The Use of Stimulus Equivalence Procedures to Expand an Augmentative Communication System

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Overview
- Brief introduction to Stimulus Equivalence & Sidman (1971)
- Rationale for why may be important for clinicians to consider within IBI settings
- Case study
  - Initial teaching
  - Manding (requesting) expansion
  - Tacting (labeling pictures) expansion
  - Other avenues
  - Questions and or Comments

Which One do You choose?

“LEFT”

S +
S -
Conditional Discrimination

Which One do You choose?

“RIGHT”

S -
S -
S +
Conditional Discrimination
Basis of Many IBI Programs

Which One do You choose?

MIDDLE
LEFT
RIGHT

XTY ‘same’ Left

Which One do You choose?

RYU
XTY
MOD

XTY
LEFT
How able to respond to “XTY”?

- Where is the learning history in terms of ABCs?
  - e.g. selection of yellow in response to “XTY” never explicitly trained
- Stimulus Equivalence literature: one method where we learn to form arbitrary relations

Sidman (1971)

20 verbal labels (A),
20 pictures (B),
20 text labels (C)

“Dog”

Outcomes
- Initially could Tact (expressively label) 20 pictures & Receptively identify (point to etc) the same 20 pictures when hearing the spoken label
- Taught 20 new responses of selecting the text form when hearing the spoken label
- Now able to Match text to picture and vice versa (“comprehension”) & provide the spoken label when presented with the text (“reading”)
- These abilities occurred without additional explicit teaching

Possible Relevance to IBI
- One goal of IBI is to increase learning trajectories (Lovaas 1987, Pery et al, 2008)
- Some work in stimulus equivalence illustrates one method of teaching clinically relevant skills with an emphasis on ‘emergent’ or ‘untrained’ skills (e.g. Sidman, 1971)
- Some authors refer to this as an economical teaching approach (Stromer, Mackay, Stoddard, 1992)
- There have been steps to increase usage in clinical settings (Rehfeldt,P.A & Y.Barlow-Holmes (Eds.). 2003. Derived Relational Responding Applications for Learners with Autism and Other Developmental Disabilities: A Progressive Guide to Change.)
Possible Reasons Restricting Use

• More studies are needed focusing on learners with minimal language (O’Donnell & Saunders, 2003). In particular, who is capable of forming equivalence classes and how to teach those who do not appear to do so.

• Procedures and stimuli used may appear foreign to many clinicians leading to difficulties in translating into practice.

• Experimental rigor displayed can be difficult to obtain in clinical settings.

Sam’s Profile

• 7 year old boy diagnosed with ASD; attending centre-based IBI program.

• PECS-phase 4 ("I want" sentence starter).

• Various types of requests and was able to acquire new pictures rapidly.

• Minimal vocal skills including echoics and tacting (unable to echo words).

• A few utterances used with regularity but unintelligible (ka-ke- ‘broken’).

• Was able to use gestures to supplement (appeared social in nature).

• Receptively identify most common objects in his environment.

• Generalized identical and non-identical matching skills.

• Problematic behaviors included flopping, bolting & low level/frequency SIB (hitting legs or face with fists).

Clinical Goal 1

Increase complexity of mands →

"I want + verb (text) + noun"

• Marckel, Neef, & Ferrari, 2006

• 2 boys with autism were taught functions, colours, and shapes within PECS.

• These skills lead to improvisation for novel items (e.g., “I want eat circle” = Oreo).

• Rehfeldt & Root 2005; Rosales & Rehfeldt, 2007

• Adult PECS users were able to exchange text cards instead of pictures after SE teaching methods were implemented.

Initial SE Based Teaching Methods (6 verbs)

Previously Acquired One-Step Receptive Instruction

• Initial instruction = perform action (“Clap” → child claps).

Receptive Identification of Action

(Try → select picture from array; child selects picture of clapping).

Imitating Action from Picture

“Do this” with picture → child imitates from picture (picture clapping → child claps).

Matching Text to Picture

Match textual verb to picture (match CLAP to picture of clapping).

Probes:

A – Receptive Identification of Text:

("Try" → selects picture from array → "Clap" = matches CLAP)

B – Receptive Instruction from Text:

"Do this" with text → child performs action (CLAP = matches clapping).
Manding Expansion

- Training Sessions (10 trials)
  - Same as Baseline but require "I want + Verb + Noun"
  - Initially most-to-least prompting; moved to error interruption if he reached for Noun first
- Dependent measures
  - Accuracy of assembly
  - Duration/Time to complete 10 requests
  - Frequency of Problematic Behaviours
  - IOA on 50% sessions = 100%
- Generalization probe
  - Novel transport
  - In PECS binder
  - First 10 opportunities

Discussion

- Duration was approximately the same with the addition of Verbs in sentences
- In initial sessions there was 1 instance Problematic Behaviour in both Draw and Sing
  - Session were modified to ensure social interaction and rates remained at zero throughout rest of program
- Economy – Relatively few sessions potential combination of responses robust (i.e. generalized to PECS binder with other Nouns)

Clinical Goal 2

To expand his communication system beyond manding (e.g. tacting and commenting)

Yamamoto, Jun-ichi; Miya, Tomoko, 1999
3 Boys with Autism with some text in their repertoires. They were then taught to combine words to create sentences in the form of people, actions and objects (using a Matrix). Participants showed an ability to create correct sentences to novel pictures after only one smaller set had been taught (taught 3 sentences and the remaining 24 sentences were acquired without formal teaching)
Tacting Actions in Pictures

- Goal: Use acquired text to create sentences to label actions in pictures (Person + Action + Object)
- Set of pictures depicting combinations 3 staff + 3 actions + 3 items
- Board with columns of text (3 staff 3 actions 3 items in proper left to right order) with sentence strip at bottom
- Probe 1: Present Picture with instruction “What do you see?”

Probe 1: Baseline overall accuracy was 38.27% across sentences; only 1 sentence met mastery of 100%

Teach construction of sentences not mastered during probes
Taught in sets Re-probed each set prior to teaching to determine if Sam learned to generate novel sentences

Probe 2: Receptive identification of pictures in an array based on sentence “Give me” + show sentence

Roughly 5 phrases acquired per week (3 day Mastery criteria at centre 4 days week)

Minimal acquisition during probes (2 phrases)

Probe identifying picture from sentence with relatively high accuracy

Other Expansions

- Visual Schedules-Textual Schedules
- Spelling- Keyboarding/writing skills
- Following written instructions/simple worksheets

In general more research is needed, but specifically, does SE result in greater generative language skills in children with Autism in comparison to other methods of teaching sight words

Familiarity with SE research and teaching techniques may be beneficial to identify and teach robust responding in a clinical setting but use caution with claims of how learned