Acknowledgement

- Alison Betz
- Katie Nicholson
- Jeanine Tanz
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- 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

- Much of this information might be review
  - *But hopefully it will be been presented in a useful and slightly different context*

- Please ask questions as they arise

- Feel free to share related education, training, or applied experiences
A term describing organized patterns of characteristic behaviors
(Novak & Pelaez, 2010)

Behavior: *anything a person says or does*
• Latency
• Duration
• Frequency
• Topography (form)
• Magnitude (intensity)
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

By 12 months: Object permanence
By 18 months: Cause-effect play
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

- 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
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

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

• 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
11 Months

14 Months

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

18 months
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

• 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
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
### Diagnosis: Evolving

<table>
<thead>
<tr>
<th>Previously</th>
<th>NOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rare</td>
<td>Common</td>
</tr>
<tr>
<td>Intellectual Disability</td>
<td>ID in minority</td>
</tr>
<tr>
<td>Rarely traceable (biology)</td>
<td>Traceable to biological causes</td>
</tr>
<tr>
<td>Narrow Range</td>
<td>Wide range of severity</td>
</tr>
<tr>
<td>Exclusive of other disorders</td>
<td>Comorbidity</td>
</tr>
<tr>
<td>3 Domains</td>
<td>2 Domains</td>
</tr>
</tbody>
</table>

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

• Research: Prospective and retrospective observation (Zwaigenbaum, Bryson, & Garond 2013)
  – Prospective: Standardized measures early in development and over time.

• Subtle group differences
  – Reduced “spontaneous” social orienting (Bhat, Galloway, Landa, 2010)
  – Reduced social ‘liveliness’ during parent-child interaction (Wan et al., 2012)
Subtle Differences

- 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
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


• 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
• 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

VIDEO: “E” 22 months
• Discrimination teaching procedures
• Eliminate or minimize incorrect responding
• Stimulus fading]
• Differential reinforcement

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

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 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

• 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
• 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

- 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
• 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

• 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
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

Pulling it all together:

Selecting Targets for Skill Acquisition in an Early Intensive Behavioral Intervention
• 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

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
What to teach

SELECTING TARGETS
Selecting Targets:
Top 25 words for 2 year old

<table>
<thead>
<tr>
<th>Mommy</th>
<th>Daddy</th>
<th>Cat</th>
<th>Ball</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baby</td>
<td>Milk</td>
<td>Nose</td>
<td>Eye</td>
</tr>
<tr>
<td>Juice</td>
<td>Hello</td>
<td>Banana</td>
<td>Cookie</td>
</tr>
<tr>
<td>Bye-bye</td>
<td>Yes</td>
<td>Car</td>
<td>Hot</td>
</tr>
<tr>
<td>No</td>
<td>Bath</td>
<td>Thank you</td>
<td>Book</td>
</tr>
<tr>
<td>Shoe</td>
<td>Hat</td>
<td>More</td>
<td>All gone</td>
</tr>
</tbody>
</table>

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?
• **Functional**
  – Teaching things encountered in everyday context
  – Culturally appropriate
  – Age appropriate
  – Or skills that support functional skills

• **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
• Following Instructions
  – Common instructions outside of session
  – Other settings

• Conditional Discrimination (Receptive)
  – “Need” to know, safety

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

• Walking, talking, joint attention
• Imitation, scanning
• Verbal behavior
Considerations

- 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

Multiple Operants

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

Final Thoughts

What to Teach

SELECTING/CREATING TASK
STIMULI
• Based on individual skill level, but keep in mind:
  – Complexity of stimulus
  – ‘Noise’ (stimulus; background)
  – Relevance
What to Teach

DISTRACTORS AND OTHER TARGETS

• Options for distracters:
  – Mastered targets
  – Non-target distracters
  – Other targets
• What are the advantages
• Disadvantages
Exclusionary Training

Non-targets

Simple discrimination...
Conditional discrimination...
• How are you?
• How old are you?
• What’s your name?
• What’s your mom’s name?
• Touch “k”
• Touch “q”

Auditory Stimuli

• About 3-5 exemplars, up to 7
• Vary by:
  – Viewpoint
  – Irrelevant stimuli
  – Partial vs. full picture
Less Studied Teaching Procedures

PRE-ARRANGED SEQUENCES
• Multiple Exemplar Training
• Matrix Training
• Instructive Feedback
• Stimulus Equivalence Paradigm
Matrix Training

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 multistep prompting to train the instructions along the diagonal of each matrix and probe 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

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

Instructive Feedback

Present stimuli + “Winnie”

Correct response

Delivery of edible and praise

Procedure
“Winnie is a bear”
(END TRIAL)

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

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

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

\[
\begin{align*}
\text{IF} & \quad \text{"Dog"} = \quad \text{DOG} \\
\text{AND} & \quad \text{"Dog"} = \quad \text{DOG} \\
\text{THEN} & \quad \text{DOG} = \quad \text{DOG}
\end{align*}
\]
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

CLASS 1

CLASS 2

Fienup et al., 2010
Target stimuli selection:

<table>
<thead>
<tr>
<th></th>
<th>Set 1</th>
<th>Set 2</th>
<th>Set 3</th>
<th>Set 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Farmer</td>
<td>Mailman</td>
<td>Framan</td>
<td>Construction Worker</td>
</tr>
<tr>
<td>B</td>
<td>Pitchfork</td>
<td>Letter</td>
<td>Trench</td>
<td>Tools</td>
</tr>
<tr>
<td>C</td>
<td>Barn</td>
<td>Post Office</td>
<td>Fire Station</td>
<td>Construction Site</td>
</tr>
<tr>
<td>D</td>
<td>Tractor</td>
<td>Mail Truck</td>
<td>Fire Truck</td>
<td>Excavator Vehicle</td>
</tr>
<tr>
<td>E</td>
<td>Weathervane</td>
<td>Mailbox - Home</td>
<td>Fire Hydrant</td>
<td>Construction Cone</td>
</tr>
</tbody>
</table>
• 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
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