



## **BSc in Psychology**

**Discrete trial teaching as an intervention for language delay;**

Multilingual children at risk for language delays

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Foreword

Submitted in partial fulfillment of the requirements of the BSc Psychology degree, Reykjavik University, this thesis is presented in the style of an article for submission to a peer-reviewed journal.

### Abstract – English

A prevalent disability in early childhood is language acquisitions. Children with delays in language function have shown serious deprivation in education and in social development. Lack of intervention has been associated with increased risk of problem behaviors such as self-injurious behavior, aggression, destructive behavior, and disobedience. Thus it is important to implement an effective intervention for those that are dealing with language delays. One method known to be useful for children with autism is Discrete trial teaching (DTT). DTT is useful when teaching new behaviors such as speech sounds, motor movements, and new discriminations.

The purpose of the study was to examine if Discrete trial teaching (DTT) could be beneficial in enhancing vocabulary for multilingual children, and the effectiveness of generalization after the intervention. The Verbal Milestones Assessment and Placement program (VB-MAPP), a tool that evaluates an individual's verbal repertoire on three developmental levels was used to evaluate the language deficit in a four-year-old, multilingual boy. The teaching procedure resulted in increased vocabulary for the child, which is compliant with previous research. The participant showed good generalization after DTT. Because of individual differences, it is not possible to generalize for all multilingual individuals. Further research with more participants is recommended

*Keywords:* language delay, discrete trial teaching, generalization, VB-MAPP, multilingual children

### Útdráttur

Tungumálaörðugleikar eru algengt vandamál í barnæsku. Börn með seinan málþroska hafa sýnt fram á námsörðuleika og vandamál í félagslegum samskiptum. Skortur á inngrípum hefur verið tengdur við auknar líkur á vandamálahegðun eins og sjálfsskaða, ýgi og óhlíðni. The Verbal Milestones Assessment and Placement program (VB-MAPP), mælitæki sem metur málgetu á þremur mismunandi þroskastigum, var notað til að meta tungumálaörðugleika hjá fjöltyngdum fjögurra ára strák.

Markmið rannsóknarinnar var að skoða hvort Discrete trial teaching (DTT) geti verið góð aðferð til að auka málfærni hjá fjöltyngdum börnum sem kljást við seinan málþroska, og hvort alhæfing eigi sér stað eftir þjálfun. DTT er vinsæl aðferð sem hefur mikið verið notuð og við góðan árangur með börnum með einhverfu. Aðferðin hefur reynst vel þegar kemur að því að læra nýja hegðun eins og máhljóð, aðgreiningu og ýmsar hreyfingar. Ekki hefur verið gerð rannsókn á DTT og fjöltyngdum einstaklingum, en leiddu niðurstöður þessarar rannsóknar í ljós að DTT getur verið góð aðferð til þess að bæta orðaforða. Einnig sýndi þátttakandinn fram á góða alhæfingu eftir kennslu. Vegna einstaklingsmunar er ekki hægt að alhæfa árangurinn yfir á alla fjöltyngda einstaklinga sem eiga við tungumálaörðugleika að stríða, mælt með því að efnið verði rannsakað betur með fleiri þátttakendum.

*Lykilorð:* tungumálaörðugleikar, discrete trial teaching, alhæfing, VB-MAPP, fjöltyngd börn

Discrete trial teaching as an intervention for language delay: Multilingual children at risk for language delays.

Developmental language impairment is when a child has problems with the acquisition of spoken language (Tomblin et al., 1997). In an epidemiological study where language impairment was estimated in monolingual children, 26,2% of 7,218 children failed the screening (e.g., failing a screening means that language impairments are present). The prevalence rate was measured at 7,4%, the prevalence for boys was 8% and for girls 6% (Tomblin et al., 1997).

It's important to identify language impairments early for several reasons. Children that have delayed language functions often show serious deprivation in education and social development (Peterson, 2004). Lack of early interventions for these children has been associated with increased risk in other adaptive areas, e.g. problematic behaviors such as self-injuries and aggression. Destructive behavior and disobedience have been linked to delays in communication abilities (Kelley, Castro, Addison, LaRue, & Shillingsburg, 2007). The purpose of intervention is to increase adaptive, prosocial behavior and decrease problematic behaviors (Steege, Mace, Perry, & Longenecker, 2007).

Individuals that acquire one language or more are often referred to as bilingual or multilingual. Multilingual people are defined as those who “are able to comprehend and/or produce two or more languages in oral, manual, or written form with at least a basic level of functional proficiency or use, regardless of the age at which the languages were learned” (McLeod, Harrison, Whiteford, & Walker, 2016). It is believed that approximately 20% of the population in the U.S. and Canada speak another language than English at home, and that more than half of the world's population is bilingual (Bialystok & Werker, 2017).

For most children, the ability to communicate is accomplished both in educational settings and by interacting with their family and their community, but for some children

additional support is necessary. Children who speak more than one language often get additional support in order to strengthen their ability to speak the dominant language of their community (McLeod et al., 2016). No epidemiological studies have been performed on Primary Language Impairment (PLI) in children learning two languages. Children that only speak one language and multilingual children are considered to be equally affected by PLI. If that is truly the case, around 7% of multilingual children should develop PLI (Kohnert, 2010).

All children have the need to communicate and for children that have trouble with the development of speech, alternative methods have been developed (Paul, 2008). Methods of Applied Behavior Analysis (ABA) have played a big role the past few years in education and treatment for individuals with autism (Ghezzi, 2007). The ABA approaches are to a great extent based on Skinner's (1957) analysis of verbal behavior. Skinner described four main units of verbal behavior, two of which are *mand* and *tact* (Madden & APA, 2013).

*Mand* is a verbal response that is under the control of motivating operations (MO's) and is reinforced by the requested stimulus (Martin & Pear, 2015), i.e. what the child says is controlled by what the child wants (e.g., request; Sundberg & Michael, 2001). Motivating operations (MO'S) are stimuli that change the value of objects or events (as reinforcers/punishers) and also change the frequency of a behavior followed by that reinforcement (e.g., being thirsty is a motivating operation for drinking water; Jennett, Harris, & Delmolino, 2008).

*Tact* is when an individual responds by naming a certain object, it is developed and maintained by social reinforcement (i.e., if a child is asked "what is that?" and the child answers "water," which would be the right answer and the child gets a praise, then the child's response was a tact; Martin & Pear, 2015). Mands and tacts can be taught with discrete trial training (DTT; Jennett, Harris, & Delmolino, 2008), which is one of the most studied

methods for children with autism. It is also known as discrete trial teaching, which is a preferable term. DTT is known to be very useful when teaching new behaviors (e.g., speech sounds and motor movements) and new discriminations (Ghezzi, 2007). Other methods that are used by behavior analysts to enhance speech are pivotal response teaching, precision teaching, incidental teaching and natural environmental teaching (Ghezzi, 2007).

Discrete trials are characterized by a teacher and a child working one on one in a distraction-free setting where the teacher gives instructions (Smith, 2001). The teacher manages the situation entirely and controls the opportunities for the child to respond (e.g., what happens before, during, after the child responds to the task; Ghezzi, 2007). DTT is implemented by breaking complex tasks down into small components, which are repeatedly presented to the individual in a simple manner to promote his/her learning (Ryan & Hemmes, 2005). Usually, each session lasts for 2 to 5 minutes, following a 1- or 2-minute break between sessions (Smith, 2001). An example of a discrete trial is when a teacher begins by giving the child an instruction (e.g., sit down) which is followed by a response (e.g., the child sits down). If the response is an accurate reflection of the instruction, the teacher delivers a positive consequence (e.g., compliments the child). If the response is inaccurate (e.g., the child does not sit down), the teacher withholds a positive consequence (e.g. withdraws attention; Ghezzi, 2007).

Previous research has shown evidence of the effectiveness of DTT when teaching new behaviors such as speech sounds, motor movements and new discriminations to children with developmental disabilities. This method has mainly been used with children with autism and has shown good results (Ghezzi, 2007). DTT leads to fast improvements according to Miranda-Linné & Melin (1992), but compared to other procedures (e.g., Naturalistic procedures like Incidental teaching), it shows worse results when it comes to generalization and spontaneous speech.

Naturalistic teaching approaches promote a normalized development where activities can be employed at home, in daycares and in educational settings rather than in a limited teaching environment (LeBlanc, Esch, Sidener, & Firth, 2006). Naturalistic approaches are based on what motivates the child (Jennett et al., 2008). The child's lead is followed and its interests (e.g., favorable object or something that appeals to the child) provide a "natural reinforce". This approach has been used to enhance verbal language in autistic non-verbal children (Miranda-Linné & Melin, 1992) and has been helpful when promoting language across different contexts (i.e., generalization; LeBlanc, Esch, Sidener, & Firth, 2006).

When implemented correctly, DTT is one of the most beneficial ways of teaching children with autism. It is known to be very effective when teaching a single unit of behavior (e.g., verbal request and color recognition), but less effective when teaching series of behavior (e.g., brushing teeth and getting dressed). DTT has many advantages and has been recommended for use, although it has some disadvantages. Most of these disadvantages can be offset by accompanying DTT with other ABA methods (i.e., methods that teach generalization across people and settings and sequential behavior; Steege et al., 2007).

A known problem for children with autism following language training is that they often do not generalize words they have been taught to spontaneous communication, unless they are prompted to do so (e.g., do not transfer new words into natural settings). Generalization is when an individual emits word that he has previously trained in treatment, in other situations (i.e., across adults, across settings and across instructional tasks; Miranda-Linné & Melin, 1992). To be a competent language user, it is important that language impaired individuals are able to generalize trained words after teaching trials (Fey, 1988). Problems with generalization are most likely to prevail following training methods that are implemented by only one adult, in a single setting and with limited instructional tasks (Miranda-Linné & Melin, 1992).

The purpose of the current study was to see if DTT can be effective for multilingual individuals with language delay's and to evaluate the effectiveness of generalization after the teaching procedure. It was hypothesized that DTT would be an effective method to enhance language in multilingual children with language delays. An additional hypothesis was that after DTT, multilingual individuals would show good generalization (e.g., between settings and across people).

## **Method**

### **Participants, materials, and settings**

The participant was a four-year-old boy who is originally from the Philippines but now lives in Iceland. Three languages are spoken at his home (Tagalog, English, and Icelandic). The participant was chosen because his teachers noticed that he had trouble with the acquisition of speech and his speech was underdeveloped compared to other multilingual children in his kindergarten. The boy had not been diagnosed with any developmental disabilities when the study was undertaken.

The study was performed at the boy's kindergarten in Reykjavik, Iceland. Data collection and training sessions took place two times per week for about an hour (sometimes longer), for approximately three months. The training was conducted in the same room every session. The room contained a small table and two chairs, where the teaching took place. There was also a shelf with children's books and a teacher's desk and a larger chair.

Materials used during the sessions included pencils, data sheets, VB-MAPP assessment sheets, VB-MAPP book, apple bits, raisins and oat crackers. The data was collected with approval from The Icelandic Data Protection Authority. The participant was not exposed to any risk during the study.

Food items for the session were selected based on information from teachers at the boy's kindergarten. Food items were utilized during the DTT sessions. They were delivered every time the boy responded correctly to the given task (e.g., correctly named objects on a photo shown to him). For example, the boy was given a piece of an apple, a raisin or an oat cracker after responding correctly.

### **Phase 1: VB-MAPP Assessment**

The Verbal Behavior Milestones Assessment and Placement Program (VB-MAPP), a commonly used measurement tool was used to identify the child's language deficit. The purpose of the assessment is to identify unique behaviors, needs and characteristics of the individual where interactions between individual and his/her environment are observed (Steege et al., 2007). VB-MAPP was mostly created from key principles of verbal behavior therapy by Skinner (Dixon et al., 2015). The VB-MAPP consists of 16 milestone areas and 170 milestones. It evaluates the verbal repertoire of an individual on three developmental levels. Example of skills assessed are to identify items, request items, engage in social play, demonstrate conversation, solve simple math and demonstrate reading comprehension (Dixon et al., 2015).

The first level assesses required language skills that are believed to develop in the first 18 months of age. On the second level, skills from the first level are expanded by targeting language skills that are believed to develop between 18-30 months (i.e., more requesting skills and simple conversations). Level three assesses language skills that are believed to develop between 30-48 months (i.e., skills like simple mathematics; Dixon et al., 2015).

If accurately administered, VB-MAPP can be useful to identify instructional goals and objectives (Barnes, Mellor, & Rehfeldt, 2014). No data has been published on the

validity or reliability of the VB-MAPP. Limitation of the assessment is it only measures an individual's verbal repertoire up to a typical developmental age of 48-months (Dixon et al., 2015).

### **Procedure**

The child's skills were assessed by testing him on different tasks that are thoroughly described in the VB-MAPP handbook, and also by observing him in certain situations. On level one the child was tested in *tacts*, *mands*, listener responding, visual perception, independent play, social behavior/social play, motor imitation, echoic, spontaneous verbal behavior and intraverbal behavior. The child's skills were very poor, so on level two and three his tacting and manding skills were only tested. An example of how tacts were tested on level one, the child was shown a book and then asked to name 2 items (e.g., characters, pets, or other objects). When tacts were tested on level two, the child had to tact 25 items when asked: "What is that?" (e.g., book, shoe, car, dog). On level three, when tacts were tested the child was asked to tact four different prepositions (e.g., in, out, on, under) and four pronouns (e.g., I, you, mine, me).

### **Data Collection**

There are five different tasks presented in each category on each level, individuals can obtain a score from zero points to five points in each milestone category (e.g., tact would be one milestone category). The number of milestone categories on each level are different. On level one there are 10 milestone categories, the child was tested in all of them. On level two there are 12 milestone categories and on level three there are 13 milestone categories, and the child was only tested in two of the milestone categories on levels two and three (i.e., mand and tact). When the child completed a presented task (i.e., one task of five), he scored one point. If he completed a part of the task (e.g., if the task was to name 25 items when asked "what is

that?” and he only named 10), he scored half a point. If the child was not able to complete the presented task he got no point.

## **Phase 2: Discrete Trial Teaching (DTT)**

### **Procedure**

#### **Baseline**

The baseline sessions consisted of the researcher presenting one photo at a time to the child, where the child was asked: “what is in this photo?” A 5-second response period was given. This was repeated until each photo had been presented to the child three times. When a correct answer was given, the correct response was recorded and the child got a positive feedback (e.g., “that’s correct, good job”) and delivered an edible item (e.g., given an apple bit), then the interventionist proceeded to the next instruction. An error was recorded if a wrong answer was given, and the child did not get a feedback and interventionist proceeded to the next instruction.

#### **Teaching procedures**

Discrete teaching trials were performed in accordance with standard procedures. In the beginning, the child was asked to sit down in his seat. Then each session started by the interventionist presenting the child with one photo at a time in random order. The researchers divided the words into three sets. The words taught in set one were *diskur*, *rauður* and *gaffall* (i.e., dish, red, and fork). Words taught in the second set were *hnifur*, *skæri* and *tölva* (i.e., knife, scissors, and computer). Words taught in the third set were *penni*, *hjálmur* and *skál* (i.e., pen, helmet, and bowl). These words were chosen because it was considered beneficial for the child to know them. Each set contained three pictures, each picture was presented to the child three times, with the total of nine presentations.

In the first step of each set, the child was verbally prompted (e.g., the child was shown a photo of a knife and was asked “what is in this photo?”, then before he got a chance to respond, the interventionist said “knife”, and the child repeated “knife”). If the child gave a correct response (e.g., echoed what the interventionist said), he got a positive feedback (e.g., “that’s correct, good job”) and was delivered an edible item. If the child repeated the words correctly eight out of nine times, for two sessions in a row, he moved on to step two. On step two everything was the same, except the child was given three seconds to answer before he was verbally prompted. If he repeated the words in step two correctly eight out of nine times, for two sessions in a row, he moved on to the third step. In step three, the child got no prompting. He was only asked what was in the photo and if he gave the right response eight out of nine times, for two sessions in a row, the set was completed.

### **Experimental Design and Data collection**

A single-subject multiple baseline design was used to demonstrate the effect of DTT on a 4-year old multilingual boy with delayed language. The dependent variable was the percentage of accurate responses. An accurate response was defined as when the child responded with the correct word (e.g., correctly identified and spoke what was in the photo presented to him). The independent variable was the teaching method (i.e., DTT).

The data were recorded in five different ways. The child got a minus (–) if he answered incorrectly without being verbally prompted. The child got a plus (+) if he answered correctly without being verbally prompted. If the child did not answer at all he got an ES (i.e., no response). If the child gave the correct answer when verbally prompted, he got a plus s (+s) and if he answered incorrectly when verbally prompted, he got a minus s (–s).

### Phase 3: Generalization Assessment

#### Procedure

In order to assess generalization of newly learned words, situations were set up.

Interventionist waited for five seconds until the child would request the desired item or for him to name it. If the child had not asked for the item or named it after five seconds, he was verbally prompted, if he did not say the word despite being prompted, generalization had not been accomplished.

Generalization of the word *fork* was tested in a situation where the child was about to eat lunch. A fork had not been placed on the table for the child, so when he wanted to start eating he had to ask for a fork. The researcher waited for five seconds to see if the child would request the fork. Generalization of the word *knife* was tested in the same situation, except the researcher asked the child “what is this?” and pointed to the knife.

Generalization of the word *red* was tested in a situation where the child was playing with colored sticks (e.g., sticks that children collect after eating ice-cream, they can build things out of them). The researcher asked the child about the color of the stick and waited for five seconds to see if the child would respond by naming the correct color.

Generalization of the word *scissors* was tested in a situation where the child was asked to cut out a ring, box and a triangle that had been drawn on a piece of paper. The child was given the paper, but no scissors. The researcher waited for five seconds to see if the child would request the scissors. The word *dish* was not directly tested but the child spontaneously tacted it when the other words were being tested. When establishing generalization for the word *pen*, the child was shown a pen that the researcher was holding and then he was asked: “do you know what this is I am holding?”.

As for the word *computer*, the researcher pointed to a computer located in one of the playrooms and asked: “do you remember what this is?” When the words *bowl* and *helmet*

were tested, the child was shown random photos of bowls and helmets on the computer screen.

## Results

### Phase 1: VB-MAPP Assessment

The child got five points out of five possible on every milestone on level one (tact, mand, listener responding, visual perception, independent play, social behavior/social play, motor imitation, echoic, spontaneous verbal behavior and intraverbal), which indicates he had developed skills that children aged 0-18 months should have developed. Because it was clear from the beginning that his language skills were very weak, the main focus was set on mands and tacts. Only mands and tacts were tested at levels two and three.

As shown in table 1, the child scored one and a half point out of five for tacts on level two, and got two out of five points on mands on level two. This indicates that he could not perform all skills that children aged 18-30 months should be able to perform, not scoring more than two out of five points on level two indicates that the level three skills were also absent.

Results from the VB-MAPP assessment implied that the boy's language skills were severely impaired and that it would be best to implement methods to increase his vocabulary.

Table 1. Points scored on each level of VB-MAPP assessment

	Level 1.	Level 2.	Level 3.
Tact	5	1 ½	0
Mand	5	2	0

### Phase 2: Discrete Trial Training (DTT)

The boy participated in a total of 27 experimental sessions. It took him five sessions to reach the criteria for the first set of words, seven sessions to reach the criteria on set two and 15 sessions to reach criteria for set three. As shown in figure 1, he reached the criteria for set one in the fewest number of sessions and it took him the greatest number of sessions to reach the criteria for the third set.

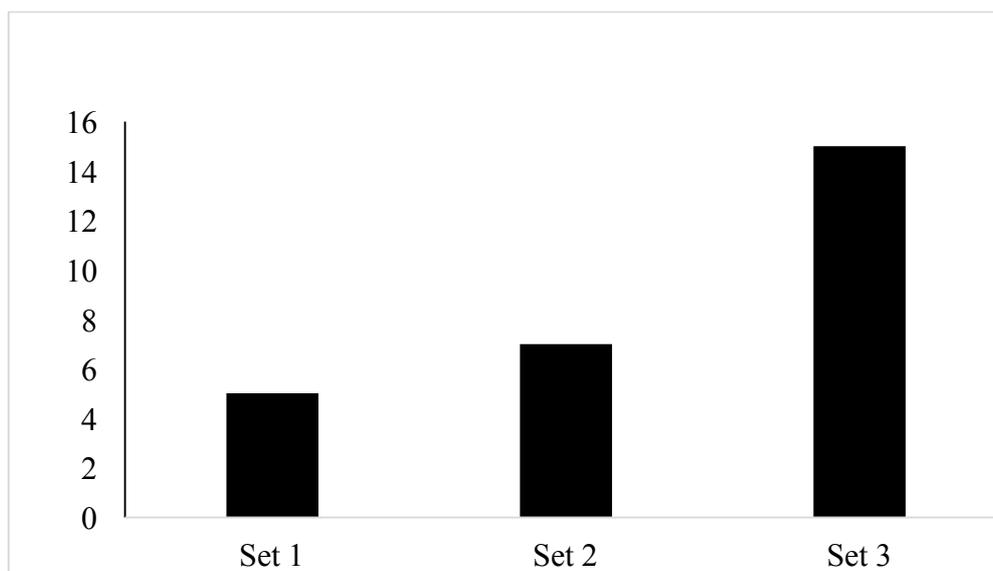


Figure 1. Number of sessions it took the child to learn each set

The child was very motivated to learn in the beginning. As can be seen in figure 2, the child responded correctly in 97,5% of occurrences, of which 38,9% of responses were verbally prompted, 58,6% were not verbally prompted (e.g., the child responded independently). The child answered incorrectly in 2,5% of occurrences. In set one, the child answered without prompting in 67,8% of occurrences, in 27,8% of occurrences with prompting and he gave the wrong answer in 4,4% of occurrences. In sets two and three, the child answered correctly without prompting in 54% of occurrences, answered correctly with prompting in 44,43% of occurrences and gave the wrong answer in 4,4% of occurrences. The child had no trouble with learning the words fork, dish, scissors, red, computer and helmet. However, the child had more difficulties with learning the words knife and bowl.

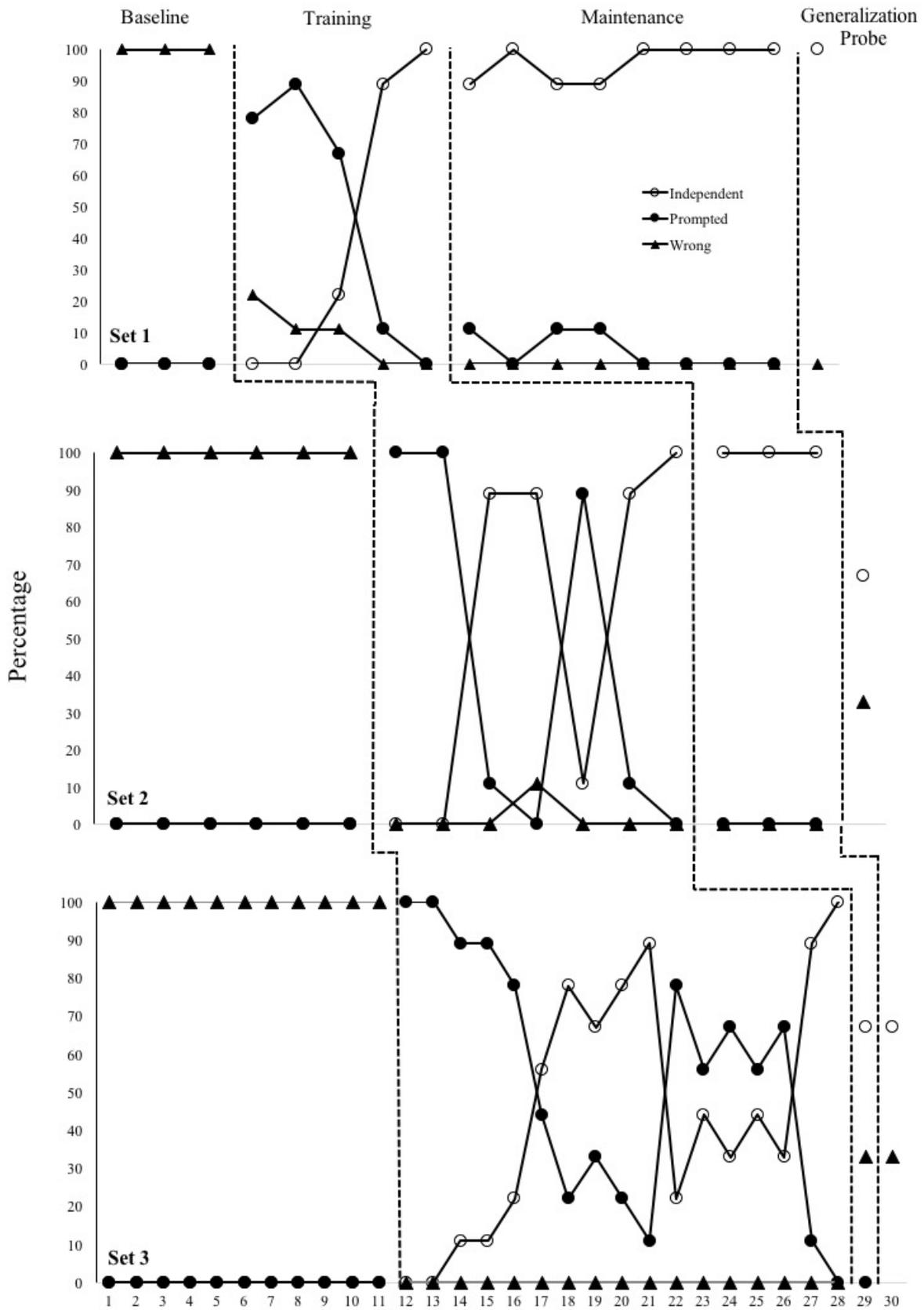


Figure 2. Percentage of correct, prompted, and incorrect responses during DTT (across baseline, treatment session, maintenance, and generalization probes)

### Phase 3: Generalization

Generalization after traditional DTT was tested. The child was able to generalize 78% of words previously learned with DTT. As shown in figure 3, he was able to generalize a 100% of the words in set one. In sets two and three, he was able to generalize 67% of the words. He was unable to generalize 33% of words from sets two and three.

In the set up situation, the child requested a *fork* without being verbally prompted, and the child spontaneously tacted the word *dish* after the researcher had complimented the child for his response on the missing *fork* (e.g., he pointed to his disk and told the researcher he had a dish in front of him), he was not able to recognize the word *knife* in the set up situations. In the situation where the child had to request *scissors*, he reached out for the *scissors* without asking for them so he was verbally prompted (e.g., the researcher asked “what do you want?”) which resulted in him asking for the *scissors* verbally. The child showed generalization of the word *red* after being asked: “what color is this?” When generalization for the words *helmet* and *computer* were tested, he was able to identify those objects.

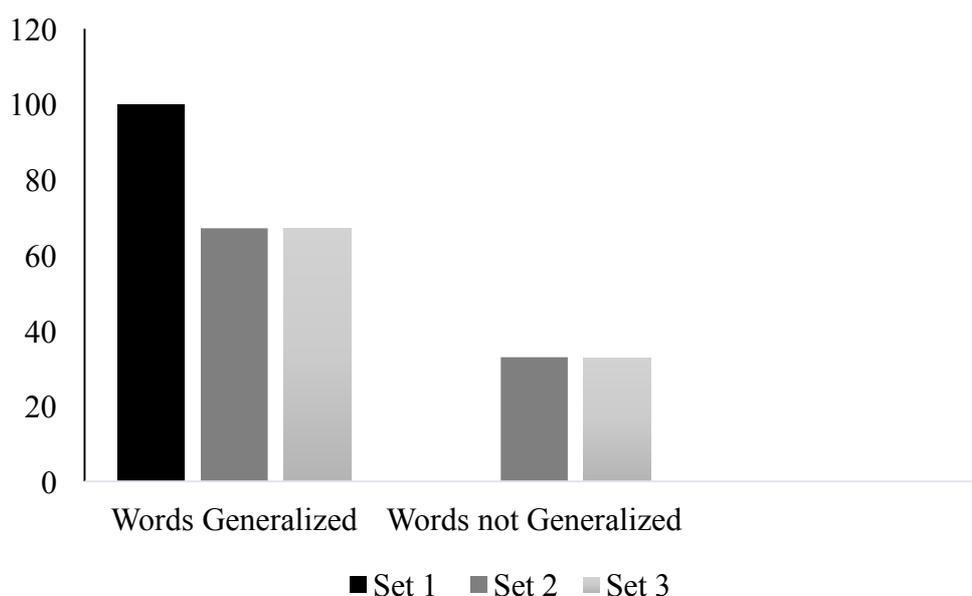


Figure 3. Percentage of words generalized in each set.

In summary, the child showed generalization of the words *fork, dish, scissors, red, computer* and *helmet*. He was not able to generalize the words *knife* and *bowl*, which were the same words he had the most trouble with during DTT sessions.

### Discussion

The present study examined if DTT could be effective in increasing the vocabulary of a multilingual individual with a language delay, and it also examined the extent to which trained items were generalized after the teaching procedure. The presented findings showed that DTT can be an effective way to increase the vocabulary of multilingual children with language dysfunctions and it can lead to good generalization.

The VB-MAPP, a method that evaluates an individual's verbal repertoire on three developmental levels, was used to evaluate the child's language deficit. The child was tested on different tasks and observed in certain situations. On level one, the child got five points out of five possible points on every milestone. It was clear from the beginning that his language was weak, so only mands and tacts were tested on levels two and level three. The child got one and a half point (out of five possible) for *tacts* on level two and scored no points (out of five possible) on *tacts* on level three. The results of the assessment implied that the child's language skills were severely impaired and some method had to be implemented to increase his vocabulary.

DTT resulted in increased vocabulary for the child. The child responded correctly in 97,5% of occurrences during DTT training. The child answered incorrectly in 2,5% of occurrences. Out of the times the child answered correctly, 38,9% of occurrences were verbally prompted and 58,6% of occurrences were not verbally prompted.

The child learned the first set of words in the fewest number of sessions and it took him the greatest number of sessions to learn the last set (i.e., took him five sessions to reach

criteria for set one, 15 sets to reach criteria for set three). The reasons for that could be several, first, he might have been more motivated in the beginning and more excited for the edible items (e.g., raisins and apple bits). He was very motivated in the first set, then in the second set his motivation decreased. When it came to the last set, he was not very motivated and got distracted easily. When trying to regain motivation, a change was made on the edible items and the child got oat crackers instead of apple bits or raisins. He did not get as motivated as he was in the beginning, but after the change of edible items, he was able to reach the criteria for the last set.

Another possible reason could be that the words in set one might have been less difficult than the words for sets two and three. To test that possibility, a speech therapist could evaluate the difficulty of the words on each set.

The third possible reason could be that with the increasing number of words the child had to remember, some difficulties with maintaining the knowledge might have occurred. Finally, a last reason for why it took him longer to learn sets two and three could be that during Easter the kindergarten was closed for a few days and there were no teaching sessions for over a week. When the teaching began again after the break his performance was worse and he could not remember the words he had previously learned (i.e., the words from set two). That could play a role in why it took him more sessions to learn set number two than set number one.

Previous research has mostly been conducted on individuals with autism, results have established that DTT is a good method when teaching new behaviors (Ghezzi, 2007), and the presented results are in compliance with previous research.

The child showed good generalization after DTT sessions, he was able to generalize 78% of the previously learned words, while he was unable to generalize 22% of the previously learned words. Research has shown rapid improvements in speech with DTT.

When it comes to generalization, DTT has shown worse results compared to other procedures (Miranda-Linné & Melin, 1992). Results from this study showed good generalization after DTT, indicating a non-compliance with previous research. The child was not able to generalize the words *knife* and *bowl*, which were the same words he had the most trouble with during the DTT sessions, which might explain why he had trouble generalizing them.

### **Limitations and future research**

One limitation of the current study is that it took place at the boy's kindergarten, so when the kindergarten was closed for three days, his sessions were canceled and the child missed out. Another limitation was that the child was not as motivated in the last sessions as the ones in the beginning, and he got less excited for the edible items. It might have been good to have more diverse edible items from the beginning to try to keep his interest for the whole period.

Time was also a limitation, as it would have been better if there had been more time for the teaching and generalization. The VB-MAPP assessment in the beginning took more time than expected, which resulted in fewer than anticipated sessions to check the maintenance for set three (i.e., constrained time to see if the child remembered words learned in set three).

Because of individual differences, it is not possible to generalize the results to all multilingual individuals. Further research with more participants is recommended. Another recommendation for future research is to study the effectiveness of naturalistic procedures with multilingual children with language dysfunctions and the effectiveness of generalization after teaching. Another possibility for future research could be to develop efficient methods to facilitate generalization in individuals with language dysfunctions.

### **Conclusion**

The importance of effective interventions for those who are dealing with language delays has been established (Kelley et al., 2007; Peterson, 2004). The results of the present paper

suggest that Discrete Trial Teaching is not only effective for children with developmental disabilities but can also be effective for multilingual children with language dysfunctions. The results also add evidence pertaining to the generalization effects following the DTT teaching procedure, although other ways have been known to be more effective (Miranda-Linné & Melin, 1992).

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