Efficiency in Teaching Speaker and Listener Repertoires: Comparing Three Instructional Sequences in Autistic Children

Daniel Carvalho de Matos, Pollianna Galvão Soares de Matos

Universidade Ceuma, Brasil

Universidade Federal do Maranhão and

Instituto Evoluir, São Luís city, Brazil

Neylla Cristina Pereira Cordeiro, Katiane Reis da Silva

Universidade Ceuma and

Instituto Evoluir, São Luís city, Brazil

Previous studies have investigated the efficiency in teaching listener and speaker repertoires in children diagnosed with autism spectrum disorder (ASD). Some investigations focused on listener responding by function, feature, and class (LRFFC) and intraverbal by function, feature, and class (FFC). For some children, teaching intraverbal FFC was more efficient because it resulted in a better emergence effect of a related untaught repertoire (LRFFC). For other children, teaching LRFFC along with tacting pictures was more efficient, resulting in a better emergence effect of a related untaught repertoire (intraverbal FFC). In these cases, it is not clear whether the tact increased the efficiency of LRFFC training because a comparison with a condition in which tacts were not required was not conducted. This investigation consisted of a replication with two children diagnosed with ASD. Three instructional sequences were compared: teaching LRFFC - probing intraverbal; teaching LRFFC + tacts - probing intraverbal; teaching intraverbal - probing LRFFC. For a child, all sequences were equally efficient because all related untaught repertoires emerged without errors. However, the acquisition of intraverbals during training occurred with variability. In the case of the second child, the most efficient sequence consisted of teaching intraverbals, resulting in the emergence of LRFFC without errors. In both cases of teaching LRFFC, the emergence of related intraverbals was partial and acquisition of the trained repertoires occurred with variability. The case that did not demand tact responses was slightly more efficient. Data were discussed in the sense that the best instructional sequence may vary from learner to learner.

Keywords: autism spectrum disorder, listener repertoire, speaker repertoire, efficiency

Introduction

In Applied Behavior Analysis (ABA), the teaching of speaker and listener repertoires (also referred as

---

Daniel Carvalho de Matos, Master, Doctor and Post-Doctor in Psychology, department of Psychology, Universidade Ceuma, Universidade Federal do Maranhão and Instituto Evoluir, São Luís city, Brazil.

Pollianna Galvão Soares de Matos, Master, Doctor and Post-Doctor in Psychology, department of Psychology, Universidade Ceuma, Universidade Federal do Maranhão and Instituto Evoluir, São Luís city, Brazil.

Neylla Cristina Pereira Cordeiro, Master in Psychology, specialist in Applied Behavior Analysis, specialization course at Universidade Ceuma and Instituto Evoluir, São Luís city, Brazil.

Katiane Reis da Silva, specialist in Applied Behavior Analysis, department of Psychology, Universidade Ceuma and Instituto Evoluir, São Luís city, Brazil.

expressive and receptive language) is frequently addressed in interventions to children diagnosed with autism spectrum disorder (ASD). Research along the years resulted in the publication of manuals, which guide practitioners to implement the teaching of verbal and non-verbal skills (Greer & Ross, 2008; Lovaas, 2003; Matos, 2016; Sundberg & Partington, 1998). One type of speaker repertoire is called tact. As an example of a contingency comprising the teaching of tact, when a therapist presents the picture of a dog and the question "what is this?", a child says "dog". Thereafter, the therapist praises the child. On the other hand, the child may also respond by selecting the picture of dog as a listener. In this case, the contingency may involve the presentation of an array with different pictures (including the picture of dog). The therapist then presents the verbal antecedent "touch dog", the child touches the corresponding picture, and he/she is praised. These two repertoires are related, although they involve different response topography.

Other related speaker and listener repertoires are also commonly targeted in interventions for learners diagnosed with ASD. The speaker skill is called intraverbal, and an example of contingency to teach a type of intraverbal by function, feature, and class (FFC) comprises the presentation of a verbal antecedent such as "tell me the name of an animal". The child then says "dog" and gets praised by the interventionist. The listener skill is called listener responding by function, feature, and class (LRFFC). An example of contingency regarding this repertoire involves manipulating an arrangement of pictures and the verbal instruction "show me animal". The child then touches the picture of dog, and the interventionist praises him/her.

Traditionally, the literature has suggested a particular sequence for teaching repertoires to atypically developing learners. In this sense, listener repertoires should be trained first until acquisition and, speaker repertoires, thereafter (Lovaas, 2003). However, research along the years has shown that teaching speaker repertoires first may be more efficient for several learners. In a review study, Petursdottir and Carr (2011) presented nine studies (Cuvo & Riva, 1980; Hupp et al., 1986; Keller & Bucher, 1979; Miller et al., 1977; Smeets, 1978; Smeets & Striefel, 1976; Watters et al., 1981; Wynn & Smith, 2003) that compared two instructional sequences (1-teaching tact - probing related listener responding, 2-teaching listener responding - probing related tact) in children and adults with intellectual disabilities (including two cases diagnosed with ASD). The first sequence was more efficient because the teaching of tacts resulted in better emergence effect of the related untaught repertoire of listener responding (better than the second case of teaching listener responding to produce the emergence of tacts).

Another review, conducted by Contreras, Cooper, and Kahng (2020), showed five studies (all of them involving children diagnosed with ASD) (Bao et al., 2017; Delfs et al., 2014; Frampton et al., 2017; Kodak & Paden, 2015; Sprinkle & Miguel, 2012). In two of these studies more specifically (Bao et al., 2017; Kodak & Paden, 2015), two instructional sequences comprising LRFFC and intraverbal FFC were also compared regarding the efficiency in producing emerging repertoires (1-teaching intraverbal FFC - probing LRFFC, 2-teaching LRFFC - probing intraverbal FFC). In these cases, the first teaching sequence was also more efficient, like in previous studies comparing the efficiency in teaching other speaker and listener skills (Petursdottir & Carr, 2011). So, teaching intraverbal FFC produced a better emergence effect of a related untaught repertoire of LRFFC.

Nevertheless, an investigation conducted by Matos et al. (2020), involving two children diagnosed with ASD, produced different results. In this case, two instructional sequences were also investigated as to compare the efficiency of teaching speaker and listener skills (same repertoires as in the studies reviewed by Contreras et

al., 2020). In the new research, one important difference was that, regarding the sequence of teaching LRFFC - probing intraverbal FFC, the LRFFC task was combined with a new demand, that is, the children were also directly taught to tact the pictures used. This was a recommendation by the authors from a previous study (Kodak & Paden, 2015), which was also added in the review by Contreras et al. (2020).

In Matos et al. (2020), training LRFFC combined with tacting the pictures resulted in a better emergence effect of related untaught intraverbal FFC (different from the cases of the studies reviewed by Contreras et al., 2020). This was the most efficient instructional sequence for both children in the research. However, it was not clear whether solely teaching the LRFFC repertoire (without demanding the tact of pictures) would be enough to fully produce intraverbal emergence. Since this condition was not implemented in the study, it represented a limitation. Therefore, the current investigation extended the study by Matos et al. (2020) by adding a third instructional sequence in which solely teaching LRFFC was implemented (without demanding the tact of pictures) for two children diagnosed with ASD. The three instructional sequences (1-teaching LRFFC + tact pictures - probing intraverbal FFC, 2-teaching intraverbal FFC - probing LRFFC, and 3-teaching LRFFC alone - probing intraverbal FFC) were investigated to establish which of them would be the most efficient in producing emergence of an untaught related repertoire, and to determine if tact of pictures increased the effectiveness of LRFFC training.

Method

Participants

Two 4-year-old children (girls) diagnosed with ASD were participants in this research. The children's repertoires were characterized based on assessment criteria of the Verbal Behavior Milestones Assessment and Placement Program/VB-MAPP (Sundberg, 2008). Both children were able to tact and identify as listener hundreds of non-verbal stimuli (pictures and objects). Plus, during interventions outside the context of the research, they showed emergence of untaught listener responding after training tacts of related non-verbal stimuli used and vice-versa, which is also called bidirectional naming (Miguel, 2016). As for the LRFFC and intraverbal FFC repertoires, which were targets in this study, the children were learners according to VB-MAPP development milestones level two. The teaching of LRFFC and assessment of the emergence of the related intraverbal FFC (and vice-versa) had not been systematically explored outside the research context. Selecting unknown targets (considering both LRFFC and intraverbal FFC repertoires) by the two children was a participation criterion.

Instruments and Materials

As in the research by Matos et al. (2020), for both LRFFC and intraverbal FFC repertoires, pictures measuring 6×3 cm were used. Each picture depicted an everyday item or place (e.g., book, school, etc.). Desired toys and games were also used as reinforcers for correct performances during intervention phase with the target repertoires. Data sheets were customized for data collection in assessment and intervention phases.

Environment, Interobserver Agreement, Dependent and Independent Variables

Data collection was conducted in an assessment and intervention research laboratory in ASD in a private Brazilian University. Individual assessment and intervention phases occurred in a room equipped with a table and chairs. The child sat on a chair and, an experimenter (who collected data on the research target repertoires),

sat on another chair facing the child. In some sessions, another observer (who also collected data) sat on a chair by the experimenter's side. This happened in approximately 20% of the sessions during which the degree of interobserver agreement (IOA) was measured. For each child, agreements and disagreements were calculated on a trial-by-trial basis (regarding assessment and intervention sessions). An agreement on a trial was confirmed if the two observers recorded the child's response in the same way. The percentage of agreement was calculated through the following formula: number of trials with agreement divided by the total number of trials in each session, and the result was multiplied by 100. The mean percentage of agreement for the first child (participant 1, P1) was 100% and, for the second child (participant 2, P2), 98%.

In this study, the dependent variables (DV) corresponded to the correct responses of LRFFC (e.g., touching the picture of school in an array and under the verbal antecedent "where do you study?") and intraverbal FFC (e.g., saying "hairbrush" under the verbal antecedent "what do you brush your hair with?"). An additional DV was the tact of pictures (e.g., saying "bed" to the picture of bed and the question "what is this?") related to one of the LRFFC target groups since, in this case, the teaching of tacts was implemented. The independent variables (IV) corresponded to differential reinforcement of independent performances and correction procedures for errors or non-response within 5s of providing the instruction to respond. During the intervention phase, access to a preferred toy or game for 10s, through a variable-ratio intermittent reinforcement schedule (VR4), was the differential consequence administered contingently to independent responses (considering LRFFC, tact of pictures, and intraverbal FFC repertoires). However, verbal praise was always delivered under a continuous reinforcement schedule, that is, contingently to every correct response.

Corrections, when needed in the case of the LRFFC repertoire, involved the experimenter pointing to the correct comparison picture displayed in an array with three pictures in total, and the child had to touch the picture after the prompt. If a more intrusive correction was necessary, the experimenter gently put the child's hand over the right picture. In learning LRFFC trials during which tact of the correct pictures was demanded, when corrections were necessary for tacting pictures, they consisted of the presentation of verbal response models, so the child could echo them. In the case of the intraverbal FFC, one type of correction consisted of presenting a picture representing the target not verbalized by the child. The picture would represent an opportunity for the emission of a tact response. If this was not demonstrated, the experimenter then would verbalize the target so the child would emit an echoic response (vocal imitation).

Procedure

Initial assessment. 24 targets, possibly unknown to each child both in trials to assess LRFFC and intraverbal FFC, were defined. The purpose with the evaluation was to establish 12 unknown targets out of 24 for each of the two children. The assessment was conducted in a single session, comprising 24 intraverbal FFC trials and 24 LRFFC trials. For each repertoire, each trial involved the presentation of the specific verbal antecedent (as in the examples presented in the previous subsection with descriptions of DV and IV). The child had up to 5s to respond. Differential consequences for correct and incorrect responses (or no response) were not used. Upon completion of this phase, the 12 selected targets were divided into three groups of four. This was done because later, during the intervention phase, the targets of a group were taught as LRFFC without demand to tact the pictures (the related untaught intraverbal FFC emergence was then probed). The targets of a second group were taught as LRFFC with the demand to tact the pictures (the related untaught intraverbal FFC emergence was then probed).

The targets of a third group were taught as intraverbal FFC (the related untaught LRFFC emergence was then probed).

Baseline. As it was previously mentioned, each of the three groups of four targets established during the initial assessment focused on a specific repertoire to teach. Before teaching (next condition), a baseline was defined to ensure that the children would not demonstrate the target repertoires in two or more assessment sessions. Each baseline session implemented involved the administration of 12 trials for each of the three groups of targets, considering the provision of specific verbal antecedents for each type of repertoire determined (LRFFC for two groups, one of which demanding the tact of pictures later in the intervention condition, and intraverbal FFC for one group). After providing the antecedent of each trial, the child had up to 5s to respond. As in the initial assessment, no differential consequences for independent performance, errors (or no response) were programmed. Along the sessions, once it was determined that the repertoires would not be demonstrated without intervention, the baseline condition would be terminated.

Intervention. As in baseline condition, sessions administered for each of the three groups of four targets comprised 12 trials and each group involved the provision of specific verbal antecedents for each type of repertoire determined (LRFFC for two groups, one of which demanding the tact of pictures, and intraverbal FFC for one group). After each antecedent, the child had up to 5s to respond. However, if a correct response was emitted (regardless of the repertoire being taught), reinforcement was provided (following the descriptions in the subsection about DV and IV). In trials related to LRFFC with the demand to tact the pictures used, the reinforcers were delivered after responding correctly to both LRFFC and tact demand. When errors (or no response) occurred regarding all repertoires being taught, specific correction procedures (as described in the subsection about DV and IV), considering each type of repertoire, were administered. A learning criterion for each repertoire consisted of two sessions without errors. However, to terminate the intervention condition for each child, she needed to demonstrate the total absence of errors, considering all groups of targets, in two consecutive sessions.

Experimental Design

As in the research by Matos et al. (2020), an alternating treatments design with initial baseline was implemented to measure experimental control of the IV(s) over the VD(s) (Barlow & Hayes, 1979; Cooper et al., 2007; Sindelar et al., 1985). After the baseline condition, in which it was determined that the children did not demonstrate the LRFFC (two groups of targets) and intraverbal FFC (one group of targets) repertoires, the intervention condition commenced and the training of each group of targets was conducted alternately. The presentation of trial blocks from the groups of targets was randomized along the sessions. After errorless learning was established for each group in two consecutive training sessions, probes to verify the possible emergence of the related untaught LRFFC and intraverbal FFC repertoires were conducted.

Ethical Procedures

This study was approved by an ethics committee in research with humans (authorization 4.284.271) from Federal University of Maranhão, Brazil, São Luís-MA. Both parents and children gave consent by signing a form for participation.

Results

Figure 1 and Figure 2 show the performances of P1 and P2, respectively, throughout baseline and intervention sessions of the three defined groups of targets (two of LRFFC and one of intraverbal FFC). In addition, the last two sessions for each child represented probes to verify the emergence of untaught related repertoires of LRFFC and intraverbal FFC (each case depending on the type of repertoire taught during intervention). It is important to remember that the three groups of four targets referred to stimuli that the research children had difficulty in discriminating both as LRFFC and intraverbal FFC during the initial target assessment (data not displayed in the manuscript). Next, Figure 1 representing P1 main results is presented first.
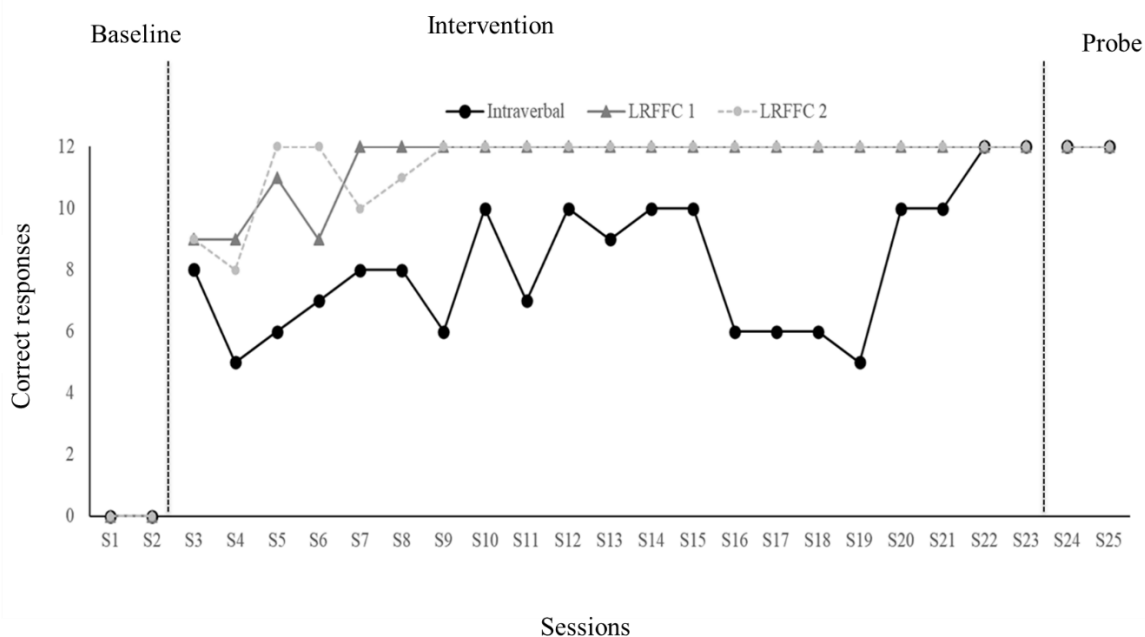

Figure 1. Number of correct responses in LRFFC and intraverbal for P1.

Note. Figure 1 shows correct performance in each of three groups of targets along baseline, intervention, and probe sessions. Two groups involved assessment and teaching of LRFFC, one of which demanded tact of pictures (LRFFC 2). The last two sessions probed the emergence of a related untaught repertoire (intraverbal). One last group involved assessment and teaching of intraverbal FFC. The last two sessions probed the emergence of a related untaught repertoire (LRFFC).

According to Figure 1, P1 showed no correct responses in baseline considering all groups of targets. Along the intervention condition, for the two groups trained as LRFFC 1 and LRFFC 2, acquisition of errorless performance occurred after five and three sessions, respectively. In most sessions (from S9 to S3) no errors were made. As to the remaining group of targets trained as intraverbal FFC, the establishment of the repertoire occurred with variability along several sessions. Errorless performance was only demonstrated in the penultimate session (S22). Considering all three groups, no errors were committed in the last two training sessions (S22 and S23). After that, the untaught related repertoires (LRFFC or intraverbal FFC, depending on the repertoire previously trained) were probed in two sessions. The emergence was demonstrated without errors for all three groups of four targets. Figure 2 shows P2's performances in the LRFFC and intraverbal FFC repertoires across baseline, training, and probe conditions.
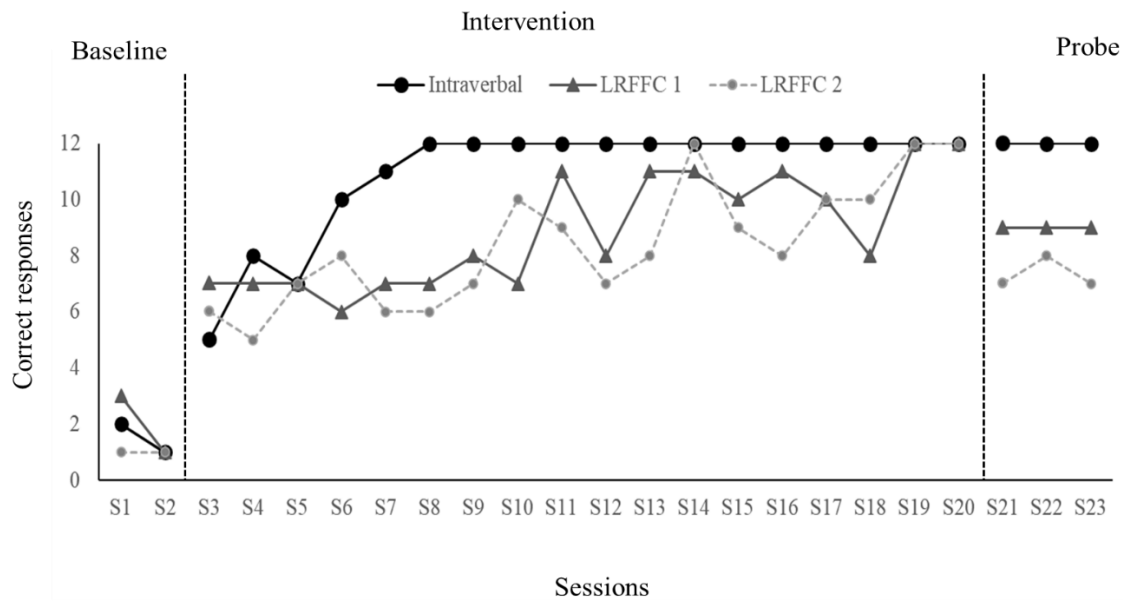
Figure 2. Number of correct responses in LRFFC and intraverbal for P2.

Note. Figure 2 shows correct performance in each of three groups of targets along baseline, intervention, and probe sessions. Two groups involved assessment and teaching of LRFFC, one of which demanded tact of pictures (LRFFC 2). The last three sessions probed the emergence of a related untaught repertoire (intraverbal). One last group involved assessment and teaching of intraverbal FFC. The last three sessions probed the emergence of a related untaught repertoire (LRFFC).

As it can be seen in Figure 2, P2 showed a low performance during two baseline sessions, considering all LRFFC and intraverbal FFC repertoires. When the intervention phase commenced, a learning criterion was first met for the group of targets taught as intraverbal FFC. In this case, six sessions sufficiently established an errorless performance, and it was maintained over several maintenance sessions. As to the remaining two groups of targets taught as LRFFC, producing a fully independent performance was more difficult and both cases involved variability across teaching sessions. In the case of the group taught without the demand to tact pictures (LRFFC 1), the absence of errors only occurred in the penultimate session of the intervention condition.

As to the last group demanding the tact of pictures (LRFFC 2), the absence of errors was noticed after 12 sessions. However, errors were made in the following four teaching sessions. Thereafter, independent performance was reestablished. In the last two intervention sessions (S19 and S20), no errors were made regarding all groups of teaching targets and the condition was terminated. In the last condition, involving three probe sessions to verify emergence of the related untaught repertoire regarding all groups of teaching targets, LRFFC fully emerged after teaching intraverbal FFC. However, teaching LRFFC did not produce totally errorless intraverbal FFC emergence. After teaching LRFFC 1, nine correct intraverbal FFC responses out of 12 opportunities were established in the three probe sessions. As to the case of LRFFC 2, correct intraverbal FFC responses ranged from seven to eight out of 12 opportunities.

Discussion

The teaching of all repertoires was effective for both children, as in the cases of previous studies that involved teaching LRFFC and intraverbal FFC. Previously, data from children diagnosed with ASD from Kodak and Paden (2015) and Bao et al. (2017) showed that teaching intraverbal FFC for establishing LRFFC repertoire emergence, without direct teaching, was a more efficient instructional sequence than the reverse sequence. Similarly, other studies reviewed by Petursdottir and Carr (2011) and Contreras et al. (2020) had also shown that an instructional sequence consisting of teaching another speaker skill (tact) for establishing the emergence of another listener repertoire (simple listener responding) was more efficient than the opposite case. All this was contrary to the suggestion of sequencing in teaching skills in the previous literature, in the sense that the listener repertoires should be taught first than the speaker ones (Lovaas, 2003).

However, a recent study by Matos et al. (2020), which also compared the efficiency of two instructional sequences regarding LRFFC and intraverbal FFC, showed that teaching the listener repertoire (LRFFC) was more efficient in producing the emergence of the related untaught speaker repertoire (intraverbal FFC) in two children diagnosed with ASD. Previously, Kodak and Paden (2015) measured the emission of tacts during the teaching of LRFFC repertoire to check the possible influence on the establishment of intraverbals. However, they did not teach tacts and recommended that future studies could do this. Matos et al. (2020) demanded the tact of pictures during LRFFC training. It is possible that teaching tacts played a role in intraverbal emergence in this research, but it is not clear if this variable was necessary to increase the efficiency of the instructional sequence consisting of teaching LRFFC - probing the emergence of intraverbal FFC. A limitation was that this sequence was not compared to another in which the tact of pictures was not required. In the current investigation, this was done with two children diagnosed with ASD.

The results of a child (P1) in the current research showed that the three instructional sequences used (teaching LRFFC - probing intraverbal FFC; teaching LRFFC + demanding tact of pictures - probing intraverbal FFC; teaching intraverbal FFC - probing LRFFC) were all equally efficient in the sense that, in all cases, the emergence of the related untaught repertoire was demonstrated without errors. These results were therefore different from those of the previous studies, which indicated that a specific type of instructional sequence was more efficient (Kodak & Paden, 2015; Bao et al., 2017; Matos et al., 2020).

However, for P1 in this study, in both sequences in which the LRFFC repertoire was taught, fewer trial blocks were needed to establish errorless performance of the trained repertoires compared to the case where the intraverbal FFC was taught. One important limitation concerned the number of trials to teach the skills per session. Since two groups of four targets were taught as LRFFC, the number of trials was twice as high as the case in which one group was taught as intraverbal FFC. Perhaps if the number of teaching trials regarding both LRFFC and intraverbal FFC repertoires had been similar, the performance during intraverbal teaching for P1 would reveal less variability.

In the case of P2 of this research, the results were like those produced by the children in the studies by Kodak and Paden (2015) and Bao et al. (2017), that is, the instructional sequence consisting of teaching intraverbal FFC - probing LRFFC for emergence was the most efficient of all. Although also for this child the number of trials to teach LRFFC was twice as high as in the case of intraverbal FFC teaching, this one demanded less trials to establish errorless performance compared to both LRFFC cases. Plus, the teaching of both LRFFC repertoires

involved variability, different from the case of teaching intraverbal FFC. When the two LRFFC teaching cases are compared between them, it is observed that the one that required the tact of pictures produced a slightly lower emergence effect of a related untaught repertoire (intraverbal), suggesting that, in the case of this child, the teaching of overt tacts may not be a critical variable in improving the efficiency of the LRFFC teaching, contrasting what was suggested by previous investigations (Kodak & Paden, 2015; Matos et al., 2020).

Considering what has been produced in the literature on the efficiency of speaker and listener repertoires corresponding to intraverbal FFC and LRFFC, respectively, the results are mixed. This includes the case of the present study. For some children diagnosed with ASD, teaching intraverbal first may be more efficient, in the sense of producing emergence of a new repertoire, than teaching LRFFC first. Conversely, for other children, the opposite instructional sequence (teaching LRFFC first to establish intraverbal emergence) may be more efficient. Regarding the role of tact in increasing the efficiency of LRFFC teaching, the previous study by Matos et al. (2020) was limited because it did not compare a sequence in which the teaching of LRFFC also required the tact of pictures with another sequence in which tacts were not required.

In this research, such a comparison was conducted. The reinforcement of overt tacts did not seem to increase the efficiency of teaching for any of the two children. For P1, all instructional sequences were equally efficient (including the LRFFC case in which tacts were not required). For P2, the emission of overt tacts did not increase the efficiency of LRFFC training because the LRFFC case, without the demand to tact pictures, was correlated with a better emergence effect of the related untaught intraverbal repertoire. One could suggest, however, that in the cases where children were not required to overtly tact pictures, they possibly did so covertly. Similarly, a recent literature discusses that the possible emission of verbal repertoires covertly (e.g., echoing information regarding stimuli as in the studies by Cariveau et al., 2022; Frampton & Shillingsburg, 2020; Laddaga Gavidia et al., 2022) could be a variable that influences the acquisition of other non-verbal and verbal repertoires in children diagnosed with ASD. Anyway, the results of this study, and others in the literature on the efficiency in teaching LRFFC and intraverbal FFC (Kodak & Paden, 2015; Bao et al., 2017; Matos et al., 2020), suggest that the best instructional sequence may vary from learner to learner and only a careful evaluation with everyone will indicate the best path for acquiring new repertoires with less effort.

Conclusion

For both children in the current research, all interventions effectively established a directly taught skill (either intraverbal FFC and LRFFC). Depending on the child, LRFFC or intraverbal FFC teaching required fewer sessions to acquire the skill. In this sense, intraverbal training was better for P2 and LRFFC training was better for P1. Regarding the two LRFFC cases, for both children, the one involving tact of pictures demanded fewer sessions to achieve criterion. As for the emergence of the related untaught repertoire in probes, for P1, a full emergence effect was noticed after all interventions were finished. However, for P2, only the intraverbal FFC training resulted in the full emergence of the related untaught repertoire (LRFFC). These results suggest that the best instructional sequence may vary from learner to learner.

References

Bao, S., Sweatt, K. T., Lechago, S. A., & Antal, S. (2017). The effects of receptive and expressive instructional sequences on varied conditional discriminations. *Journal of Applied Behavior Analysis, 50*(4), 775-788. Retrieved from https://doi.org/10.1002/jaba.404

Barlow, D. H., & Hayes, S. C. (1979). Alternating treatments design: One strategy for comparing the effects of two treatments in a single subject. *Journal of Applied Behavior Analysis, 12*(2), 199-210. Retrieved from https://doi.org/10.1901/jaba.1979.12-199

Cariveau, T., Brown, A., Platt, D., Ellington, P., & Hurtado, R. (2022). An evaluation of instructed feedback during mastered demands. *The Analysis of Verbal Behavior, 38*, 179-189. Retrieved from https://doi.org/10.1007/s40616-022-00174-9

Contreras, B. P., Cooper, A. J., & Kahng, S. (2020). Recent research on the relative efficiency of speaker and listener instruction for children with autism spectrum disorder. *Journal of Applied Behavior Analysis, 53*(1), 584-589. Retrieved from https://doi.org/10.1002/jaba.543

Cooper, J. O., Heron, T. E., & Heward, W. (2007). *Applied behavior analysis* (2nd ed.). Harlow: Pearson Merry Prentice Hall.

Cuvo, A. J., & Riva, M. T. (1980). Generalization and transfer between comprehension and production: A comparison of retarded and nonretarded persons. *Journal of Applied Behavior Analyis, 13*, 315-31. Retrieved from https://doi.org/10.1901/jaba.1980.13-315

Delfs, C. H., Conine, D. E., Frampton, S. E., Shillingsburg, M. A., & Robinson, H. C. (2014). Evaluation of the efficiency of listener and tact instruction for children with autism. *Journal of Applied Behavior Analysis, 47*(4), 793-809. Retrieved from https://doi.org/10.1002/jaba.166

Frampton, S. E., & Shillingsburg, M. A. (2020). Promoting the development of verbal responses using instructive feedback. *Journal of Applied Behavior Analysis, 53*(2), 1029-1041. Retrieved from https://doi.org/10.1002/jaba.659

Frampton, S. E., Robinson, H. C., Conine, D. E., & Delfs, C. H. (2017). An abbreviated evaluation of the efficiency of listener and tact instruction for children with autism. *Behavior Analysis in Practice, 10*(2), 131-144. Retrieved from https://doi.org/10.1007/s40617-017-0175-y

Greer, R. D., & Ross, D. E. (2008). *Verbal behavior analysis: Inducing and expanding complex communication in children with severe language delays*. Ashland: Allyn & Bacon.

Hupp, S. C., Mervis, C. B., Able, H., & Conroy-Gunter, M. (1986). Effects of receptive and expressive training of category labels on generalized learning by severely mentally retarded children. *American Journal of Mental Deficiency, 90*, 558-565. Retrieved from https://psycnet.apa.org/record/1986-18010-001

Keller, M. F., & Bucher, B. D. (1979). Transfer between receptive and productive language in developmentally disabled children. *Journal of Applied Behavior Analysis, 12*, 311. Retrieved from https://doi.org/10.1901/jaba.1979.12-311

Kodak, T., & Paden, A. R. (2015). A comparison of intraverbal and listener training for children with autism spectrum disorder. *The Analysis of Verbal Behavior, 31*(1), 137-144. Retrieved from https://doi.org/10.1007/s40616-015-0033-3

Laddaga Gavidia, V., Bergmann, S., & Rader, K. A. (2022). The use of instructive feedback to promote emergent tact and intraverbal control: a replication. *The Analysis of Verbal Behavior, 38*, 95-120. Retrieved from https://doi.org/10.1007/s40616-022-00171-y

Lovaas, O. I. (2003). *Teaching individuals with developmental delays*. Pro-Ed.

Matos, D. C. (2016). *Análise do comportamento aplicada ao desenvolvimento atípico com ênfase em autismo* [Applied behavior Analysis to atypical development with an emphasis on autism]. Porto Velho: AICSA.

Matos, D. C., Cordeiro, N. C. P., Mendes, B. P., Carvalho, A. V. S., Silva, F. M. A. M., Firmo, W. C. A., & Matos, P. G. S. (2020). Efficiency of expressive and receptive language teaching in children with autism spectrum disorder. *Research, Society and Development, 9*(8), 1-27. Retrieved from http://dx.doi.org/10.33448/rsd-v9i8.5268

Miguel, C. F. (2016). Common and intraverbal bidirectional naming. *The Analysis of Verbal Behavior, 32*(2), 125-138. Retrieved from https://doi.org/10.1007/s40616-016-0066-2

Miller, M. A., Cuvo, A. J., & Borakove, L. (1977). Teaching naming of coin values-comprehension before production versus production alone. *Journal of Applied Behavior Analysis, 10*(4), 735-736. Retrieved from https://doi.org/10.1901/jaba.1977.10-735

Petursdottir, A. I., & Carr, J. E. (2011). A review of recommendations for sequencing receptive and expressive language instruction. *Journal of Applied Behavior Analysis, 44*, 859-876. Retrieved from https://doi.org/10.1901/jaba.2011.44-859

Sindelar, P. T., Rosenberg, M. S., & Wilson, R. J. (1985). An adapted alternating treatments design for instructional research. *Education and Treatment of Children, 8*(1), 67-76. Retrieved from https://psycnet.apa.org/record/1987-20056-001

Smeets, P. M. (1978). Establishing generative performance and cross modal generalization of the manual plural sign in a severely retarded deaf girl. *British Journal of Communication Disorders, 13*(1), 49-57. Retrieved from https://doi.org/10.3109/13682827809011325

Smeets, P. M., & Striefel, S. (1976). Acquisition and cross modal generalization of receptive and expressive signing skills in a retarded deaf girl. *Journal of Mental Deficiency Research, 20*(4), 251-259. Retrieved from https://doi.org/10.1111/j.1365-2788.1976.tb00951.x

Sprinkle, E. C., & Miguel, C. F. (2012). The effects of listener and speaker training on emergent relations in children with autism. *The Analysis of Verbal Behavior, 28*(1), 111-117. Retrieved from https://doi.org/10.1007/BF03393111

Sundberg, M. L. (2008). *The verbal behavior milestones assessment and placement program: The VB-MAPP*. Concord, CA: AVB Press.

Sundberg, M. L., & Partington, J. W. (1998). *Teaching language to children with autism or other developmental disabilities*. Pleasant Hill, CA: Behavior Analysts, Inc.

Watters, R. G., Wheeler, L. J., & Watters, W. E. (1981). The relative efficiency of two orders for training autistic children in the expressive and receptive use of manual signs. *Journal of Communication Disorders, 14*(4), 273-285. Retrieved from https://doi.org/10.1016/0021-9924(81)90012-5

Wynn, J. W., & Smith, T. (2003). Generalization between receptive and expressive language in young children with autism. *Behavioral Interventions, 18*(4), 245-266. Retrieved from https://doi.org/10.1002/bin.142