-8106 ext. 1

Multiple Exemplar Training

*USING MULTIPLE-EXEMPLAR TRAINING TO TEACH A
GENERALIZED REPERTOIRE OF SHARING TO CHILDREN
WITH AUTISM*

DENISE MARZULLO-KERTH, SHARON A. REEVE, AND KENNETH F. REEVE

CALDWELL COLLEGE

AND

DAWN B. TOWNSEND

INSTITUTE FOR EDUCATIONAL ACHIEVEMENT

The current study examined the utility of multiple-exemplar training to teach children with autism to share. Stimuli from 3 of 4 categories were trained using a treatment package of video modeling, prompting, and reinforcement. Offers to share increased for all 3 children following the introduction of treatment, with evidence of skill maintenance. In addition, within-stimulus-category generalization of sharing was evident for all participants, although only 1 participant demonstrated across-category generalization of sharing. Offers to share occurred in a novel setting, with familiar and novel stimuli, and in the presence of novel adults and peers for all participants during posttreatment probes.



www.thescottcenter.org
(321) 674-8106 ext. 1

Matrix Training

JOURNAL OF APPLIED BEHAVIOR ANALYSIS

2010, 43, 635–652

NUMBER 4 (WINTER 2)

MATRIX TRAINING OF PRELITERACY SKILLS WITH PRESCHOOLERS WITH AUTISM

JUDAH B. AXE AND DIANE M. SAINATO

THE OHIO STATE UNIVERSITY

Matrix training is a generative approach to instruction in which words are arranged in a matrix so that some multiword phrases are taught and others emerge without direct teaching. We taught 4 preschoolers with autism to follow instructions to perform action–picture combinations (e.g., circle the pepper, underline the deer). Each matrix contained 6 actions on 1 axis and 6 pictures on the other axis. We used most-to-least prompting to train the instructions along the diagonal of each matrix and probed the untrained combinations. For 2 participants, untrained responding emerged after the minimum amount of training. The other 2 participants required further training before untrained combinations emerged. At the end of the study, 3 of the 4 participants performed the trained actions with previously known pictures, letters, and numbers. This study demonstrated that matrix training is an efficient approach to teaching language and literacy skills to children with autism.

Key words: letter identification, matrix training, number identification, picture identification, recombinative generalization



www.thescottcenter.org
(321) 674-8106 ext. 1

- Action-object
- Object-location
- Object-action
- Expression-person
- Object-preposition-location
- Carrier phrases
- Adjectives
- Reading, spelling, math



Possible Combinations

www.thescottcenter.org
(321) 674-8106 ext. 1

	OBJECTS					
		ball	car	book	shirt	shoe
Adjective	red	Train				
	blue		Train			
	yellow					
	green					
	pink					



www.thescottcenter.org
(321) 674-8106 ext. 1

Instructive Feedback

Early Education and Development
January 1993, Volume 4, Number 1

Effects of Simultaneous Prompting and Instructive Feedback

Mark Wolery, Ariane Holcombe, Margaret Gessler Werts
Allegheny-Singer Research Institute

Rose M. Cipolloni
St. Peter's Child Development Center
Pittsburgh



www.thescottcenter.org
(321) 674-8106 ext. 1

- Presentation of additional, non-target stimulus after the consequent event of a trial
- No requirement to respond IF
- No programmed reinforcement or prompting to respond to IF



Present stimuli + "Winnie"



Correct response



Delivery of edible and praise





“Winnie is a bear”
(END TRIAL)



www.thescottcenter.org
(321) 674-8106 ext. 1

Increased efficiency of procedures:

1. Participants learned responses during teaching of target behavior without direct teaching
2. Category skills introduced for direct teaching took less time to teach in (priming)
3. Results showed that multiple category skills can emerge from the presentation of one stimulus using instructive feedback



Implications

www.thescottcenter.org
(321) 674-8106 ext. 1

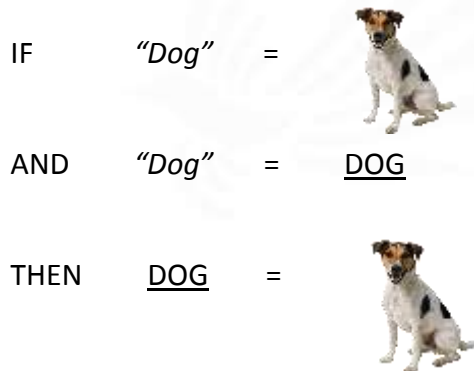
Discrimination Training in the Context of Stimulus Equivalence to Produce Class Mergers

Jeanine R. Tanz, Ivy Chong, & Michael E. Kelley
(in progress)



www.thescottcenter.org
(321) 674-8106 ext. 1

- Stimulus equivalence (Sidman, Kirk, & Wilson-Morris, 1985)
 - Teaching method to form stimulus classes through conditional discrimination
- Can facilitate generality of skills (Sidman, 1994)



www.thescottcenter.org
(321) 674-8106 ext. 1

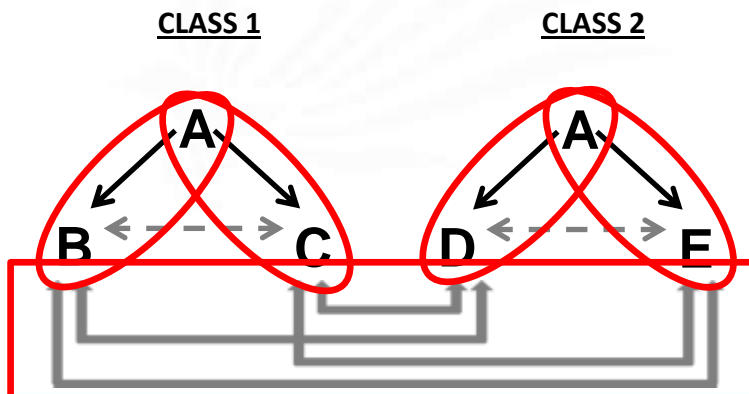
3 properties of SE (Sidman and Tailby, 1982)

1. Reflexivity: identity matching
 - Sameness ($A = A$)
2. Symmetry: non-identical matching
 - Bi-directionality ($A = B$, then $B = A$)
 - One relation taught ($A = B$), other emerges ($B = A$)
3. Transitivity: emergent relation
 - No direct teaching ($B = C$ and $C = B$)









(Sidman et al., 1985; Fienup et al., 2010)

- Two or more stimulus classes share a common member
- Form one larger stimulus class
- Increases # of stimulus relations



Stimulus Sets used in Testing and Training

Stimulus	Set 1	Set 2	Set 3	Set 4	Set 5	Set 6
A						
B	1/3	1/4	1/5	2/3	3/4	4/5
C	"1/3"	"1/4"	"1/5"	"2/3"	"3/4"	"4/5"
D	33%	25%	20%	67%	75%	80%
E	"33%"	"25%"	"20%"	"67%"	"75%"	"80%"



Target stimuli selection:

	Set 1	Set 2	Set 3	Set 4
A	Farmer	Mailman	Fireman	Construction Worker
B	Pitchfork	Letter	Firehose	Tools
C	Barn	Post Office	Fire Station	Construction Site
D	Tractor	Mail Truck	Fire Truck	Excavator Vehicle
E	Weather vane	Mailbox - Home	Fire Hydrant	Construction Cone





- Viable options for teaching children with autism
- May increase generalization of skills
- We don't know for *whom* it works
- We don't know *why* it doesn't work

ichong@fit.edu



www.thescottcenter.org
(321) 674-8106 ext. 1