

USING TIME DELAY IN SMALL GROUPS TO TEACH SPANISH AND TELUGU
VOCABULARY WORDS

by

Neeraja Prabhakaran

Thesis

Submitted to the Faculty of

Peabody College of Vanderbilt University

In Partial Fulfillment of the Requirements

for the degree of

MASTER OF EDUCATION

in

Special Education

May 2023

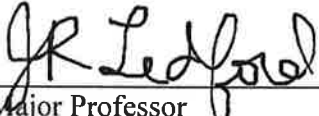

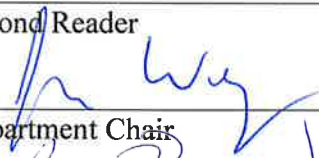
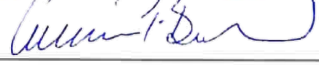
 Major Professor	4/10/2023 Date
 Second Reader	4/10/2023 Date
 Department Chair	4/10/2023 Date.
 Dean of Peabody College	4/19/23 Date

TABLE OF CONTENTS

Chapter	Page
I INTRODUCTION.....	1
II METHOD.....	4
III RESULTS.....	18
IV DISCUSSION AND CONCLUSION.....	27
V REFERENCES.....	49
VI APPENDIX	53

LIST OF TABLES

Table	Page
1. Inclusion and Exclusion criteria of participants	33
2. IOA data across conditions, tiers, and participants for dyads 1,2 and 3.....	34
3. PF data across conditions, tiers, and participants for dyads 1,2 and 3	35
4. Riley’s number of unprompted correct, unprompted errors and percentage of correct responding across tiers and conditions for instructive feedback targets	36
5. Warren’s number of unprompted correct, unprompted errors and percentage of correct responding across tiers and conditions for instructive feedback targets	37
6. Aditya’s number of unprompted correct, unprompted errors and percentage of correct responding across tiers and conditions for instructive feedback targets	38
7. Emily’s number of unprompted correct, unprompted errors and percentage of correct responding across tiers and conditions for instructive feedback targets	39
8. Ananya’s number of unprompted correct, unprompted errors and percentage of correct responding across tiers and conditions for instructive feedback targets	40
9. Felicia’s number of unprompted correct, unprompted errors and percentage of correct responding across tiers and conditions for instructive feedback targets	41

LIST OF FIGURES

Figure	Page
1. Riley's percentage of unprompted correct responding across conditions	42
2. Warren's percentage of unprompted correct responding across conditions	43
3. Aditya's percentage of unprompted correct responding across conditions	44
4. Emily's percentage of unprompted correct responding across conditions	45
5. Ananya's percentage of unprompted correct responding across conditions	46
6. Felicia's percentage of unprompted correct responding across conditions	47
7. General flowchart representing the different sessions conducted in the study	48

USING TIME DELAY IN SMALL GROUPS TO TEACH SPANISH AND TELUGU
VOCABULARY WORDS

by
Neeraja Prabhakaran
Peabody College of Vanderbilt University
May 2023

Major Area: Special Education

Number of Words 189

Prompting procedures such as Constant Time Delay (CTD) are effective in teaching various skills to young children however there exists limited evidence on the use of time delay procedures to teach children different languages. This study aimed to use CTD to teach preschool children 12 Spanish and Telugu words in a dyadic setup. This study also aimed to investigate the acquisition of 12 targets presented as instructive feedback targets and observational learning of 12 peers' targets. To assess efficiency in this prompting procedure over acquisition of words and to analyze changes in childrens' learning over time, we used a Multiple Probe across Behaviors single case design to assess these outcomes. Results indicated that CTD was an effective procedure for teaching preschool children with and without disabilities Spanish and Telugu words. Children also showed acquisition of instructive feedback targets when probed approximately every three sessions. Observational learning occurred for most children but to a reduced extent. Data collection is still in progress for two dyads. Modifications relating to reinforcement, time of sessions, explicit teaching procedures and number of words taught at once were made to different children throughout the study.

CHAPTER I

INTRODUCTION

Many individuals in the United States of America speak a language other than English at home, with Spanish being the most common second language (Center for Immigration Studies, 2019; U.S. Census Bureau, 2018). Future predictions also indicate that the population of culturally and linguistically diverse children enrolled in schools will continue to grow. (Willis, 2000). The best time to acquire a new language is the period of early childhood (Gasemi & Hashemi, 2011). Researchers agree that learning a new language before the age of ten helps children to speak as fluently as native speakers (Gasemi & Hashemi, 2011). Learning a new language is tied to better communication skills, stronger cognitive development, and higher cultural awareness (Gasemi & Hashemi, 2011). Bilingual preschool children have also been shown to display improved cognitive performance on a variety of behavioral attention tasks measuring cognitive control (Bialystok, 1999, 2001, 2010; Bialystok & Martin, 2004; Carlson & Meltzoff, 2008). There are also numerous benefits to learning a second language at the pre-primary and primary levels of education with some being learning about different cultures, developing favorable attitudes towards different languages, and different strategies to be more aware of languages (Mayo, 2017). Bilingual children who attend schools that support their home language feel more supported, connected to their school environments, and felt more nurtured in their educational setting (Cavaluzzi,2010).

Constant time delay (CTD) has been shown to be effective for teaching receptive identification of symbols (Johnston, 2003), skills assisting in food preparation (Schuster et al., 1988), producing manual signs (Kleinhart & Gast, 1982) and verbal requesting (Halle et al., 1979), among many other behaviors. It has been also established as effective for teaching English-speaking participants to identify stimuli in Spanish (Browder et al 2009; Appleman et al. 2014). CTD has been shown to be more effective than the system of least prompts in terms of percentage of errors and length of instruction time for preschoolers with developmental delays (Doyle et al., 1990). It has also been shown that for children who can clearly differentiate between contingencies, CTD is a more effective procedure to learn compared to the system of least prompts (Chazin & Ledford, 2020).

Initial CTD instruction involves presenting an initial instruction and immediately prompting the correct response (also known as the controlling prompt). During the remainder of instructional trials, the wait time remains constant throughout trials, usually several seconds. This delay is introduced to provide individuals with a chance to respond independently (Brandt et al., 2016). For example, during initial sessions, a teacher holds up a blue card and provides the direction; “What color is this in Spanish?” and immediately provides the prompt by saying, “Azul”. After one or more sessions, the teacher presents the card and asks the same question, but this time waits for a set number of seconds before providing the controlling prompt. This procedure is a near-errorless teaching procedure (Swain, Lane & Gast, 2014). The individual is also taught to wait if he or she does not know the answer and the instructor will provide the correct response (Wolery et al, 1992). Alig-Cybriwsky et al. in 1990 demonstrated that CTD plus instructive feedback in a group setting is effective for teaching both targets directly

taught to children and targets taught to their groupmates, implicating the process of observational learning as being responsible for extra learning in small group contexts. Although there are numerous studies using CTD to teach preschool children various skills and targets, the research base supporting its use in teaching preschool children to use different languages to name age-appropriate targets is limited.

One procedure that can be used along with CTD to assist children in acquiring new skills is instructive feedback. Instructive feedback involves presenting learners with non-target information either before or after the learner's response during learning trials (Rankin, 2018). The learner is not required to respond to these learning stimuli and no specific consequence is provided if they do respond (Rankin, 2018). When instructive feedback was used with direct prompting procedures in varied direct instructional arrangements, students were shown to both acquire and maintain some of the non-target information presented via instructive feedback (Werts et al., 1995). For example, a teacher holds up a sight word in English to a child and asks, "What word?" If the word was blue, when the child says, "Blue" the teacher responds by saying, "That's right and blue in Spanish is azul." In this example, identifying azul as the Spanish equivalent of blue was the identification of the instructive feedback target. There are numerous studies which demonstrate the effectiveness of instructive feedback to help students acquire at least some of the non-target information without direct instruction (Appleman et al, 2014; Apple, 2005; Wolery et al., 1993). Instructive feedback has been used to teach children how to read words (Appleman et al, 2014; Gast et al, 1994), acquire meaningful sentences related to instructional targets (Ross and Stevens, 2003) and learn explanations for problems (Tullis, 2017). Even when instructive feedback targets are not learned to

mastery, future teaching of these targets results in faster acquisition than if a child has been exposed to them via instructive feedback (Wolery et al, 1991). Instructive feedback enhances trial-based teaching procedures for students with disabilities because it minimizes the planning time and burden on teachers and decreases additional demands on learners (Albarran & Sandbank, 2018).

When CTD is used in small groups, instructors can also take advantage of observational learning—the “acquisition of novel operants because of observing contingencies related to the actions of others” (Catania, 1998). The importance of observational learning for children with disabilities cannot be understated. To teach children various targets, observational learning is an efficient process to encourage peer contact and observation skills in small groups. (Ledford & Wolery, 2015) Hence, this technique can also be used between children with and without disabilities to encourage peer proximity and to observe and learn their peers’ target words. Children with and without disabilities have been shown to learn all their own targets and at least some of their peer’s targets through observational learning in the context of small group instruction (Ledford & Wolery, 2015). Children with disabilities were also found to learn response chains through observation of their typically developing peers (Werts et al., 1996). Discrimination and observational learning also lead to stimulus generalization, which is the “spread of effects of reinforcement for responses emitted in the presence of one stimulus to different but physically similar stimuli that were not initially paired with reinforcement.” (Stokes & Baer, 1977). There have been numerous studies that focused on studying observational learning in small group contexts for discrete academic behaviors in school-age children (Ledford and Wolery, 2015) but more research is

required on the effects of observational learning in preschoolers, especially in a learning context with peers with and without disabilities and learning a new language.

Empirical research on second language acquisition is limited with preschoolers (Saunders and Brian, 2006). Although there is a substantial evidence base for the use of CTD, instructive feedback, and observational learning, there is only one study that examines teaching children to identify stimuli in a second language using small group direct instruction. That study evaluated the presence of a functional relation between the use of dyads as an instructional arrangement and the acquisition of Spanish words (Appelman et al., 2014). For children in the U.S. whose first language is English, it may be advantageous to learn different languages to communicate and interact. It might also increase inclusion of their bilingual peers in social interactions, considering the number of children speaking different languages is rapidly increasing (Toppelberg, 2011).

This study will examine the use of CTD to teach Spanish and Telugu vocabulary and will assess learning of Spanish and Telugu vocabulary words presented as instructive feedback. Students were paired in dyads during instruction, to allow for assessment of observational learning of peer targets. Our hypothesis is that preschool children will demonstrate mastery of vocabulary words learned using CTD, Spanish and Telugu vocabulary words presented via instructive feedback during training sessions and peer's target Spanish and Telugu vocabulary words via observational learning. Based on this hypothesis, our research questions are as follows:

- 1) Does the use of a dyadic CTD procedure increase pre-school children's accuracy in naming Spanish and Telugu vocabulary sight words?

- 2) Does the use of Spanish and Telugu vocabulary words as instructive feedback increase pre-school children's accuracy in naming the words?
- 3) When in dyads, will pre-school children learn to accurately name peers' target vocabulary words in Spanish and Telugu?
- 4) Do the effects of the intervention maintain post-intervention for targets that are directly taught

CHAPTER II

METHOD

Participants and implementors

Six children participated in this study, which was approved by the Institutional Review Board of a large university. Consent was obtained from parents of children prior to participation, and assent was assessed daily (i.e., by assessing response to “do you want to learn Spanish words today” or a similar phrase). All the participants’ first language was English. One of the participants was diagnosed with autism spectrum disorder (ASD) and five of the participants had no identified disabilities. All participants attended an inclusive preschool in the southeastern US, which was affiliated with a local university.

The participants name, age, race, and disability status were collected prior to the beginning of the study from teachers or parents. The age of all participants was between 48 and 72 months. The primary implementer was the first author, a 23-year-old Indian female pursuing a master’s degree in early childhood special education with an add on specialization in Applied behavior Analysis. Three master’s level graduate students and one Doctoral student coded IOA and PF data after receiving training by the primary implementer. All the coders identified as women with three of them identifying as white and one identifying as Asian. All the information regarding inclusion and exclusion criteria were collected using teacher report and initial screening trials before the trials for

the study began. (See table 1 for inclusion and exclusion criteria along with measurement system).

Dyad 1

The first dyad consisted of two participants, Riley, and Warren. They were enrolled in a preschool classroom for 4–5-year-olds, with two teachers who spoke with one teacher speaking English and one teacher speaking English and Chinese. Riley and Warren’s families both spoke only English at home. Riley was a 63-month-old white, non-Hispanic female with no identified disabilities. She communicated frequently and proficiently with children and adults using complete sentences. According to teacher report, she frequently engaged in small and large group activities with minimal support. Warren was a 60-month-old white, non-Hispanic male with no identified disabilities. He communicated frequently and proficiently with children and adults using complete sentences. His teachers reported him as having some difficulty engaging during small group activities but stayed engaged during large group activities.

Dyad 2

The second dyad consisted of two participants, Aditya, and Emily. They were enrolled in a classroom where both teachers spoke Spanish and English, including one who spoke Spanish as her first language. Aditya and Emily’s families both spoke English at home, although Aditya’s mother’s family spoke Kannada and Aditya’s father’s family spoke Telugu. Both these languages are commonly spoken in the southern part of India particularly in the states of Karnataka and Andhra Pradesh. Aditya did not speak Telugu or Kannada fluently but did understand a few Telugu words. Aditya was a 59-month-old Indian male with no identified disabilities but significant environmental and food

allergies which impacted classroom participation and school attendance. His teachers reported him to have good engagement in small group and large group activities and would frequently initiate with various peers in the classroom. Emily was a 58-month-old white, non-Hispanic female with autism spectrum disorder (ASD). She initiated with peers frequently and with full sentences but had articulation errors that made her communication difficult to understand, especially for unfamiliar listeners. Teacher reports stated that she engaged in small and large group settings provided there are teacher directions and frequent prompts to stay on task. She received physical therapy, occupational therapy, and speech therapy in the preschool setting.

Dyad 3

The third dyad consisted of two participants, Ananya, and Felicia, who were enrolled in the same classroom as Dyad 2. Ananya was a 58-month-old American Indian female with no identified disabilities. Ananya's father is Indian and from a family who spoke in Telugu. Ananya's mother is white and comes from an English-speaking background. She communicated frequently and proficiently with adults using full sentences but needed additional prompts to communicate with peers. Her teachers reported her as being engaged in both small and large group activities. Felicia was a 61-month-old biracial, non-Hispanic female with no identified disabilities. Felicia is from a single parent household and her mother comes from an English-speaking background. She communicated frequently and proficiently with peers and adults using full sentences but had articulation errors that made her communication difficult to understand, especially for unfamiliar listeners. Her teachers reported that she consistently engaged in

both small and large group instruction. She received occupational therapy and speech therapy in the preschool setting.

Setting

This study occurred in a university-based inclusive preschool. Approximately five families in this preschool spoke English as a second language. Both children in each dyad were enrolled in the same classroom. Sessions took place in either the preschool's designated art room or a resource room located in the back hallway of the preschool. All sessions occurred during the children's playground time or the first part of their nap time (dyad 3); children attended sessions for approximately fifteen to twenty minutes during the hour-long scheduled playground break or the two-hour long scheduled nap time. Sessions occurred once or twice a day in the morning and/or afternoon depending on child and implementer availability. During probe, instructional, and maintenance sessions, the implementer and the two children were present in the room and both children were seated at the table side by side, with the implementer seated at the opposite side of the table. All screening sessions occurred in a 1:1 arrangement.

Materials

During experimental conditions the experimenter used the following materials: (a) a camera, (b) cards with photographs of the target words (c) data sheets (d) a token board with tokens (i.e., chips of different colors, approximately the size of a quarter)/ index cards (e) reinforcers, (f) stickers, (g) writing materials and (h) a timer. All sessions were recorded using a Canon VIXIA digital video camera and tripod. Data were collected in-vivo by the primary implementer and coded from video recordings using data sheets either online or using physical copies by the coding team with specifically formulated

data sheets for each condition (See Appendix A). All picture cards were 3x3 inches and contained colored photographs. Reinforcers included edibles such as goldfish and baked apples, age-appropriate videos on YouTube on the implementer's iPhone or a laboratory iPad and toys. Reinforcers differed for each dyad.

Response Definitions and Measurement Systems

We collected data on (a) percentage of unprompted correct responses for vocabulary words taught using CTD, (b) percentage of unprompted correct responses for vocabulary words introduced via instructive feedback, (c) percentage of unprompted correct responses for words taught to peers. Data were collected using data sheets by marking UPE (unprompted error in which a child responds inaccurately without any prompt or does not respond within 3 s), UPC (unprompted correct in which a child responds accurately without a prompt), PC (prompted correct in which a child responds accurately after a prompt) or PE (prompted error in which a child responds inaccurately after a prompt). For directly taught words, children could respond with UPC or UPE responses during baseline and maintenance conditions and with UPC, PC, UPE, or PE responses during the instruction condition. For words assigned to peers or presented via instructive feedback, only UPC or UPE responses were possible, given these behaviors were never prompted by an adult.

Primary data were collected live and during the session using the relevant data collection sheet by the primary interventionist. Sessions lasted for approximately 15 minutes and occurred every day at a set time. Instruction lasted 15-20 minutes and children were allowed to access preferred reinforcers for the last 5 minutes. The primary variable measured for visual analysis was the percentage of unprompted correct

responses. The secondary variables were (a) the percentage of accurate responses for vocabulary words learned via instructive feedback and (b) the percentage of accurate responses for vocabulary words learned via observational learning.

Interobserver agreement (IOA)

IOA data was collected for at least 33% of the total sessions across participants, conditions, and tiers (including maintenance sessions). IOA data was collected using the same data sheets as the primary data collector and was collected by watching recorded video sessions. The secondary data collectors were first- or second-year masters students pursuing a degree in early childhood special education along with an add on specialization in Applied Behavior Analysis and a doctoral student pursuing a degree in early childhood special education. One in every three sessions were randomly selected and coded to assess IOA. Agreement was calculated using a point-by-point method in which the number of agreements was divided by the number of agreements plus the number of disagreements and multiplied by 100. This yielded the percentage of agreements (Ayres & Ledford, 2014). IOA for this study should be at a minimum of 95% or above for the results to be reliable. All coders were trained in data collection by the primary author and a minimum of two sessions were consensus coded before calculating IOA data. This consensus coding will occur for sessions with targets learned via CTD and targets learned via instructive feedback and observational learning. Coders were also trained in the Spanish and Telugu target words names and pronunciations to ensure there is uniformity and accuracy in data collection across targets. If IOA fell below the 95% criterion, coders were re-trained by the primary interventionist and consensus coding of a

minimum of two sessions occurred before continuing IOA data collection after approval by the primary author. IOA data for all dyads is shown in table 2.

Experimental Design

A multiple probe design across behavior sets replicated across participants was used to evaluate the effectiveness of CTD and instructive feedback on the acquisition of Spanish and Telugu vocabulary words. Data were collected intermittently during probe conditions, which preceded introduction of the independent variable in each tier (Gast & Ledford, 2010). The staggering of the introduction of instruction across sets in a multiple probe design allows for the opportunity to demonstrate experimental control with potential replication of effects across six total participants (i.e., three dyads). This design was chosen because the dependent variable (i.e., acquisition of Spanish and Telugu vocabulary words) is a behavior that is non-reversible, hence making multiple probe across behavior sets an ideal design to use. All the participants recruited for the study had similar behaviors before the start of the study depending on the inclusion criteria. In relation to threats to internal validity, behavioral covariation is a likely threat that was controlled for by choosing distinct, independent sets that do not sound like one another (Gast & Ledford, 2010). History and maturation threats were also controlled for as the intervention was introduced in a time-lagged manner (at different, but temporarily connected time points) with ongoing data collection across all tiers to detect potential threats. The three sets for use in this study was picked to be functionally similar and independent of each to control for the threat of covariation. Visual analysis was conducted vertically across tiers and horizontally across conditions. Visual analysis was used to examine the overall level, trend and variability within conditions and the

proportion of overlap, consistency, and immediacy of change across conditions to identify functional relations (Ledford & Gast, 2018).

Procedures

Child assent was acquired before the start of each session. The implementer approached the child and said, “Would you like to come learn some words with me?” before leading the child to the resource/art room. Child assent included saying “yes”, nodding, showing interest to accompany the implementer, holding the implementer’s hand, or any behavior that showed the child’s willingness to accompany the implementer. If the child dissented or did not show interest, the implementer asked the same question again after 5 minutes. If the child continued to dissent or show disinterest, the session was not conducted for that day. A contingency review of the procedures was stated by the implementer before the start of the session for all conditions.

Screening

Prior to instruction, a screening of all Spanish and Telugu vocabulary words (for both CTD and instructive feedback targets) was conducted. The screening assessed the participants’ knowledge of 48 Spanish and Telugu vocabulary words with the language of the words depending on the dyad. This was conducted for the purpose of eliminating any words that the child had learned prior to instruction. Each word was assessed one time. These sessions were video recorded to ensure clarity of expressive language of the student and to avoid marking an incorrect response due to an articulation error. The implementor watched the recorded video after the screening sessions to ensure all responses were marked accurately.

Initial Probe Condition

Probe conditions were conducted to assess acquisition of target Spanish and Telugu sight words before instruction occurred and to assess maintenance following acquisition of each set. Probes were conducted in a dyadic instructional arrangement. Probe conditions were alternated between children for different tiers of words unless the children consistently had individual sessions. Words were randomized and four probe trials were conducted per child almost every session.

During the initial probe condition, the implementor held a card with the photograph of the target word ensured the child is attending, followed by the task direction, “What is _____ in Spanish/Telugu?” providing the child with 3 s to respond. Following an incorrect or no response error, the implementor marked an unprompted error on the data sheet (UPE), removed all stimuli presented and presented the next word after a 3 s intertrial interval. If the child responded accurately, the implementer marked that trial as unprompted correct (UPC), followed by praise and a token contingent on correct responding. Tokens were provided after every response reinforcing social, attending behaviors or correct responding. This was done to maintain engagement for the participant. Reinforcement was hence provided on a fixed ratio 1 schedule (FR1).

Instruction Condition

CTD Instruction. Both members of the dyad were present during instruction of CTD targets unless a child was absent or declined to participate. Three sets consisting of four targets each were taught to the children in a time lagged sequence in keeping with the multiple probe across behaviors design (12 targets per child). The targets were randomized before every session by using a random list generator. This resulted in a sequence of 12 trials per child (3 per target) and 24 trials total per dyad per instructional

session. Instructional trials took place once to twice daily during non-instructional time. (recess, gym etc.) The implementer ensured children were attending at the beginning of the session (e.g., by saying “Are you ready?”). Once the children indicated they were ready (verbally or non-verbally), the implementer began by holding up a card with the target word photograph and provided the task direction. (What is ____ in Spanish/Telugu?).

For all children, initial instructional sessions consisted of a 0-s delay. During these sessions, the implementer held up the picture card, provided the task direction, and immediately provided the controlling prompt to the child by saying the right answer. If the student responded incorrectly, said “I don’t know”, or did not provide a response, the implementer marked the trial as a prompted error PE on the data sheet and began a new trial after 3 seconds. When the student provided a correct response, the instructor marked PC on the data sheet and provided behavior specific praise (“Amazing job saying ____!”) and provided a token or sticker on a FR1 schedule. Once each student in the dyad reached 100% PC responding for two consecutive sessions at a 0-s delay, the remaining instructional sessions were conducted at a 3-s time delay.

During the 3-s delay trials, the implementer held up the card with the photograph of the target word, provided the task direction and waited 3 seconds. If the student responded incorrectly the implementer marked a UPE response, said the correct word, and reminded the student to wait if they did not know the correct response. (“Remember if you don’t know the answer, you can wait, and I will help you”). If the student responded accurately, the implementer provided behavior specific praise (“Great job saying ____!”), instructive feedback (see instructive feedback procedures below) and a

token on a FR1 schedule of reinforcement for correct responding. If the student waited during the delay, the controlling prompt was provided after 3 seconds. If the student responded accurately, the implementer marked PC on the data sheet and provided behavior specific praise and a token. If the student responded inaccurately after the prompt or with no response, the child was not reinforced, and PE was marked on the data sheet. After all, 24 trials, children played with their preferred toys, access desired tangibles, watch videos or social reinforcers for five minutes before returning to regularly programmed activities.

Following every response during CTD procedures, an instructive feedback stimulus was presented. The instructive feedback statements were selected as one related noun, one unrelated noun, one related color and one unrelated shape for each target set. For example, if the Spanish word taught via CTD is “la hoja,” the instructive feedback for that target might be “verde”. If the child responded correctly, the implementer said “That’s right, la hoja! And green in Spanish is verde”. The child was not required or expected to respond to instructive feedback and if the child did respond, the response was acknowledged by saying any neutral response such as “thanks!” and the implementer moved on to the next trial.

Modifications

For Riley and Warren, the implementer provided both children with two tokens for unprompted correct responding and one token for prompted correct responding to motivate Riley to respond without a prompt as she did not show change from baseline levels of responding for a few sessions. This modification occurred at Intervention session 9 for both participants.

For Aditya and Emily, stickers were provided as reinforcers instead of tokens to increase the strength of reinforcers. For Emily, a modification was introduced in the second tier after she showed acquisition of two words only for an extended period. This modification was introduced during her 19th intervention session in tier 2. The two words she had difficulty acquiring had the same starting sound (-ch) and hence a modification was introduced wherein she was taught the words explicitly before each session occurred wherein the implementer provided her with the word in writing along with the visual picture of the word and sounded out both the words twice.

For Ananya and Felicia, stickers were provided on an index card for correct responding to increase the strength of reinforcers. For Ananya, as she showed prolonged zero percent levels of responding for tier 1 targets, a modification was implemented wherein the implementer taught her two words instead of four. After she reached mastery of two words, the implementer increased the words to be taught by one word until she reached mastery of four words.

Intermittent Probes

Secondary targets (baseline, maintenance, instructive feedback) were probed intermittently, after almost every instructional session. The probes were generally alternated between the participants (e.g., during instruction in Tier 1, probes were assigned such as: Day 1 was Tier 2 targets for the first participant, Day 2 was Tier 2 targets for the second participant, Day 3 was Tier 3 targets for the first participant and Day 4 was Tier 3 targets plus instructive feedback targets from Tier 1 for both participants). Due to some sessions being conducted with individual children, the schedule of the probes slightly varied.

Instructive feedback probes were conducted about every fourth session, included four trials, presented in a random order, and included the instructive feedback stimuli that were currently being presented in instruction. The instructor presented the same stimuli as those used in instruction and conducted the session with one child at a time. The other child either cleaned up tokens, waited or looked at stickers while the implementer conducted trials with the other participant. If the child responded accurately the implementer provided praise (“Amazing job!”). If the child said, “I don’t know” or didn’t respond, the implementer simply acknowledged the child by saying “that’s okay” or “thanks” and moved on to the next probe trial. These probes generally occurred after instructional trials.

Intermittent data were collected approximately every fourth session for stimuli assigned to tiers not currently receiving instruction. These were baseline probes in Tier 1 (e.g., stimuli assigned to Tiers 2 & 3), alternating baseline and maintenance probes in Tier 2 (e.g., stimuli assigned to Tiers 1 [maintenance] & 3 [baseline]), and maintenance probes during Tier 3 (e.g., stimuli assigned to Tiers 1 & 2). These sessions also occurred after instructional sessions. Baseline and maintenance probes were conducted in a similar fashion to baseline procedures. Children were presented with four targets assigned to the same tier and were given the task direction. If the child responded accurately during baseline and maintenance probes, praise was given contingent on correct responding along with a token or sticker. If the child responded inaccurately to a baseline probe, a neutral response such as “thank you” or “thanks for working hard and staying focused” was given along with a token or sticker contingent on neutral praise. If the child

responded inaccurately to maintenance probes, a neutral response such as “thanks” was given, and no token was provided.

Observational Learning Assessment

Observational learning of the student’s partner’s target words was assessed in a dyadic posttest probe procedure. These words were probed during screening procedures before the start of instructional sessions to ensure the participants did not know each other’s’ target words. The implementer probed the participants on their peers’ CTD targets relevant to each tier after the participants had reached mastery on each tier. No prompts were provided, and responses were recorded as UPC or UPE. Praise was provided for accurate responding a neutral response was prided for inaccurate responding. This procedure was used to assess the extent of acquisition of peers’ Spanish and Telugu vocabulary word targets via observational learning.

Procedural fidelity

Procedural fidelity (PF) was measured for all aspects of correct implementation of all experimental conditions for at least 33% of sessions across all participants. PF was measured for all conditions including probe sessions, intervention sessions, maintenance sessions, and generalization sessions. An acceptability criterion of 90% or above was established a priori. Set up of the procedures, contextual variables, and procedural variables were measured to provide a precise calculation of the implementer’s adherence to the experimental procedures. The variables measured included ensuring participant’s attending, presenting the task direction accurately, presenting the correct wait delay, correcting errors and providing a wait reminder if child responds inaccurately without a prompt or correcting the error if the child responds inaccurately after the prompt,

providing praise, tokens/stickers and an instructive feedback target if the child responds accurately (PC or UPC), waiting an inter-trial interval of five to ten seconds before starting a new trial, alternating targets between participants and providing the terminal reinforcer to the participants. During baseline procedural fidelity, all behaviors measured remain the same except that the implementer should provide a neutral response along with a sticker/token instead of praise, error correction or a wait reminder and that is reflected in the baseline PF sheet accordingly (see Appendix A). Procedural fidelity was measured by dividing the total number of correct behaviors with the total number of observed behaviors and multiplied by 100 to yield the percentage of correct responses. Procedural fidelity was measured across all participants and implementers. One in every three sessions for each behavior set (33%) were randomly selected and coded by a graduate student or doctoral student in early childhood special education who is not the primary implementer of the study. The students were trained in collecting PF by watching video recordings of sessions and consensus coding two sessions along with the primary implementer. Three students coded PF with both identifying as women. One student identified as Asian, and the other two students identified as White. If data fell below this acceptable criterion, the primary implementer was retrained on procedures and procedural fidelity, underwent role plays and practiced with another early childhood graduate student until PF reached above 90% before implementing the intervention with the children again. This process did not happen during the duration of this study.

CHAPTER III

RESULTS

Data analysis

Data was graphed for every participant after every session. Data were graphed separately for each participant via Microsoft Excel. The initial probe session consisted of intermittent data collection across tiers and consisted of a minimum of three data points. The CTD intervention continued until each child reached two consecutive sessions of above 90% unprompted correct responding or until children graduated from the school (Dyad 1 only). All conditions were separated on the graphs with phase change lines indicating a change in conditions. We anticipated baseline data with few to no correct responses and no trend, followed by a short duration of continued 0% correct responding during intervention, followed by an increasing trend to criterion. Modifications to procedures were made depending on this formative analysis by making data-based decisions before every session. The author used line graphs conduct visual analysis. Visual analysis took place across tiers in a vertical manner and occurred in a horizontal manner for each target set for CTD targets.

Riley (Participant 1, Dyad 1)

Figure 1 represents Riley's percentage of unprompted correct responding of 12 target Spanish words randomized into three sets of four words each. For set 1, Aria's baseline level of responding was at 0% and stable. During intervention conditions, the first two data points showed overlap with the baseline sessions as these two sessions were

0-s intervention sessions where the prompt was provided immediately after the task direction and so unprompted correct responding remained at 0%. When the implementer moved up to a 3-s prompt delay, there was an immediate increase in the level of unprompted correct responses and from there on there was an increasing trend. Riley reached mastery in the 20th session after which intervention sessions were concluded for the first set. For sets 2 and 3, data were collected intermittently throughout the initial probe sessions with data being collected for the third tier up to 31 sessions. After 0-s sessions, there was an immediate and increasing trend in unprompted correct responding in both tiers 2 and 3 with Riley reaching mastery in the 10th intervention session for tier 2. Data was consistent with low to moderate variability for tiers 2 and 3 respectively. For the third tier, intervention was discontinued because the academic school year came to an end and the participant graduated from preschool. Unprompted correct responding of target Spanish sight words maintained at a 75% and 100% accuracy for sets 1 and 2 respectively. Maintenance data were not collected for the third tier. Across tiers, data were consistent and stable with minimal overlap between conditions, there are three demonstrations of effect hence symbolizing a functional relation between CTD and the acquisition of Spanish sight words.

Table 4 shows Riley's acquisition of the instructive feedback targets. An initial baseline instructive feedback session was conducted with all the targets. Instructive feedback targets were probed after approximately every 3rd intervention session. For the first set, instructive feedback targets were probed four times and she responded accurately to 50%, 75%, 75% and 100% of the words across the four sessions. For the second set, three probe sessions were conducted and she showed correct responding for

50%, 100% and 75% of the words respectively. For the third set, she was probed only once but responded accurately to 75% of the instructive feedback targets for that set.

There are too little data to draw conclusions about a functional relation for instructive feedback, but Riley's data suggest behavior change occurred following IF exposures for each set.

Warren (Dyad 1, Participant 2)

Figure 2 represents Warren's percentage of unprompted correct responding of 12 target Spanish words randomized into three sets of four words each. For set 1, Warren's baseline level of responding was at 0% and stable. During intervention conditions, the first two data points showed overlap with the baseline sessions as these two sessions were 0-s intervention sessions where the prompt was provided immediately after the task direction and so unprompted correct responding remained at 0%. When the implementer moved to a 3-s prompt delay, there was an immediate increase in the level of unprompted correct responses and an increasing trend for all three tiers. Warren reached mastery in the 16th session for set 1 but three additional intervention sessions for set 1 were conducted. This was conducted as his partner Riley had not yet reached mastery and hence three extra sessions were conducted to give her extra sessions to reach mastery. For sets 2 and 3, probe data were collected intermittently for up to 29 sessions. During the intervention condition, there is an increasing trend in unprompted correct responding in both tiers with Michael reaching mastery in session 14 for tier 2 words. For set 3, there was not an immediate increase in accurate responding during the 3 second delay sessions and he ended with 25% unprompted correct responding during the 9th intervention session. Sessions could not be concluded in the third tier due to the end of the academic

year. In terms of maintenance, maintenance probes were collected every 4th session after mastery of the words, and he maintained tier 1 words at 100% for three sessions and 75% for three sessions with these sessions being alternating in nature. He maintained tier 2 words at 100% for all three maintenance sessions. Across tiers, data were consistent and stable with minimal overlap between conditions, there are three demonstrations of effect hence symbolizing a functional relation between CTD and the acquisition of Spanish sight words.

Table 5 represents Warren's results in terms of acquisition of the instructive feedback targets. An initial baseline instructive feedback probing session was conducted with all the targets. Baseline responding was at 0% for all three-sets. Instructive feedback targets were probed after approximately every 3rd intervention session. For the first set. Instructive feedback targets were probed three times and he responded accurately to 75%,75% and 100% of the words for the three sessions. For the second set, four probe sessions were conducted and he showed correct responding for 75%, 100%,100% and 100% of the words respectively. For the third set, he was probed only once but responded accurately to 100% of the instructive feedback targets for that set. There are too little data to draw conclusions about a functional relation for instructive feedback, but Riley's data suggest behavior change occurred following IF exposures for each set.

Aditya (dyad 2, participant 1)

Figure 3 represents Aditya's results so far in terms of his percentage of unprompted correct responding of 12 Telugu words randomized into three sets of four words each. Aditya's baseline levels of responding for set 1 were at 0% and stable. When the implementer moved to a 3-s prompt delay, there was not an immediate change in the

level of unprompted correct responding after the first two intervention sessions of a 0-s delay. In the 15th intervention session, he began to respond accurately without a prompt and from there the data showed an increasing trend. He reached mastery in this tier during his 27th intervention session. There was mild variability in data. Intermittent baseline collection for set two was collected intermittently until the 27th session. Intermittent data collection for tier 3 words was conducted until the 60th session. Maintenance data collected so far showed that he maintained tier 1 words at 75-100% accuracy over seven maintenance probe sessions. In terms of tier 2 targets, he showed an immediate increase in level of accurate responding following the introduction of a three second wait delay. The trend of data has been increasing with mild variability. Due to prolonged consistent responding at 50% between sessions 42 and 49, a modification was introduced wherein the number of words taught was reduced to two. Aditya immediately hit mastery over 2 sessions at the 51st session and then the third word was added which he reached mastery at session 60. Data collection was concluded for this participant at this point due to implementer time constraints.

Table 6 represents Aditya's results in terms of the acquisition of instructive feedback targets for the first set of words. Baseline responding was at 0% for all three-sets. Aditya was tested on instructive feedback targets ten times until this point and has responded accurately to 0%, 0%, 25%, 100%, 100% and 100% of the words for tier 1 and 50%, 100%, 100%, 100%, 75%, 75%, 75%, and 75% of the words for tier 2.

Emily (dyad 2, participant 2)

Figure 4 represents Emily's results so far in terms of her percentage of unprompted correct responding of 12 Telugu words randomized into three sets of four

words each. Emily's baseline responding for set 1 was at zero and stable. She did not show an immediate increase in unprompted correct responding after the zero second delay but from her 6th intervention session began to respond accurately without any prompts. There was moderate variability in data, and she reached mastery of words in the first set during her 22nd. During instruction of her second set of words, there was a steady rise in level and trend but due to data reaching a plateau stage, the modification of explicitly teaching two words was introduced from the 45th session. The two words she was consistently responding to inaccurately had the same starting sound which could have led to less characteristics of differentiation between the words. Following introduction of the modification, Emily reached mastery in the 6th session. There was moderate variability in data following the introduction of the modification. During instruction of her third set of words, there was an immediate increase in responding with a stable and consistent rising trend. There was moderate variability of data over sessions. Emily reached mastery of tier 3 target words during her 17th instructional session. Maintenance data collected showed that she maintained tier 1 words at 100%, 100%, 75%, 50% 25% and 50% accuracy over six maintenance probe sessions and tier 2 words at 75%, 75%, 50% and 50% over four probe sessions. Maintenance data for tier 3 target words could not be collected due to implementer time constraints.

Table 7 represents Emily's results in terms of acquisition of instructive feedback targets for the first and second set of words. Baseline responding was at 0% for all three-sets. Emily was tested on instructive feedback targets for the first set of words five times and responded accurately to 25%, 25%, 25%, 100%, and 100% of those words during the five sessions respectively. During her six probes with the second set of words, she

responded accurately to 50% ,75%, 50%, 100%, 100%, 75% and 100% of the words. For her probes for tier 3 target words, she responded accurately to 0%, 50%, 50% and 100% of the four times she was probed.

Ananya (dyad 3, participant 1)

Figure 5 represents Ananya's results in terms of percentage of unprompted correct responding of 12 Telugu words randomized into three sets of four words each. Ananya's baseline responding for set 1 was 0% and stable. During intervention sessions there is currently no increasing trend in data as she has not responded accurately to the task direction without a prompt yet even after her modification was implemented. Hence her intervention data are currently at 0% and stable. Data collection is ongoing for Ananya and intermittent data collection for sets two and three are occurring. Ananya has had eight individual sessions so far due to her dyad partner dissenting to instructional sessions. A modification for Ananya began at session 21 wherein she was taught only two targets randomized into 12 trials as her data had not yet showed an increased trend from 0% unprompted correct responding. Once the modification was introduced accurate responding remained at a low level for one session before it began to increase. After that, data showed an increasing trend with mild variability. She reached mastery of two words during the 10th session following introduction of the modification. Following this, another word after which responding decreased. From sessions 38-44, her responding remained consistent and stable at 66.67%. During session 45, the word she was having difficulty with was taught to her explicitly for twelve trials before the session before conducting the actual session. She immediately reached mastery within two sessions following this modification. The final word was then added at session 47 following which responding

decreased again. Instruction could not be completed for this participant due to implementer time constraints. No maintenance data was collected for this participant as she did not reach mastery of her tier 1 words.

Table 8 represents Ananya's results so far in terms of acquisition of instructive feedback targets. Baseline responding was at 0% for all three sets and Ananya has been probed seven ten so far on Instructive feedback targets for tier 1 and has responded accurately to 0%, 0% ,25% and 0%, 0%,0% 0%, 50%, 66.67%, and 66.67% of the targets probed during these three sessions. See table 8 for additional information on number of targets probed.

Felicia (dyad 3, participant 2)

Figure 6 represents Felicia's results in terms of percentage of unprompted correct responding of 12 Telugu words randomized into three sets of four words each. Her baseline responding for set 1 was at 0% and stable. There was an immediate increase in unprompted correct responding after the 0-s delay sessions with an increasing trend. Fewer instructional sessions have been conducted for Felicia than Ananya due to frequent dissent. After changing the timing of sessions, Felicia assented consistently. Felicia reached mastery of tier 1 target words during the 18th session. In terms of acquisition of tier 2 targets, Felicia showed an immediate increase in the level of words acquired with an increasing trend and minor variability. Responding showed an initial increasing and consistent trend but showed a decreasing trend from session 29. When data collection ended for this participant, she was responding accurately to 50% of the tier 2 words. Data collection could not be continued due to implementer time constraints. Maintenance data

for this participant showed that she maintained tier 1 targets at 75%, 100%, 100%, and 100% out of the four maintenance sessions conducted.

Table 9 represents Felicia's results in terms of acquisition of instructive feedback targets so far. Baseline responding was at 0% for all three sets and she was probed four times for instructive feedback targets for the first set and responded accurately to 0%, 50%, 75% and 75% of the words. For the second set of words, she has been probed four times and responded accurately to 50%, 75%, 75% and 100% of the instructive feedback targets during those four sessions.

Observational Learning

Dyad 1 During probes following exposures to observational learning targets (i.e., targets directly taught to their peers, Riley, and Warren both demonstrated some correct responding. Riley responded correctly to 75% of observational learning stimuli for Tiers 1, 2, and 3. Warren responded correctly to 75%, 50%, and 25% of stimuli for Tiers 1, 2, and 3 (respectively). Tier 3 targets, unlike Tiers 1 and 2, were probed prior to mastery due to the end of the school year.

Dyad 2 During probes following exposures to observational learning targets (i.e., targets directly taught to their peers, Aditya, and Emily both demonstrated some correct responding. Emily was tested for observational learning of Aditya's tier 1 words after she reached mastery of tier 1 target words. Emily responded accurately to 25% of stimuli from tier 1 and Aditya responded accurately to 50% of stimuli from tier 1. In terms of tier 2 target words, Aditya responded accurately to 25% of Emily's target words and Emily responded accurately to 25% of Aditya's target words. Tier 3 words were not probed for either participant.

Dyad 3 During probes following exposures to observational learning targets, Ananya responded accurately to 0% of Felicia's CTD targets for tier 1. In terms of tier 2 target words, Ananya responded accurately to 0% of Felicia's target words and Felicia responded accurately to 50% of Ananya's target words. Tier 3 target words were not probed for both participants as tier 3 instruction did not occur for both participants.

Reliability and Fidelity

Average IOA across baseline, intervention and maintenance sessions ranged from 98.50-100%. (Riley = 98.50%, Warren = 99.36%, Aditya = 99.42%, Emily = 99.30%, Ananya = 100%, Felicia = 98.84%). Average fidelity across baseline, intervention and maintenance sessions was above 96% for each participant (Riley = 97.97%, Warren = 98.89%, Aditya = 98.42% Emily = 96.97%, Ananya = 99.825%, Felicia = 99.33%). For Riley, IOA was collected for 43.94% of sessions and PF collected for 42.66% of sessions across conditions. For Warren, IOA was collected for 42.59% of sessions and PF collected for 41.66% of sessions across conditions. For Aditya, IOA was collected for 34.33% of sessions and PF was collected for 33% of sessions across conditions. For Emily, IOA was collected for 33.33% of sessions and PF was collected for 33.59% of sessions across conditions. For Ananya, IOA was collected for 34.11% of sessions across conditions and PF was collected for 34.08% of sessions across conditions. For Felicia, IOA was collected for 45.97% of sessions and PF was collected for 39.27% of sessions across conditions.

CHAPTER IV

DISCUSSION

Summary of Findings

The key findings of the study indicated that CTD was an effective prompting procedure to teach target words in a different language to children with and without disabilities in a small group dyadic setup. Modifications were required for some children, generally related to increasing the value of reinforcers provided or decreasing the complexity of learning (e.g., teaching two targets at once instead of four targets). In a study conducted by Doyle et al. in 1990, with preschoolers, one of the participants required a modification of wait training during CTD instructional session where the participant was reinforced when she waited to respond before the controlling prompt was provided. This modification was anticipated in our initial procedures but did not have to be done in our study. Alig-Cybriwsky et al, 1990 used CTD to teach each participant six words each but divided the six words into three sets and presented each word six times during sessions which added up to 12 trials. They required no modifications in their study which was different from the current study as we taught 12 words to each child and divided them into three sets by teaching four words in each tier with each word being presented three times per tier. For one of the participants (Ananya), we introduced a modification wherein she was taught two words at a time until she reached mastery and one more word could be added. For one participant, she found waiting aversive and

requested that the implementer provide her with the answer at a shorter delay. There is limited research on possible adverse events in single case studies, including those using CTD (Bottema-Beutel et al., 2022). In one study, a participant found the system of least prompts procedure to be aversive and preferred time delay (Bennett-Eyler & Ledford, in preparation), suggesting preferences might be idiosyncratic. It is important that this finding is discussed as it would help implementers to allow children to choose an intervention that is best suited to their learning styles and preferences.

Another key finding is that instructive feedback targets provided along with targets can lead to acquisition of a high percentage of those targets for most children even when children are not required to respond to them. For every participant except Ananya, acquisition of instructive feedback targets was moderate to high. This finding is consistent with previous research stating that children acquired at least some of the non-target stimuli without direct instruction. (Appleman et al, 2014; Apple, 2005; Wolery et al., 1993). It was also consistent with research stating that when instructive feedback targets were presented using direct prompting procedures such as CTD, students were shown to acquire and maintain some of the non-target information (Werts et al., 1995) although maintenance of instructive feedback targets was not probed in this study.

Another finding was that by teaching children in small groups consisting of two children, children also acquire peers' target words via observational learning although the percentage of acquisition of these words were not as significant as target words and instructive feedback targets. This is consistent with previous findings that showed that children with and without disabilities were shown to learn all their own targets and some

of their peers' target words through observational learning in small group contexts.
(Ledford & Wolery, 2015)

Additional findings indicated that participants showed acquisition of higher percentages of Spanish and Telugu vocabulary words and words presented via instructive feedback than words acquired by observational learning. The percentage of words learned via observational learning differed amongst participants in the same dyad and were lower than acquisition of target words. This closely relates to Appleman et al. (2014) results that the participants in their study showed higher percentage of acquisition of English sight words and Spanish translations of those words taught via an instructive feedback procedure. Percentages of acquisition of non-target English and Spanish words were lower.

The rate of skill acquisition differed amongst participants and different modifications were made to ensure to every participant acquired their targets at a pace that worked for them. For Ananya, a modification in the first tier was made to teach only two words and then to continue adding a word after she reached mastery in acquiring the two words and three words respectively. For Emily, a modification was made in the second tier wherein she was explicitly taught two words before the start of the session as the two words had the same starting sound and hence needed additional instruction to acquire those two words. This indicates that within dyads all children do not learn the same and interventions need to be modified or differentiated to meet the individual needs of the child.

Limitations

There are several limitations to this study. First, due to it being the end of the school year, tier 3 target word instruction could not be completed for Riley and Warren and generalization probes could not be conducted for these participants. Generalization probes were not conducted for the rest of the participants due to the implementer being unable to conduct the probes due to timing and schedule constraints. Another limitation is that frequent absences due to regular travel and health concerns relating to his allergies with Aditya led to him losing several sessions of instruction and Emily having individual sessions which may have affected observational learning in both participants. A third limitation that Felicia declined to join sessions during several initial sessions (eight sessions), Ananya received individual instruction during some of those sessions. This was due to playground time being a highly preferred activity by Felicia which was when the implementer conducted sessions. When timings were changed, Felicia consistently elected to attend to sessions. The initial frequent absences may have caused lowered observational learning in both participants. A final limitation is that Tier 2 Telugu target words for Emily had three words with the same beginning sound which may have led to less characteristics of differentiation amongst the words leading to a lengthier period of instruction for Emily for those words.

Implications

Vocabulary words in different languages can be taught using CTD with a 3 s wait delay to preschool children with and without disabilities. Different children learn at different rates even within the same small group with all other factors kept the same. One child (Ananya) had difficulty learning all four targets at the same time and hence a

modification was introduced wherein she was taught two targets and then the implementer increased by one target as the child reached mastery in previous targets. Emily also required a modification in the second tier to explicitly teach two words before the session started as these two words had the same beginning sound. It can be therefore seen that not all children respond at the same rate even when all other factors remained the same and sessions for those children may need to be modified to optimize outcomes. Acquisition of Instructive feedback targets either related to or unrelated to the targets were high. Providing instructive feedback therefore seemed to be an efficient process for teaching children words without providing direct instruction but by simply presenting them along with target words. Finally, observational learning was shown to take place in higher rates in some participants than others. This was also due to frequent absences/ dissent with Aditya and Felicia which may have led to lowered percentage of words acquired via observational learning.

Teachers in classrooms can utilize the results of this study by either explicitly providing instruction in words using CTD of languages that are socially valid to their classrooms or even by providing instructive feedback along with commonly taught target words in the dominant language. Children are not required to respond to these targets but via the results of the study high rates of acquisition of instructive feedback targets do occur. Additionally, teaching novel words in small groups could impact acquisition of target words by peers in the group through observational learning and this could be a helpful procedure especially in classrooms where teachers do not have substantial periods of time for one-on-one instruction.

Suggestions for future research and practice

Future research can focus on using other prompting procedures such as Progressive Time Delay (PTD) or System of Least Prompts (SLP) to provide instruction on target vocabulary words in other languages and to compare it with Constant Time Delay (CTD) to study comparison of rates of acquisition of target words and/or what children prefer more.

Another area for future research is to probe acquisition of instructive feedback targets of peers' in the small groups via observational learning. This could be helpful to teachers in classrooms to reduce burden on teachers by teaching words using specific prompting procedures and instead just provide instructive feedback along with words they teach and study whether peers in small groups will acquire those words too.

Two final areas for further research are to change mastery criteria and to study the effects of that change on maintenance and generalization of target words taught via CTD and to study acquisition of other languages apart from Telugu and Spanish using specific prompting procedures.

Conclusion

Outcomes of the study suggest massed trial instruction of vocabulary words in two different languages (Spanish and Telugu) using CTD is effective in increasing preschoolers' acquisition of those words. Additionally, providing instructive feedback stimuli along with the target words was effective in increasing the acquisition of those targets too. Finally, observational learning of peers' target words in small groups also occurs although not to the same extent as target words. Modifications should be made

depending on rates of acquisition of the target words. Using different prompting procedures or wait training procedures for children who find it difficult to wait may also provide to be helpful.

Table 1
Inclusion and Exclusion criteria of participants

Type	Criteria	Measurement
Inclusion	Age between 48-73 months	Teacher or parent report
Inclusion	School attendance greater than 85% of days in the past month	Teacher report
Inclusion	Do not identify more than 20 common words in the target language	Screening procedures
Inclusion	Average hearing and vision	Teacher report
Inclusion	Demonstrate engagement in a dyad for atleast 10 minutes.	Teacher report
Exclusion	Avoidance of peers	Teacher report
Exclusion	High rates of challenging behavior during instruction	Teacher report

Table 2*IOA data across conditions, tiers, and participants for dyads 1,2 and 3*

Interobserver Agreement				
Participant	Baseline (%)	CTD targets (%)	Maintenance	Average (%)
			(%)	
Riley	100	95.51	100	98.50
Warren	100	98.08	100	99.36
Aditya	100	98.26	100	99.42
Emily	100	97.91	100	99.30
Ananya	100	100	N/A	100
Felicia	100	97.69	N/A	98.84

Table 3*PF data across conditions, tiers, and participants for dyads 1,2 and 3*

Participant	Procedural Fidelity			Average (%)
	Baseline (%)	CTD targets (%)	Maintenance (%)	
Riley	96.56	98.66	100	97.97
Warren	99.14	98.62	100	98.89
Aditya	100	95.28	100	98.42
Emily	100	90.91	100	96.97
Ananya	100	99.65	N/A	99.82
Felicia	100	99.31	98.68	99.33

Table 4

Riley's number of unprompted correct, unprompted errors and percentage of correct responding across tiers and conditions for instructive feedback targets

Session	Percentage Correct		
	Tier 1	Tier 2	Tier 3
Baseline	0	0	0
9	50		
13	75		
18	75		
21	100		
25		50	
29		100	
33		100	
36			75

Note: The percentage was calculated based on correct responding out of four probed targets

Table 5

Warren's number of unprompted correct, unprompted errors and percentage of correct responding across tiers and conditions for instructive feedback targets

Session	Percentage Correct		
	Tier 1	Tier 2	Tier 3
Baseline	0	0	0
9	75		
13	100		
17	100		
21		75	
25		75	
29		100	
33		100	
36			75

Note: The percentage was calculated based on correct responding out of four probed targets

Table 6

Aditya's number of unprompted correct, unprompted errors and percentage of correct responding across tiers and conditions for instructive feedback targets

Session	Percentage Correct		
	Tier 1	Tier 2	Tier 3
Baseline	0	0	0
8	0		
12	25		
18	100		
22	100		
30	100		
34		50	
38		100	
42		100	
46		100	
50		75	
54		75	
58		75	
62		75	

Note: The percentage was calculated based on correct responding out of four probed targets

Table 7

Emily's number of unprompted correct, unprompted errors and percentage of correct responding across tiers and conditions for instructive feedback targets

Session	Percentage Correct		
	Tier 1	Tier 2	Tier 3
Baseline	0	0	0
8	25		
12	25		
18	25		
22	100		
26	100		
31		50	
36		75	
40		100	
44		100	
47		75	
49		100	
55			0
59			50
63			50
67			100

Note: The percentage was calculated based on correct responding out of four probed targets

Table 8

Ananya's number of unprompted correct, unprompted errors and percentage of correct responding across tiers and conditions for instructive feedback targets

Session	Percentage Correct		
	Tier 1	Tier 2	Tier 3
Baseline	0	0	0
8	0		
12	0		
21	25		
24*	0		
27	0		
31	0		
35	0		
39	50		
43**	66.67		
49	66.67		

*Note: The percentage was calculated based on correct responding out of four probed targets until session marked with * where it was calculated out of two probed targets. ** indicates where percentage was calculated out of 3 probed targets*

Table 9

Felicia's number of unprompted correct, unprompted errors and percentage of correct responding across tiers and conditions for instructive feedback targets

Session	Percentage Correct		
	Tier 1	Tier 2	Tier 3
Baseline	0	0	0
8	0		
14	50		
16	75		
22		50	
26		75	
30		100	
33		75	

Note: The percentage was calculated based on correct responding out of four probed targets

Figure 1

Riley's percentage of unprompted correct responding across conditions

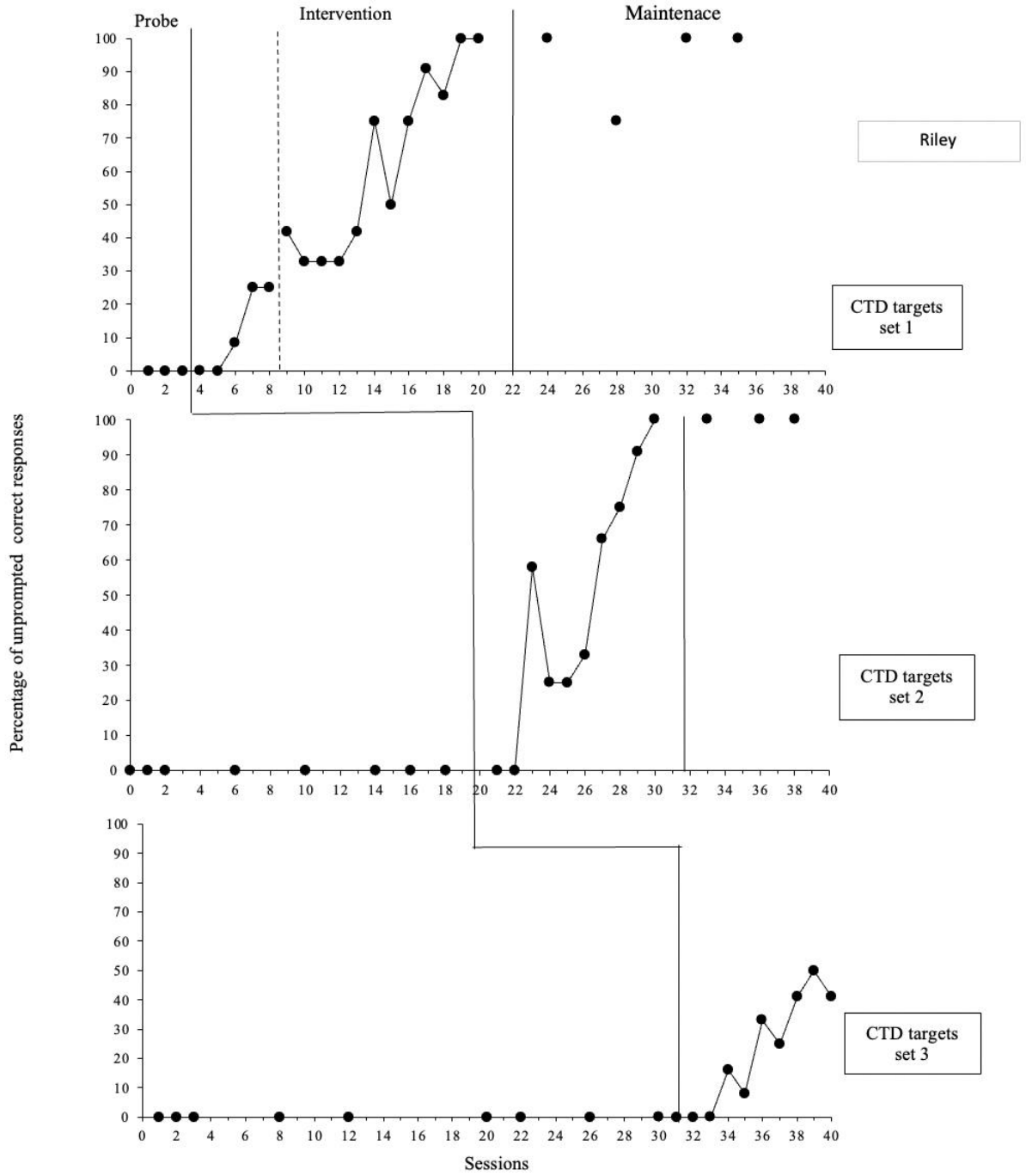


Figure 2

Warren's percentage of unprompted correct responding across conditions

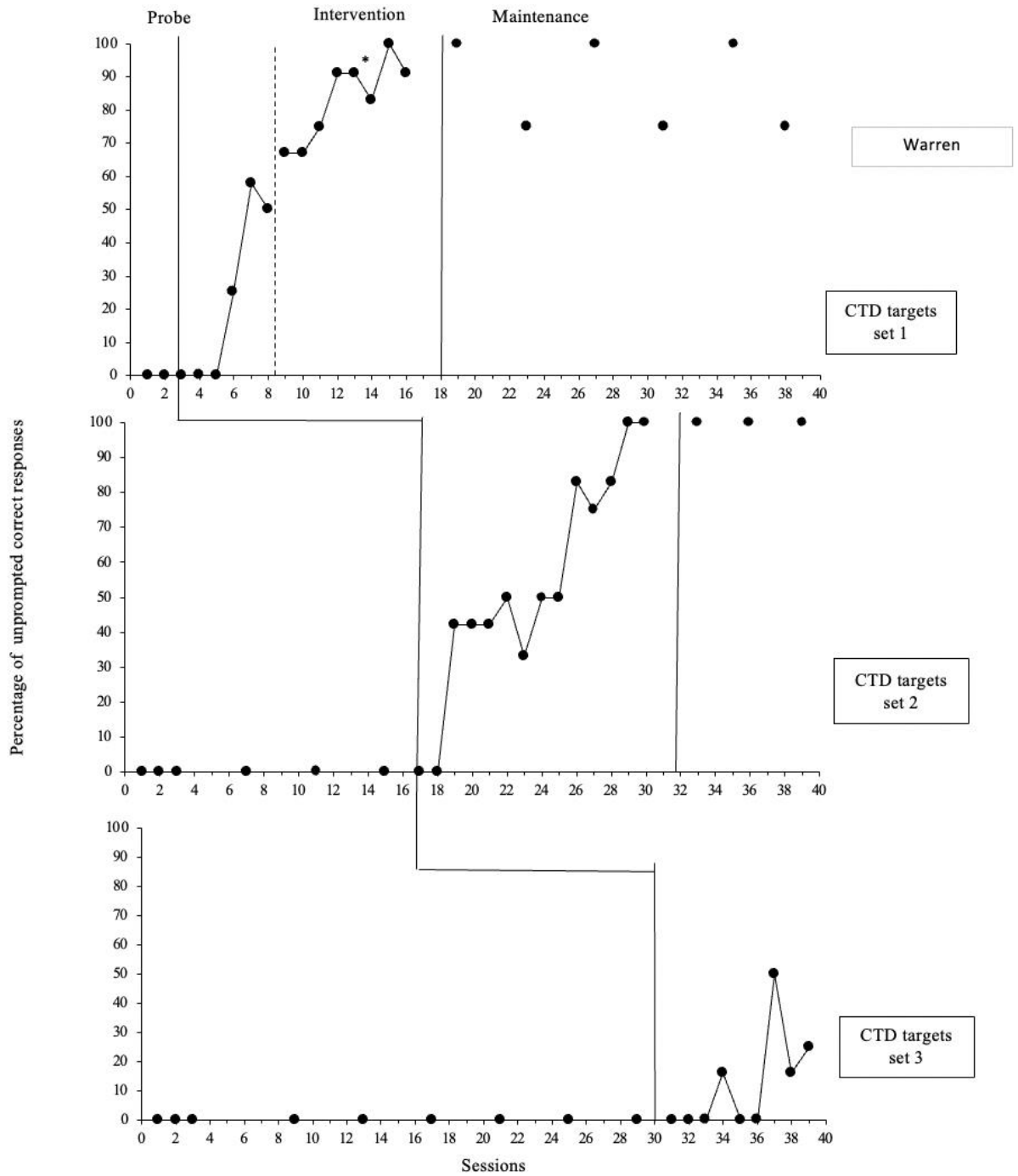


Figure 3

Aditya's percentage of unprompted correct responding across conditions

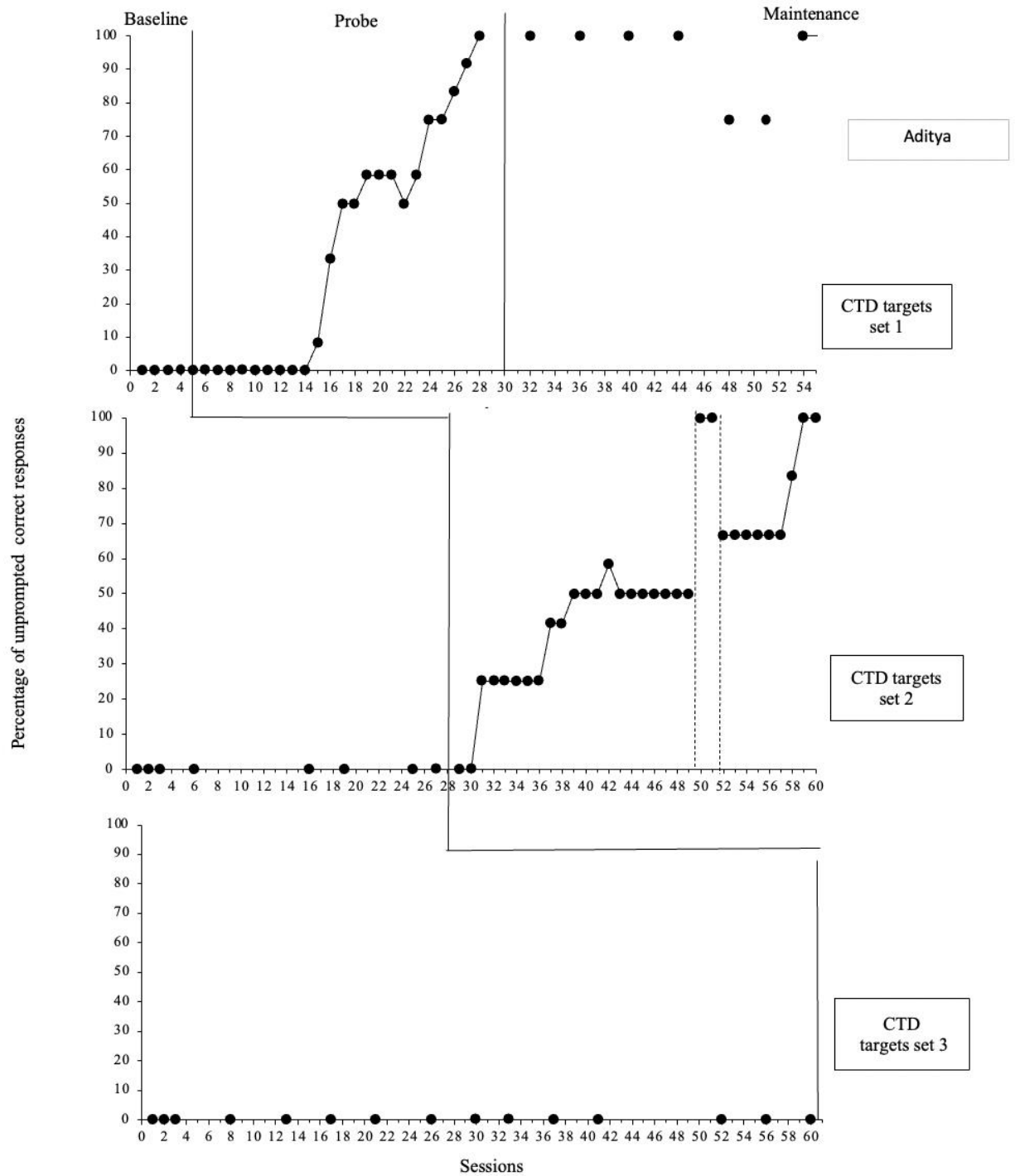


Figure 4

Emily's percentage of unprompted correct responding across conditions

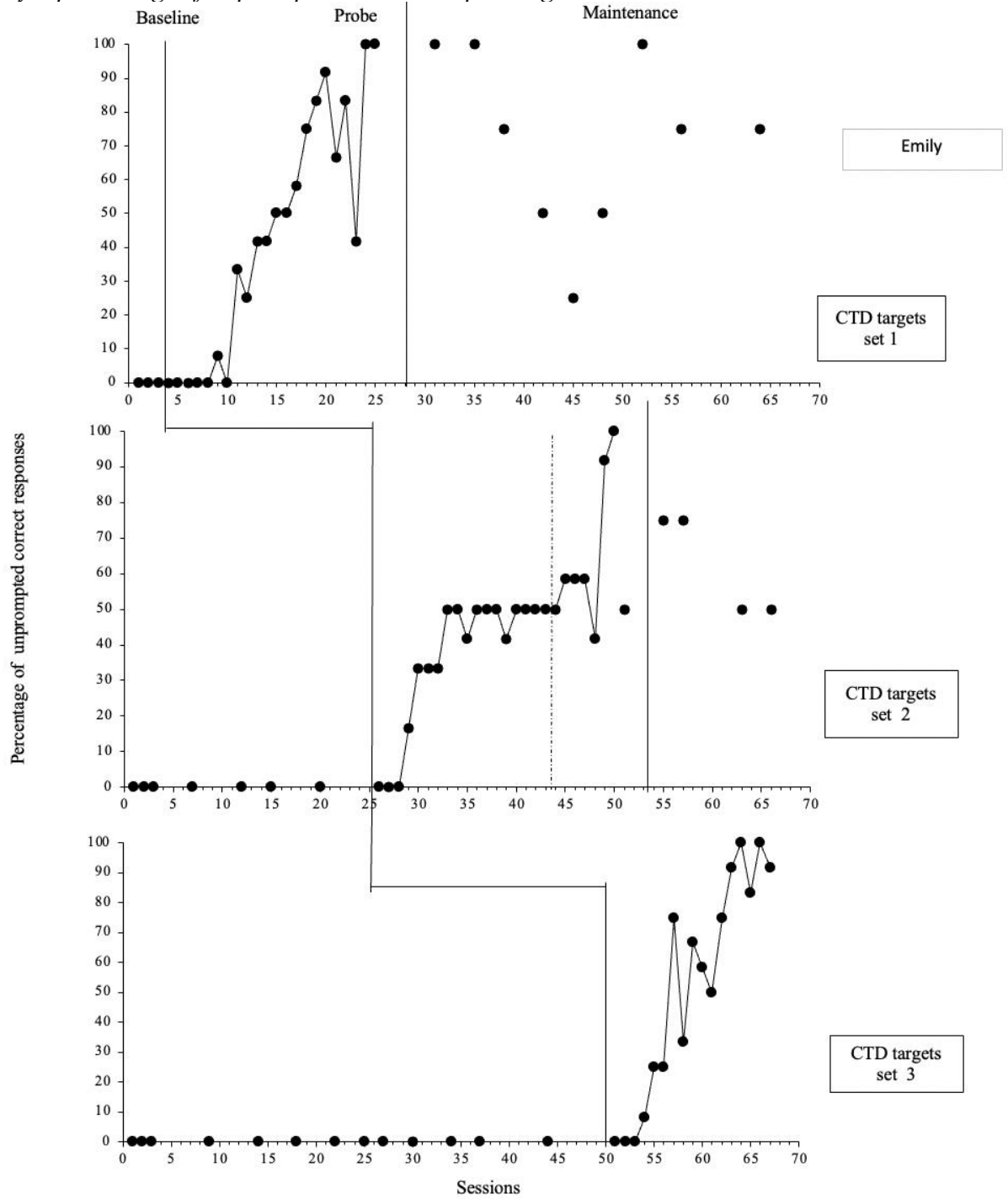


Figure 5
Ananya's percentage of unprompted correct responding across conditions

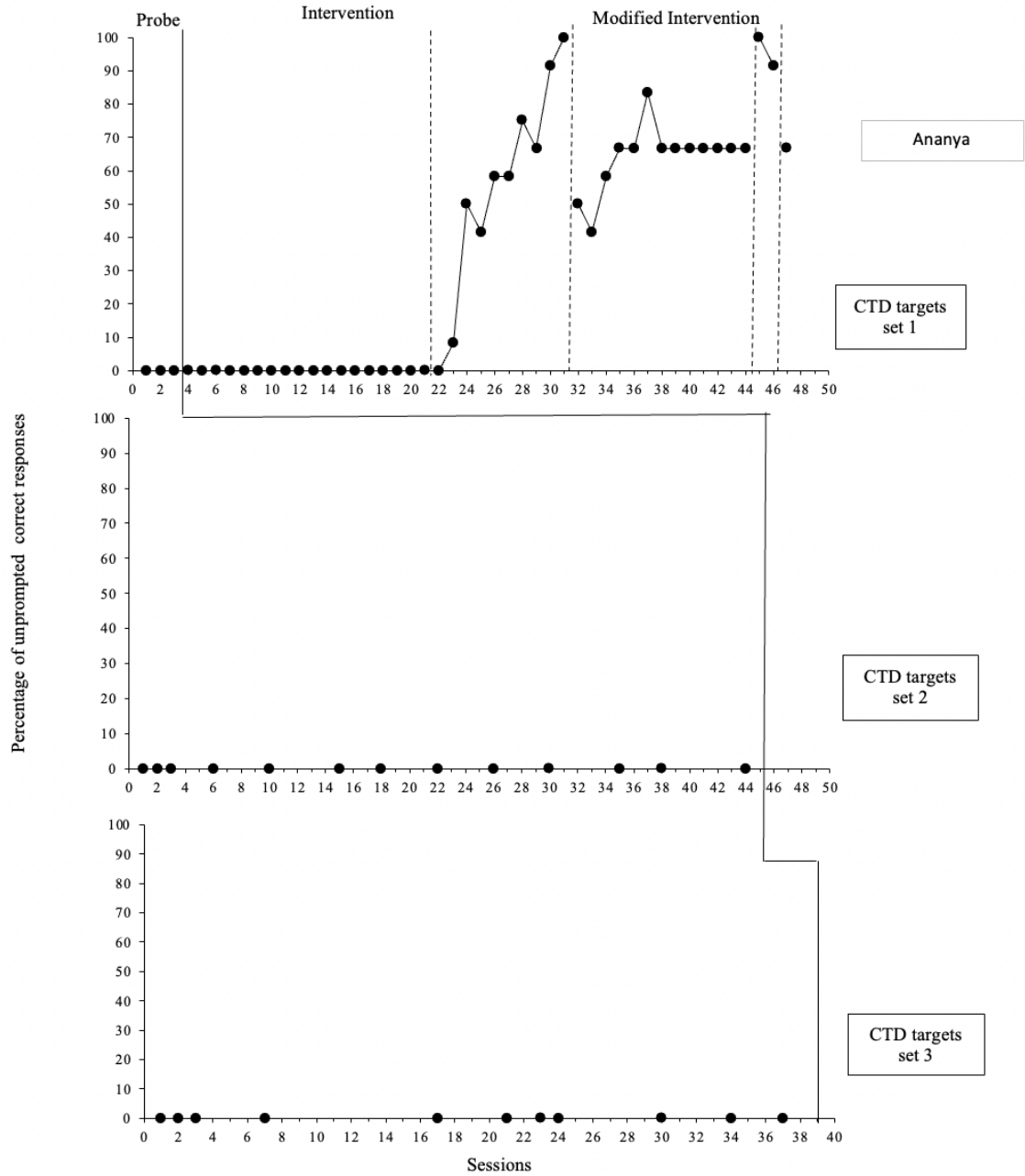


Figure 6
Felicia's percentage of unprompted correct responding across conditions

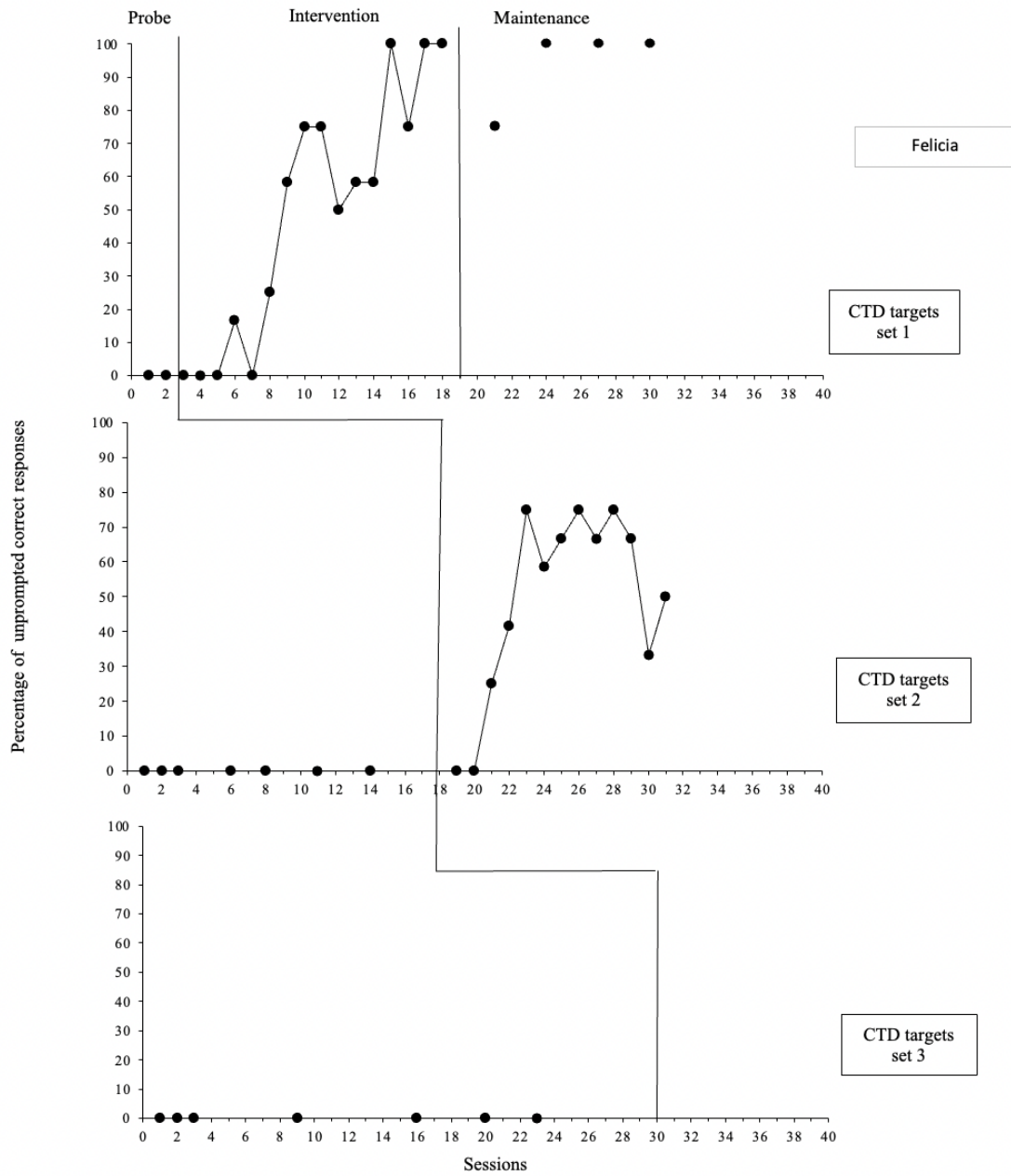
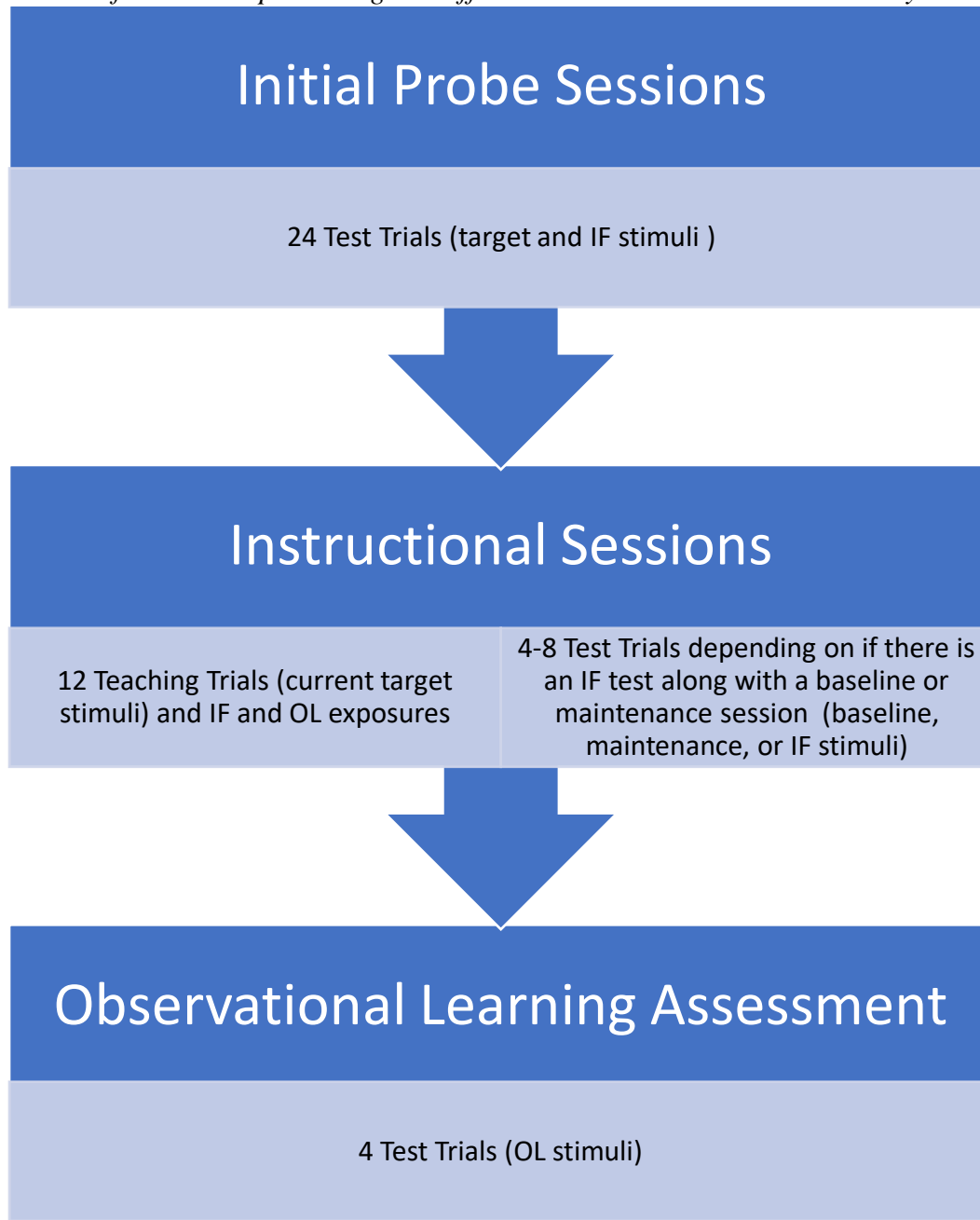


Figure 7

General flowchart representing the different sessions conducted in the study



CHAPTER V

REFERENCES

- Albarran, S. A., & Sandbank, M. P. (2019). Teaching non-target information to children with disabilities: An examination of instructive feedback literature. *Journal of Behavioral Education, 28*(1), 107-140.
- Alig-Cybriwsky, C., Wolery, M., & Gast, D. L. (1990). Use of a constant time delay procedure in teaching preschoolers in a group format. *Journal of Early Intervention, 14*(2), 99-116.
- Appelman, M., Vail, C. O., & Lieberman-Betz, R. G. (2014). The effects of constant time delay and instructive feedback on the acquisition of English and Spanish sight words. *Journal of Early Intervention, 36*(2), 131-148.
- Apple, A. L. (2005). *A comparison of the use of constant time delay alone and constant time delay with instructive feedback to teach children with autism to discriminate stimuli by function, feature and class*. University of Washington.
- Ayres, K., & Ledford, J. R. (2014). Dependent measures and measurement systems. In D. L. Gast & J. R. Ledford (Eds.), *Single case research methodology: Applications in special education and behavioral sciences* (pp. 124–153). New York: Routledge.
- Bialystok, E. (1999). Cognitive complexity and attentional control in the bilingual mind. *Child development, 70*(3), 636-644.
- Bialystok, E. (2001). *Bilingualism in development: Language, literacy, and cognition*. Cambridge University Press.
- Bialystok, E., & Martin, M. M. (2004). Attention and inhibition in bilingual children: Evidence from the dimensional change card sort task. *Developmental science, 7*(3), 325-339.
- Bialystok, E. (2010). Global–local and trail-making tasks by monolingual and bilingual children: Beyond inhibition. *Developmental psychology, 46*(1), 93.
- Bottema-Beutel, K., Crowley, S., Sandbank, M., & Woynaroski, T. G. (2021). Adverse event reporting in intervention research for young autistic children. *Autism, 25*(2), 322-335
- Brandt, J. A. A., Weinkauff, S., Zeug, N., & Klatt, K. P. (2016). An evaluation of constant time delay and simultaneous prompting procedures in skill acquisition for young

- children with autism. *Education and Training in Autism and Developmental Disabilities*, 51(1), 55-66.
- Browder, D., Ahlgrim-Dezell, L., Spooner, F., Mims, P. J., & Baker, J. N. (2009). Using time delay to teach literacy to students with severe developmental disabilities. *Exceptional Children*, 75(3), 343-364.
- Carlson, S. M., & Meltzoff, A. N. (2008). Bilingual experience and executive functioning in young children. *Developmental science*, 11(2), 282-298.
- Catania, A. C. (1998). The taxonomy of verbal behavior. In *Handbook of research methods in human operant behavior* (pp. 405-433). Springer, Boston, MA.
- Cavaluzzi, M. (2010). Promoting cultural and linguistic diversity. *Texas Child Care*, 2.
- Daly III, E. J., Wells, N. J., Swanger-Gagné, M. S., Carr, J. E., Kunz, G. M., & Taylor, A. M. (2009). Evaluation of the multiple stimulus without replacement preference assessment method using activities as stimuli. *Journal of Applied Behavior Analysis*, 42(3), 563-574.
- Doyle, P. M., Wolery, M., Gast, D. L., Ault, M. J., & Wiley, K. (1990). Comparison of constant time delay and the system of least prompts in teaching preschoolers with developmental delays. *Research in Developmental Disabilities*, 11(1), 1-22.
- Gast, D. L., Doyle, P. M., Wolery, M., Ault, M. J., & Kolenda, J. L. (1994). Instructive feedback: Effects of number and type. *Journal of Behavioral Education*, 4(3), 313-334.
- Ghasemi, B., & Hashemi, M. (2011). Foreign language learning during childhood. *Procedia-Social and Behavioral Sciences*, 28, 872-876.
- Halle, J. W., Marshall, A. M., & Spradlin, J. E. (1979). Time delay: A technique to increase language use and facilitate generalization in retarded children. *Journal of Applied Behavior Analysis*, 12(3), 431-439.
- Johnston, S., Nelson, C., Evans, J., & Palazolo, K. (2003). The use of visual supports in teaching young children with autism spectrum disorder to initiate interactions. *Augmentative and Alternative Communication*, 19(2), 86-103.
- Kleinert, H. L., & Gast, D. L. (1981). Teaching a multi handicapped adult manual signs using a constant time delay procedure. *Journal of the Association for the Severely Handicapped*, 6(4), 25-32.
- Ledford, J. R., Gast, D. L., Luscre, D., & Ayres, K. M. (2008). Observational and incidental learning by children with autism during small group instruction. *Journal of Autism and Developmental Disorders*, 38(1), 86-103.

- Ledford, J. R., & Gast, D. L. (Eds.). (2009). *Single subject research methodology in behavioral sciences: applications in special education and behavioral sciences*. Routledge.
- Ledford, J. R., & Wolery, M. (2015). Observational learning of academic and social behaviors during small-group direct instruction. *Exceptional Children, 81*(3), 272-291.
- Mayo, M. D. P. G. (Ed.). (2017). *Learning foreign languages in primary school: Research insights* (Vol. 115). Multilingual Matters.
- Mlinarić, A., Horvat, M., & Šupak Smolčić, V. (2017). Dealing with the positive publication bias: Why you should really publish your negative results. *Biochemia medica, 27*(3), 447-452.
- Rankin, B. S. (2018). The Effects of Simultaneous Prompting and Instructive Feedback For Individuals with Autism.
- Ross, A. H., & Stevens, K. B. (2003). Teaching spelling of social studies content vocabulary prior to using the vocabulary in inclusive learning environments: An examination of constant time delay, observational learning, and instructive feedback. *Journal of Behavioral Education, 12*(4), 287-309.
- Saunders, W. M., & O'Brien, G. (2006). Oral Language. In F. Genesee, K. Lindholm-Leary, W. M. Saunders, & D. Christian (Eds.), *Educating English language learners: A synthesis of research evidence* (pp. 14–63). Cambridge University Press.
- Schuster, J. W., Gast, D. L., Wolery, M., & Gultinan, S. (1988). The effectiveness of a constant time-delay procedure to teach chained responses to adolescents with mental retardation. *Journal of Applied Behavior Analysis, 21*(2), 169-178.
- Stokes, T. F., & Baer, D. M. (1977). An implicit technology of generalization 1. *Journal of applied behavior analysis, 10*(2), 349-367.
- Swain, R., Lane, J. D., & Gast, D. L. (2015). Comparison of constant time delay and simultaneous prompting procedures: Teaching functional sight words to students with intellectual disabilities and autism spectrum disorder. *Journal of Behavioral Education, 24*(2), 210-229.
- Taylor, B. A., & DeQuinzio, J. A. (2012). Observational learning and children with autism. *Behavior Modification, 36*(3), 341-360.
- Tullis, C. A., Frampton, S. E., Delfs, C. H., Greene, K., & Reed, S. (2021). The effects of instructive feedback and stimulus equivalence procedures on group instructional outcomes. *Journal of Behavioral Education, 30*(1), 1-21.

- Toppelberg, C. O. (2011). Promover el Bilingüismo: American Children Should Learn Spanish, and so Should American Child Psychiatrists. *Journal of the American Academy of Child and Adolescent Psychiatry*, 50(10), 963.
- Werts, M. G. (1991). Instructive Feedback: Increasing Opportunities for Learning through the Addition of Incidental Information.
- Werts, M. G., Wolery, M., Holcombe, A., & Gast, D. L. (1995). Instructive feedback: Review of parameters and effects. *Journal of Behavioral Education*, 5(1), 55-75.
- Werts, M. G., Caldwell, N. K., & Wolery, M. (1996). Peer modeling of response chains: Observational learning by students with disabilities. *Journal of Applied Behavior Analysis*, 29(1), 53-66.
- Willis, A. I. (2000). Critical Issue: Addressing Literacy Needs in Culturally and Linguistically Diverse Classrooms.
- Wolery, M., Ault, M. J., Gast, D. L., Doyle, P. M., & Griffen, A. K. (1991). Teaching chained tasks in dyads: Acquisition of target and observational behaviors. *The Journal of Special Education*, 25(2), 198-220.
- Wolery, M., Holcombe, A., Cybriwsky, C., Doyle, P. M., Schuster, J. W., Ault, M. J., & Gast, D. L. (1992). Constant time delay with discrete responses: A review of effectiveness and demographic, procedural, and methodological parameters. *Research in Developmental Disabilities*, 13(3), 239-266.
- Wolery, M., Holcombe, A., Werts, M. G., & Cipolloni, R. M. (1993). Effects of simultaneous prompting and instructive feedback. *Early Education and Development*, 4(1), 20-31

CHAPTER VI
APPENDIX

**NO PROMPT DATA COLLECTION FORM
(Baseline, Maintenance, Screening sessions)**

Child Code: _____
Collector: _____

Implementer: _____

Data

Date: _____

Condition: Baseline Maintenance

For baseline, maintenance, and preview sessions, randomize all 12 stimuli and write one in each row.

Trial	Stimulus	Child Response	Comments
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

*The only possible responses are **UPC** (unprompted correct) and **UPE** (unprompted error).*

Additional Notes:

CONSTANT TIME DELAY DATA COLLECTION FORM

Child codes: _____ Implementer: _____ Data Collector: _____

Trial	Stimulus	Delay Interval (s)	Child response	Comments
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

POST SESSION PROBE: P1 P2

Baseline Maintenance

Trial	Stimulus	Child response
1		
2		
3		
4		

INSTRUCTIVE FEEDBACK PROBE (every 3rd session) P1 P2

Trial	Stimulus	Response	Trial	Stimulus	Response
1			3		
2			4		

OBSERVATIONAL LEARNING TARGETS DATA COLLECTION FORM

Child Code: _____ Implementer: _____ Data Collector:

Date: _____

Trial	Stimulus	Child Response	Comments
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

Possible responses include: + = correct response; - = incorrect response (Circle either + or - for each trial)

Additional Notes:

PROCEDURAL FIDELITY DATA COLLECTION FORM (BASELINE)

Trial	Participant	Ensure attending	Present direction	Child response	Neutral response	Token	Inter-trial interval of 10 +/- 5 seconds	Targets alternated between participants	Terminal reinforcer provided	Comments
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										

