A Comparison of Rates of Acquisition Using Time Delay versus Differential Reinforcement to Teach Tact Responses to Young Children with Autism.

Matthew Howarth, Ph.D., BCBA-D, KAITLIN JOHANNSEN, M.A., BCBA, Elizabeth Sarto, M.A., and Laura J. Hall, Ph.D., BCBA-D

Verbal Behavior Associates

PARTICIPANTS AND SETTING

- 4 children receiving in-home ABA services 4-5 days per week
- All enrolled in Special Education programs at the elementary or preschool level
- Participants A and C had previously demonstrated the capability of naming while Participants B and D had not
- Space in all settings was set aside to work one-on-one with an interventionist

Participant	Age	Diagnosis
A	7 years, 6 months	ASD
B	5 years, 6 months	ASD
C	3 years, 6 months	ASD
D	7 years, 2 months	ASD

LITERATURE REVIEW

- "Differential R+ of unprompted responses may be the most appropriate default approach to reaching children with autism" (Karsten and Carr, 2009).
- Pairing unprompted responses with high quality R+ promotes rapid acquisition of skills and decreases prompt dependency (MacDuff et al, 2001).
- Cividini-Motta and Ahearn (2013) compared two iterations of differential R+ to facilitate skill acquisition: high preference R+ vs. moderate-preference R+, and high preference R+ vs. extinction. Three-quarters of participants learned quicker during the high/moderate differential R+ condition.
- Green (2001) suggests errorless procedures rather than trial and error to teach conditional discriminations.
- There are benefits to minimizing errors in early training (Sidman & Stoddard, 1967; Terrace, 1963).
- Time delay is an effective method of transferring stimulus control; however there is risk of prompt dependency (Etzel and LeBlanc, 1979; MacDuff et al., 2001).
- Transfer of stimulus control is faster when R+ is favored for independent responding (Touchette and Howard, 1984).
- Charlop et al (1985) found children learned to request items spontaneously and generalized this skill to new settings, people, and novel objects using a time delay procedure.

REFERENCES

- Charlop, M. H., Schreibman, L., & Thibodeau, M.G. (1985). Increasing spontaneous verbal responding in autistic children using a time delay procedure. *Journal of Applied Behavior Analysis*, 18, 155-166.
- Cividini-Motta, C. & Ahearn, W.H. (2013). Effects of two variations of differential reinforcement on prompt dependency. *Journal of Applied Behavior Analysis*, 46, 640-650.
- Etzel, B. C., & LeBlanc, J. M. (1979). The simplest treatment alternative: The law of parsimony applied to choosing appropriate instructional control and errorless-learning procedures for the difficult-to-teach child. *Journal of Autism and Developmental Disorders*, *9*(4), 361-382.
- Green, G. (2001). Behavior analytic instruction for learners with autism: Advances in stimulus control technology. *Focus on Autism and Other Developmental Disabilities*, 16, 72-85.
- Karsten, A. M., & Carr, J. E. (2009). The effects of differential reinforcement of unprompted responding on the skill acquisition of children with autism. *Journal of Applied Behavior Analysis*, 42, 327-334.
- MacDuff, G. S., Krantz, P. J., & McClannahan, L. E. (2001). Prompts and prompt-fading strategies for people with autism. *Making a difference: Behavioral intervention for autism*, 37-50.
- Stoddard, L. T., & Sidman, M. (1967). The effects of errors on children's performance on a circle-ellipse discrimination. *Journal of the Experimental Analysis of Behavior*, *10*(3), 261-270.
- Terrace, H. S. (1963). Errorless transfer of a discrimination across two continua. *Journal of the experimental analysis of behavior, 6(2), 223-232.*
- Touchette, P.E., & Howard, J.S. (1984). Errorless learning: Reinforcement contingencies and stimulus control transfer in delayed prompting. *Journal of Applied Behavior Analysis*, 17, 175-188.

ABSTRACT

This alternating treatments study compares a constant time delay procedure with a differential reinforcement procedure to teach tacts to individuals with autism. The purpose was to determine whether children with autism acquire new tacts faster using differential reinforcement or time delay teaching procedures. Data were evaluated to determine which procedure produces faster rates of acquisition. Four children with autism between the ages of 3 and 7 were grouped into matched pairs. One pair had previously demonstrated the naming capability and the other did not. Results indicate the differential reinforcement procedure produces faster rates of acquisition for both groups of children.

VARIABLES

***Dependent Variable*:** The dependent variable for this study was the of total number of trials to acquisition for each teaching strategy, errorless learning and differential reinforcement.

***Independent Variable*:** The independent variable in this study was the teaching procedure used during instruction, errorless (time delay procedure) or differential reinforcement.

PROCEDURE

- The errorless time delay procedure was alternated with a differential reinforcement procedure.
- Participants were divided into two groups of matched pairs: Participants A and B, based on their acquisition of naming and Participants C and D who did not have naming.
- A counterbalanced selection procedure was used to determine the order in which the stimuli were presented. The stimuli were counterbalanced as shown in Table 1.
- Tact instruction utilized 3 sets of 2-dimensional stimuli. An instructional set of tacts consisted of 5 targets with 4 exemplars of each target to create a set of 20 stimuli.
- Sets were probed and determine to be novel to each participant.

***Table 1:* Counterbalanced Stimuli Presentation**

Participant	PHASE 1	PHASE 2	PHASE 3
A	Household Tacts Differential R+	Food Tacts Time Delay 0-second then 3-second	Animal Tacts Differential R+
B	Household Tacts Differential R+ Waits to start until Participant A masters Phase 1	Food Tacts Time Delay 0-second then 3-second	Animal Tacts Differential R+
C	Animal Tacts Time Delay 0-second then 3-second	Food Tacts Differential R+	Household Tacts Time Delay 0-second then 3-second
D	Animal Tacts Time Delay 0-second then 3-second Waits to start until Participant C masters Phase 1	Food Tacts Differential R+	Household Tacts Time Delay 0-second then 3-second

RESULTS AND DISCUSSION

- All study participants learned tact responses faster using the differential reinforcement procedure supporting the research of MacDuff et al (2001).
- Findings suggest that both time delay and differential reinforcement procedures can result in mastery, but the slower rate of acquisition for time delay may imply that differential reinforcement is a more preferable method when teaching children with autism a tact response.
- Previous research has shown that errorless methods, such as time delay, often deliver the same level of reinforcement of both prompted and independent responses which can lead to prompt dependency (Cividini-Motta and Ahearn, 2013).
- It is not clear if any students developed a prompt dependency during the study however participants learned to tact an average of 257% faster using the differential reinforcement procedure.
- Faster tact acquisition using differential reinforcement indicates similar results to previous studies which have shown that pairing unprompted responses with high quality reinforcers promotes rapid acquisition of skills and decreases the occurrence of prompt dependency (MacDuff et al, 2001; Touchette and Howard, 1984).

***Figure 1*: Trials to mastery**

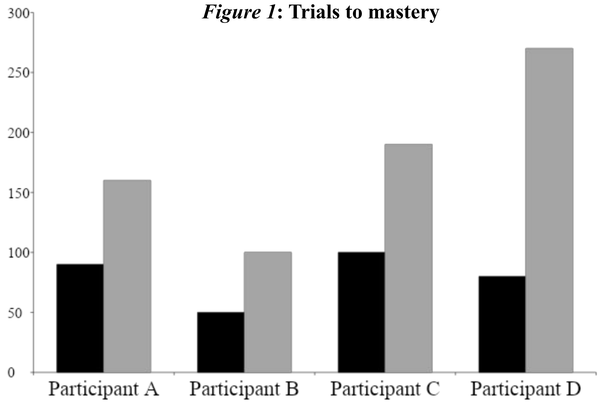


***Figure 2*: Average trials to mastery across participants**

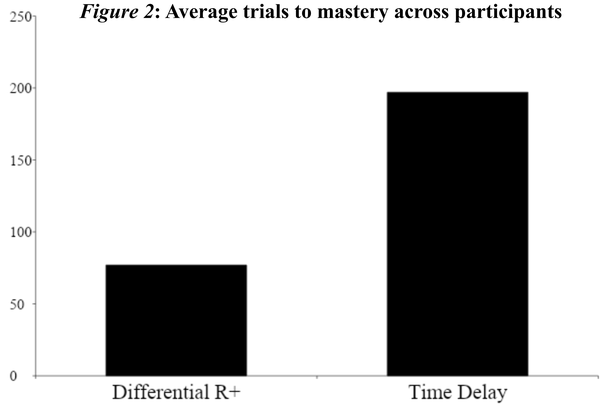


***Figure 3*: Intervention graph for Participants A and B**

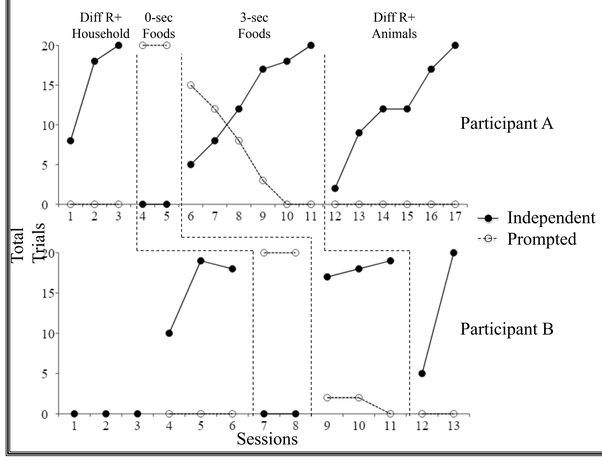
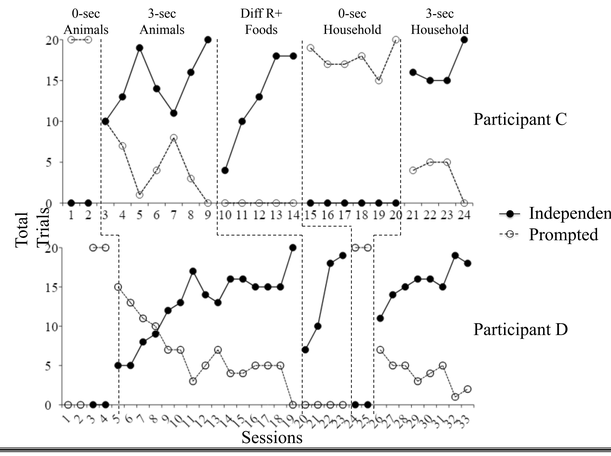


***Figure 4*: Intervention graph for Participants C and D**



Contact: matt@vbasandiego.com, kaity.johannsen@vbasandiego.com, elizabeth@vbasandiego.com
www.vbasandiego.com