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# Acquisition of Tact Responses for Early Speakers with Autism Using Listener History and the Echoic-to-Tact Strategy: A Program Evaluation Study

*Acquisition de réponses tact chez les locuteurs précoces ayant un trouble du spectre de l'autisme en fonction de leur historique langagier et les stratégies de transfert de l'échoïque vers le tact : étude d'un programme d'évaluation*

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**Abstract**

*Children with autism have demonstrated difficulty acquiring novel responses and often require repeated practice and high effort on the part of teachers to learn new language. The purpose of this study was to evaluate the effectiveness of different ways to teach. We carried out a program evaluation study using an applied behavior analytic approach to teaching participants to use new words. A single-case pre- and post-test research design was used to investigate the relationships between different early language skills in four 6-year-old boys with autism. Pictures of common items in two categories were identified for each of the participants: those items to which they could accurately point but couldn't name and those items which they were unable to either point to or to name when asked. Participants were then taught to tact (name) all the pictures using an echoic-to-tact teaching procedure derived from verbal behaviour theory. This procedure required the participant to learn to echo the instructor's word reliably before they had to use the word independently. Results indicate that all participants learned to tact pictures they could point to more quickly than those to which they could not point. The practical implications of these findings are that when children with autism are asked to learn to use new words, they will learn to say the ones they "understand" more quickly than the ones they don't.*

*When choosing targets to teach take into consideration the things that the child already knows and use that knowledge to build a bridge to new learning.*

## Résumé

*Les enfants ayant un trouble du spectre de l'autisme démontrent des difficultés dans l'acquisition de réponses nouvelles et l'apprentissage de nouveau vocabulaire. Ceux-ci requièrent parfois de la pratique répétée ainsi que des efforts importants de la part de l'enseignant. La présente étude vise à évaluer l'efficacité de différentes méthodes d'enseignement. Nous avons effectué une étude d'évaluation de programme pour apprendre aux participants à utiliser de nouveaux mots au moyen d'une approche d'analyse appliquée du comportement. Un devis à cas unique pré- et post-test a été utilisé pour examiner les relations entre différentes habiletés langagières précoces auprès de quatre garçons de six ans ayant un trouble du spectre de l'autisme. Pour chacun des participants, deux catégories d'illustrations d'objets communs ont été identifiées : 1) les objets qu'ils pouvaient pointer correctement, mais ne pouvaient pas nommer et 2) les objets qu'ils ne pouvaient pas pointer ni nommer lorsqu'on leur demandait. Les participants ont ensuite appris à nommer (c.-à-d., émettre un tact) toutes les illustrations en utilisant des procédures d'enseignement de transfert de l'échoïque vers le tact, dérivées de la théorie du comportement verbal. Cette procédure requiert que les participants apprennent à répéter fidèlement (réponse échoique) le mot de l'enseignant avant d'avoir à utiliser ce mot de façon indépendante. Les résultats nous indiquent que les participants ont appris plus rapidement le tact des illustrations qu'ils pouvaient pointer que ceux qu'ils ne pouvaient pas pointer. Une retombée pratique de ces résultats est que lorsque les enfants ayant un trouble du spectre de l'autisme doivent apprendre de nouveaux mots, ceux-ci apprennent plus rapidement les mots qu'ils « comprennent » que ceux qu'ils ne « comprennent » pas. Lors du choix des cibles d'enseignement, il faut donc considérer les choses que l'enfant connaît et utilise déjà pour bâtir un pont vers de nouveaux apprentissages.*

## Introduction

In 1957 Skinner contributed his theory of verbal behaviour to understanding the function of language. This theory is grounded in the idea that verbal behaviour is as lawful and understandable as other types of behaviour. Verbal behaviour operants are conceptualized as being independent operants (behaviour which is influenced by an antecedent and a consequence) which might interconnect under certain conditions and combine in certain ways to create more complex operants, but which are initially independent. (An antecedent is a stimulus that cues an organism to perform a learned behaviour.) Skinner theorized that these verbal operants (speaker responses like echoic—where the consequence is correspondence between the behaviour and the antecedent; mand—where the behaviour specifies the consequence; tact—where the behaviour consequence is general and probably social; autoclitic—where the behaviour qualifies the consequence in some way; and intraverbal—where the antecedent and consequence are verbal) were defined by their function as opposed to their structure. This was a difference from the cognitive theories that proposed to organize language by structures like noun, verb, grammar, semantics, and so on (Chomsky, 1957; Jackendoff, 2002; Pinker, 1999). Skinner believed this categorical distinction was critical to his theory of verbal behaviour because he felt that the way we talked about verbal behaviour and the way we thought about verbal behaviour could

influence the way we studied and taught verbal behaviour. Structural analyses can be helpful when analyzing the artifacts of language but a functional analysis such as that offered by the theory of verbal behaviour offers an active way to develop new technologies for treating individuals with language delays. It does that by signaling that teaching one function doesn't mean that other functions are automatically taught. We don't assume that someone can use a noun as a verb but we might assume that someone can listen and speak a certain word or speak with a certain function. A functional account of language highlights that listening and speaking as well as speaking with different functions might need to be taught separately (Lamarre & Holland, 1985; Twyman, 1996). A significant evidence base has accrued to support the use of verbal behaviour theory in treating language delays, especially in the treatment of children with autism or other developmental delays (Grow, Carr, Kodak, Jostad, & Kisamore, 2011; Johnson, Kohler, & Ross, 2017; Kelley, Shillingsburg, Castro, Addison, & LaRue, 2007).

Greer, Chavez-Brown, Nirgudkar, Stolfi, & Rivera-Valdes (2005) found that teaching fluent listening led to increases in achievement of new repertoires in eight young children with autism. Their study demonstrated a functional relationship between the use of listener emersion and significant decreases in the time and effort needed to teach new skills. They taught listener behaviour and they measured all individual learning that occurred without additional teaching, instead of targeting a specific verbal operant.

Ribeiro, Elias, Goyos and Miguel (2010) found that when they used a specific teaching procedure derived from verbal behaviour theory, called the matching-to-sample (MTS) task, their participants, two individuals with intellectual disabilities, learned to emit signed verbal behaviour without additional teaching. Kobari-Wright and Miguel (2014) used another teaching procedure derived from verbal behaviour theory (Miguel & Petursdottir, 2009). They found that four children with autism, after conditional discrimination training in categorization, could emit accurate tact responses (either signed or vocal). Both studies found that teaching specific listener responses produced specific speaker responses without additional teaching. Repeatedly, research findings demonstrated that teaching procedures derived from verbal behaviour theory could be used effectively to teach new listener responses and new speaker responses, sometimes producing one or the other without directly teaching them. However, these studies did not investigate the effects of an individual's prior learning history with specific stimuli (Petursdottir & Carr, 2011).

Researchers began to look more closely at the history of responding to specific stimuli and demonstrated experimental control over that history of responding. Greer (Greer & Ross, 2008; Greer & Speckman, 2009) articulated Verbal Behavior Development Theory (VBDT) to capture the idea that the organism's history with the environment affects their verbal behavior over time. Researchers began to identify specific teaching procedures, specific verbal behaviour, and specific strategies to produce specific learning histories. Studies by investigators like Greer, Stolfi, Chavez-Brown and Rivera-Valdes (2005) and Nuzzolo-Gomez and Greer (2004) were only two of several studies that demonstrated that a learners' prior history could affect their ability to emit untaught speaker responses. They used a specific teaching procedure called Multiple Exemplar Instruction (MEI) (Hayes, Barnes-Holmes, & Roche, 2001; Greer & Ross, 2008) which taught both listener and speaker responses to create that history during the instructional process through a transfer of stimulus function. But even specific teaching strategies that combined speaker and listener responses were sometimes ineffective (Lechago, Carr, Kisamore, & Grow, 2015). Questions remained about the relationship between these

categorical distinctions of listener and speaker and how they overlapped and were integrated as some learners did not demonstrate the ability to respond as speakers nor as listeners without additional efforts and training (Petursdottir, Lepper, & Peterson, 2014).

Prior research has established the efficacy of teaching new tact responses using the echoic repertoire (Bloh, 2008; Greer, 2002; Greer & Ross, 2008; Kodak & Clements, 2009). This so-called "transfer procedure" is considered commonly used as a teaching strategy (Barbera & Kubina, 2005; Coon & Miguel, 2012). This specific teaching procedure, derived from verbal behaviour theory, is called the echoic-to-tact. It involves teaching the learner to emit an echoic response and a tact response—two types of specific verbal operants—to two different conditions. The first condition is that of an echoic under joint control: the teacher says "dog," and shows the learner a picture of a dog at the same time. The learner is expected to say, "dog," echoing the teacher's word in the presence of the picture. The combination of the picture and the sounds made by the teacher controls the learner's response. The second condition is that of the tact: the teacher presents a picture of a dog, the learner says, "dog," and receives some type of generalized reinforcement such as praise. The "transfer" of stimulus function occurs through the teaching process where the joint control of the echoic by the picture and the sounds of the teacher's voice is carefully transferred to the single stimulus, the picture, and becomes the condition necessary for the tact.

This study sought to investigate more closely the interaction between the learner's listener and speaker behaviours by using a specific teaching procedure and identifying a specific learning history with the stimuli used in the study. We selected the echoic-to-tact procedure because of its use of the "transfer" of stimulus control between the echoic and tact responses. We carefully selected target stimuli with which the learners had a specific history prior to the inclusion of the stimulus in the study. We wanted to know if learners would react differently to stimuli for which they already had a specific listener response when compared to stimuli for which they lacked that same specific listener response when we taught them to emit speaker responses and used a teaching strategy that included echoic behaviour—a particular type of verbal behaviour that may overlap across listener and speaker responses (Schlinger, 2008).

Research questions: 1) Can children with autism learn to tact pictures using the echoic-to-tact teaching procedure? 2) Is there a difference for learners tacting pictures when they can point to the pictures before they learn to say them?

## Method

### Participants and Setting

Four young children who were clients in an Early Intensive Behaviour Intervention (EIBI) treatment centre participated in this program evaluation study. The participants (identified by pseudonyms) were all diagnosed with autism. All families resided within the boundaries of a major metropolitan area in South-Eastern Canada. Permission was obtained from the families to publish the information presented here.

Alan was 6 years, 2 months old at the time of the study. He used vocal speech and PECS, Phase V (Bondy & Frost, 1994), to communicate. His speaker repertoires included echoics, mands, and tacts. He used 3 to 4-word phrases for most of his communication. He was diagnosed with severe

autism at 3 years, 2 months of age, by his pediatrician. Bilal was 6 years, 5 months old at the time of the study. He, too, used vocal speech and PECS, Phase V, to communicate and his speaker repertoires included echoics, mands, and tacts, as well as some emergent intraverbals. He used 3-4-word phrases for most of his communication. He was diagnosed with moderate autism at 3 years, 5 months, by his pediatrician. Alan and Bilal were both socially withdrawn and sometimes noncompliant with adults.

Colin was 6 years, 7 months old at the time of the study. He used vocal speech to communicate, as did the fourth participant, Dev, who was 6 years, 1 month old at the time of the study. Colin was diagnosed with severe autism at 2 years, 8 months, and Dev was diagnosed with severe autism at 2 years, 4 months, both by their pediatricians. Colin and Dev both used 6-8-word phrases and sentences to communicate and engaged with adults in brief conversations about subjects of interest. They both had fluent, simple echoic, mand, tact, and intraverbal responses as well as some emergent autoclitics. They were both socially engaged with adults and other children, showing a preference for some people over others.

All four boys were proficient listeners and could usually follow a range of simple instructions given by adults. All participants were diagnosed using the DSM-IV (American Psychiatric Association, 2000) diagnostic criteria. Vineland Adaptive Behaviour Scales-Revised (VABS-R) (Sparrow, Cicchetti, & Balla, 2005) were conducted within six months prior to the onset of the study for all participants and the language skills of all four boys fell within the one and two-year age equivalent range, suggesting significant deficits in language skills for their calendar age (see Table 1 for more participant details).

Table 1 - *Characteristics of Participants*

| Participant | Calendar age (year, month) | Diagnosis | VABS-II scores (age equivalents for receptive and expressive communication domains) | VABS-II standard ABC score (Adaptive Behavior Composite) | ABLLS-R scores |
|---|---|---|---|---|---|
| Alan | 6 y, 2 m | Severe autism | R- 1:9<br>E- 2:1 | 59 | 31 |
| Bilal | 6 y, 5 m | Moderate autism | R- 1:6<br>E- 2:0 | 55 | 27 |
| Colin | 6 y, 7 m | Severe autism | R- 2:10<br>E- 2:3 | 69 | 58 |
| Dev | 6 y, 1 m | Severe autism | R- 1:11<br>E- 2:1 | 71 | 66 |

### Dependent Variable

The dependent variable in this study was the number of correct tacts for pictures. The total trials for tacts of ten targets were measured during discrete trial presentations in teaching sessions. A correct tact of a target consisted of an independent vocal verbal response within three seconds of the instructor's presentation of a picture. Mastery criterion was set at three correct, consecutive, independent tacts across two separate sessions and/or days. The average trials to criterion for tacts of those same ten targets were calculated after completion of all the teaching sessions.

### Independent Variable

The primary independent variable was the learner's history with the pictures. The target pictures were classified into two categories: those to which the participant could point and those to which they could not point. Five targets were ones that the participant had responded to accurately as a listener three times. They were presented, prior to echoic-to-tact training, in an array of three pictures and the participant was told, "Point to (name of item)." The other five targets were ones to which the participants did not point when asked. Each target had three separate exemplars: one as a line drawing or cartoon, one without a background, and one with a simple, atmospheric background. Teaching presentations were rotated across the three exemplars. All targets were taught using the same echoic-to-tact training procedure.

## Procedure

The study used a single case, pre and post-test research design (Cooper, Heron, & Heward, 2007). Prior to beginning the study, each participant was presented with a variety of pictures and asked to point to them in an array of three and, later, asked to tact the same pictures. These were experimental probes without direct reinforcement or consequences. This was done until the research team had identified at least 30 different pictures for each participant that fell into either the category of "could point to but not say" or "could not point to nor say." This preparation required about 10 days to complete. Five pictures were chosen from each category (point, not say or not point, not say) and a total of 10 targets were selected for each participant and taught in sets of 2 at a time, one from each list (see Table 2).

The echoic-to-tact teaching procedure involved discrete trial presentations of target pictures, requiring first echoic responses and then, later, independent tact responses from each participant. Criterion to move from echoic responses to tact responses was three correct echoic responses. Revision criterion for returning to echoic responses was three consecutive, incorrect tact responses. The echoic-to-tact teaching procedure was designed to require the teacher to move fluently and rapidly from echoic to tact responses within a single teaching session (Greer, 2002). Mastery criterion for a single targeted picture was three consecutive correct responses at the independent tact level across two days. Two targeted pictures were taught simultaneously, one from each targeted type, and teaching trial presentations were alternated across the two targets. For example: Bilal was presented with a picture of an ambulance, the teacher said, "ambulance," and Bilal emitted a correct echoic response. For the next trial, the teacher presented a picture of a buffalo and Bilal said, "Buffalo" (tact). Trials per session varied from 3-15 and 1-2 sessions per

day were completed. Sessions lasted no longer than five minutes. Teaching and mastery of all ten targets was completed over a period of three weeks for all four participants.

Table 2 - *Teaching Targets for Each Participant.*

| ***Teaching targets for each participant*** | ***Alan*** | ***Bilal*** | ***Colin*** | ***Dev*** |
|---|---|---|---|---|
| Pointed to but did not say | soup | soup | shower | shower |
| | tiger | tiger | pillow | pillow |
| | cereal | cereal | dolphin | dolphin |
| | pancake | pancake | toothpaste | toothpaste |
| | ambulance | ambulance | necklace | necklace |
| Did not point to, did not say | flute | flute | ambulance | ambulance |
| | gorilla | gorilla | buffalo | buffalo |
| | shower | shower | hole punch | hole punch |
| | buffalo | buffalo | wrench | wrench |
| | submarine | submarine | flute | flute |

**Interobserver Agreement and Treatment Fidelity**

Interobserver agreement (IOA) was collected for 31% of teaching sessions, ranging from 70-100% accuracy, with an average of 98%. IOA was based on direct observation during sessions by a second, trained observer. It was calculated using trial-by-trial method, dividing the total number of trials presented by the number of trials agreed (Cooper, Heron, & Heward, 2007).

Treatment fidelity measures were collected for 11% of teaching sessions, ranging from 75-100%, with an average of 93%. Treatment fidelity measures were completed through direct observation during sessions that were run by a second, trained teacher. Treatment fidelity scores were calculated by dividing the total opportunities for teacher responses by the number of opportunities agreed, using a modified Teaching Performance Rate Accuracy (TPRA) form (Ingham & Greer, 1992). Four teachers were involved in this study. They were trained therapists with at least six months experience working with the participants in the treatment centre.

## Results

Children with autism can learn to tact pictures using the echoic-to-tact teaching procedure. They learned to tact pictures with fewer trials to criterion and with fewer average trials to mastery of five target pictures when they could point to the pictures before they learned to say them. All four participants reached mastery criterion for all selected teaching targets. Alan required 214

teaching trials to meet criterion for all five target pictures to which he did not point during pre-intervention probes, averaging 43 trials to master a single picture. He required 137 trials to meet criterion for the five target pictures to which he did point during pre-intervention probes, averaging 27 trials to master a single picture. Bilal required 133 teaching trials to meet criterion for the five target pictures to which he did not point during pre-intervention probes, requiring an average of 27 trials to master a single picture. He required 112 trials to meet criterion for the five target pictures to which he did point during pre-intervention probes, requiring an average of 22 trials to master a single picture. Colin required 78 trials to criterion for targets to which he did not point (averaging 16 per picture) and he required only 63 trials to master the targets to which he had pointed (averaging 13 per picture). Dev required 53 trials to criterion for pictures to which he had not pointed (averaging 11 per picture) and only 49 trials to master those to which he had pointed (averaging 10 per picture). All four participants required fewer total teaching trials and averaged fewer teaching trials to master each picture when the picture was one to which they could already point (see Figures 1 and 2).

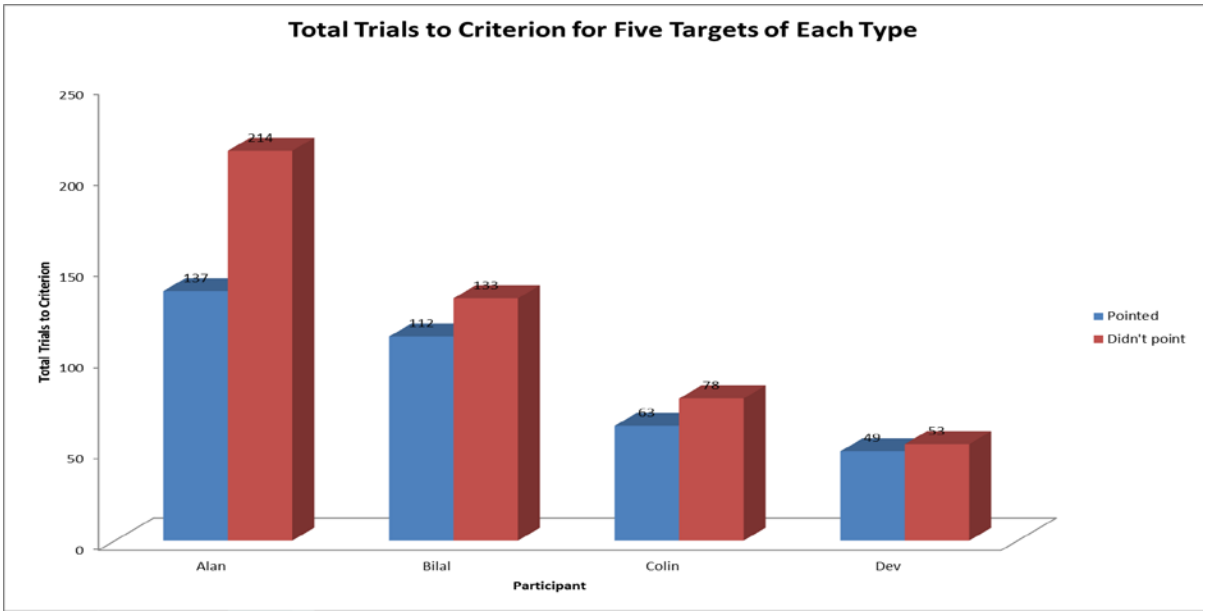


*Figure 1. Total teaching trials to criterion for five targets of each type. This graph summarizes the total number of trials that each participant required to meet mastery criterion for learning target words in two categories: those that they could point to before they started instruction and those to which they couldn't point before they started instruction.*

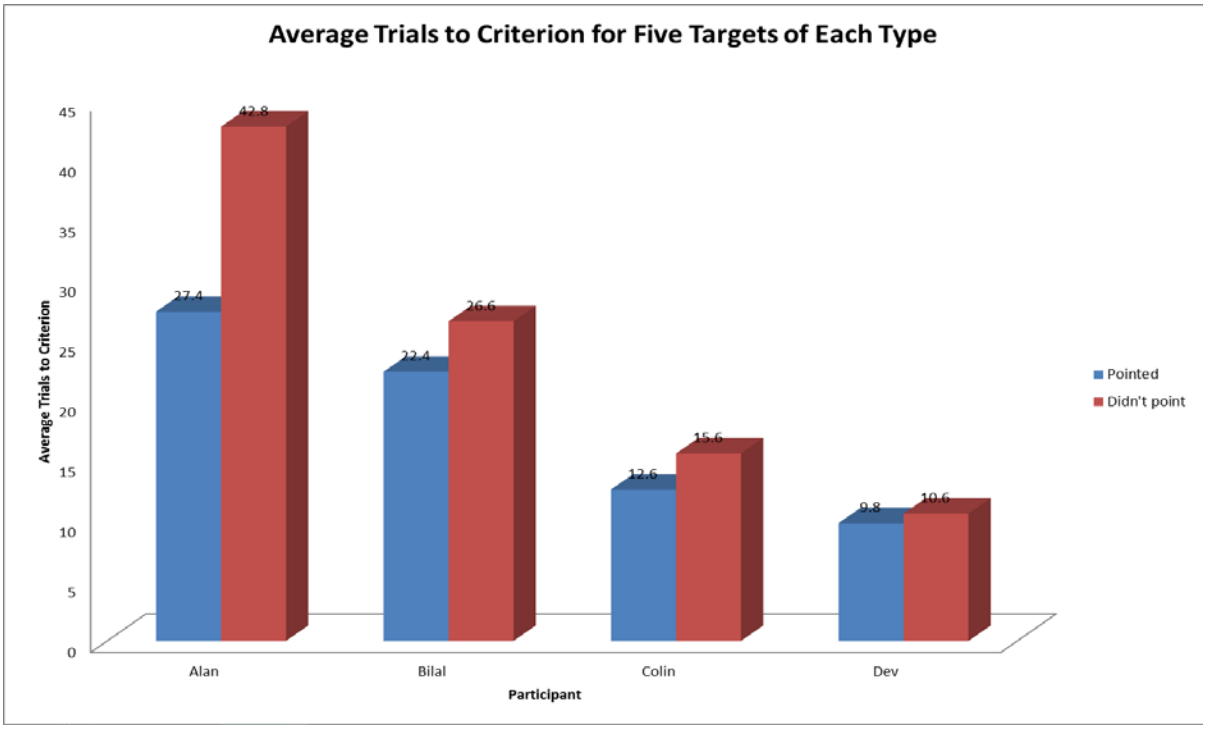


*Figure 2. Average teaching trials to criterion for five targets of each type. This graph summarizes the average number of trials that each participant required to learn target words in two categories: those that they could point to before they started instruction and those to which they couldn't point before they started instruction.*

## Discussion

All four participants in this study acquired new speaker responses using the echoic-to-tact teaching procedure. These findings contribute to the evidence base for using this teaching strategy; one that is derived from Skinner's verbal behaviour theory. This strategy drew on the idea that the transfer of stimulus function might be achieved through specific teaching and that the process of that transfer might be a sufficient condition for the emergence of new responses. In the case of the echoic-to-tact procedure, it may be that the echoic is brought under joint control of both visual and auditory stimuli (see the picture, hear the teacher say the name of the picture) before it is transferred to a tact function exclusively in the presence of the visual stimulus (see the picture, say the name of the picture). A limitation of this study is that the source of reinforcement and its potential transfer was not explicitly investigated. Choi, Greer, & Keohane (2015) suggest that the auditory match between behavior and consequence may be the source of reinforcement for the echoic. Schlinger (2008) suggested that engaging in echoic behaviour could be a defining characteristic of listening, arguing that listening and speaking may be a false discrimination in the theory of verbal behaviour. If that is true, then further research on the role of the echoic and how it might function to bridge the gap between listener and speaker responses as we currently understand them, may be warranted, and further elaboration of verbal behaviour theory should be driven by those empirical findings.

Each of the four participants in our study demonstrated a similar learning pattern of acquiring new speaker responses with fewer teaching trials when the responses targeted were for materials

to which they had already emitted correct listener responses. These findings suggest that choosing teaching targets with which learners have prior history may contribute to more effective teaching. Our participants did respond differently to teaching stimuli, depending on their prior history with those stimuli. This suggests that it is important to include prior learning history when planning for teaching our learners. Further research is needed to understand how much influence that history has over different types of learners and how much effect it has on different teaching strategies (Hayes, Barnes-Holmes, & Roche, 2001). Researchers from other disciplines have come to similar conclusions and describe their findings using different language (Wise, Sevcik, Morris, Lovett, & Wolf, 2007). But, clearly, learning history should factor into the teaching process. A limitation of this study was the lack of information collected about the extended learning history of each participant. For example, while none of the participants were scored positively for artifacts of Naming repertoires in the ABLLS-R, none of them were tested for Naming specifically using the VBDT (Greer & Speckman, 2009). Future research could look more closely at both the immediate and the more extended learning history of participants and how they might interact.

The purpose of this paper is to contribute to knowledge about how the specific characteristics of a learner's immediate verbal behaviour history might interact with a specific teaching strategy. Our knowledge of both and how best to match them together might help us to be more effective teachers. In this research, we attempted to understand how the learner's immediate history of listener responses might interact with their learning of new speaker responses.

We believe that Skinner's theory of verbal behaviour and his arguments about the natural fractures of language into distinct units like mand, tact, and intraverbal, as well as the theory of Verbal Behavior Development (VBDT), can aid us in the teaching of children with language deficits and we hope to contribute supportive evidence that guides us in our application of these theories into practice.

## Key Messages from This Article

**People with Disabilities:** Sometimes learning new language can be hard. It can help people learn new words if they already know something about the words. They might need a teacher to help them learn.

**Professionals:** New language can be taught to individual learners. It is helpful to understand the history of language for that learner before selecting new targets to teach. And to remember that new responses may be a product of that learning history.

**Policymakers:** Policy makers can support the research and development of new teaching techniques that will result in more effective and efficient teaching which will be cost-effective in the long term. Teaching techniques like the echoic-to-tact can improve the language skills of an individual, leading to their greater independence.

## Messages clés de cet article

**Personnes ayant une incapacité :** Apprendre de nouveaux mots peut parfois être difficile. Déjà savoir des choses sur ces nouveaux mots peut aider à les apprendre. Parfois un enseignant peut aider à apprendre ces mots.

**Professionnels :** De nouveaux mots peuvent être enseignés à apprenants de façon individuelle. Connaître l'historique langagier de ces personnes avant de choisir des cibles d'enseignement pourrait faciliter l'apprentissage, et les nouvelles réponses peuvent être le produit de cet historique.

**Décideurs :** Les décideurs peuvent soutenir la recherche et l'élaboration de nouvelles techniques d'enseignement qui favoriseraient l'efficacité et l'efficience de l'enseignement, qui serait également plus économique à long terme. Les techniques telles que les stratégies de transfert de l'échoïque vers le tact peuvent améliorer les habiletés langagières d'une personne et ainsi promouvoir son autonomie.

## References

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text rev.). Washington, DC: Author.

Barbera, M. L., & Kubina, R. M. (2005). Using transfer procedures to teach tacts to a child with autism. *The Analysis of Verbal Behaviour, 21*, 155-161.

Bloh, C. (2008). Assessing transfer of stimulus control procedures across learners with autism. *The Analysis of Verbal Behavior, 24*, 87-101.

Bondy, A., & Frost, L. (1994). The picture exchange communication system. *Focus on Autistic Behavior, 9*, 1–19.

Choi, J., Greer, R. D., & Keohane, D. D. (2015). The effects of an auditory match-to-sample procedure on listener literacy and echoic responses. *Behavioral Development Bulletin, 20*, 186-206. http://dx.doi.org/10.1037/h0101313

Chomsky, N. (1957) *Syntactic structures.* The Hague, NL: Mounton.

Coon, J. T., & Miguel, C. F. (2012). The role of increased exposure to transfer-of-stimulus-control procedures on the acquisition of intraverbal behavior. *Journal of Applied Behavior Analysis, 45*, 657-666.

Cooper, J. O., Heron, T. E., & Heward, W. L. (2007). *Applied Behavior Analysis* (2nd ed.). Hoboken, NJ: Pearson.

Greer, R. D. (2002). *Designing teaching strategies: An applied behavior analysis systems approach.* San Diego, CA: Academic Press.

Greer, R. D., Chavez-Brown, M., Nirgudkar, A. S., Stolfi, L., & Rivera-Valdes, C. (2005). Acquisition of fluent listener responses and the educational advancement of young children with autism and severe language delays. *European Journal of Behavior Analysis, 6*, 1-20.

Greer, R. D., & Ross, D. (2008). *Verbal behavior analysis: Inducing and expanding new verbal capabilities in children with language delays.* Boston, MA: Pearson/Allyn & Bacon.

Greer, R. D., & Speckman, J. (2009). The integration of speaker and listener responses: theory of verbal development. *The Psychological Record, 59*, 449-488.

Greer, R. D., Stolfi, L., Chavez-Brown, M., & Rivera-Valdes, C. (2005). The emergence of the listener to speaker component of naming in children as a function of multiple exemplar instruction. *The Analysis of Verbal Behavior, 21*, 123-134.

Grow, L. L., Carr, J. E., Kodak, T. M., Jostad, C. M., & Kisamore, A. N. (2011). A comparison of methods for teaching receptive labeling to children with autism spectrum disorders. *Journal of Applied Behavior Analysis, 44*, 475-498.

Hayes, S. C., Barnes-Holmes, D., & Roche, B. (2001). *Relational frame theory: A post-Skinnerian account of human language and cognition.* New York, NY: Kluwer Academic/Plenum Publishers.

Ingham, P., & Greer, R. D. (1992). Changes in student and teacher responses in observed and generalized settings as a function of supervisor observations. *Journal of Applied Behavior Analysis, 25*, 153-164.

Jackendoff, R. (2002). *Foundations of language.* Oxford, UK: Oxford University Press.

Johnson, G., Kohler, K, & Ross, D. (2017). Contributions of Skinner's theory of verbal behaviour to language interventions for children with autism spectrum disorders. *Early Child Development and Care, 187,* 436-446. doi:10.1080/03004430.2016.1236255.

Kelley, M. E., Shillingsburg, M. A., Castro, M. J., Addison, L. R., & LaRue Jr., R. H. (2007). Further evaluation of emerging speech in children with developmental disabilities: training verbal behavior. *Journal of Applied Behavior Analysis, 40,* 431-445.

Kobari-Wright, V. V., & Miguel, C. F. (2014). The effects of listener training on the emergence of categorization and speaker behavior in children with autism. *Journal of Applied Behavior Analysis, 47,* 431-436.

Kodak, T., & Clements, A. (2009). Acquisition of mands and tacts with concurrent echoic training. *Journal of Applied Behavior Analysis, 42,* 839-843.

Lamarre, J., & Holland, J. G. (1985). The functional independence of mands and tacts. *Journal of the Experimental Analysis of Behavior, 43,* 5-19.

Lechago, S. A., Carr, J. E., Kisamore, A. N., & Grow, L. L. (2015). The effects of multiple exemplar instruction on the relation between listener and intraverbal categorization repertoires. *The Analysis of Verbal Behavior, 31,* 76-95.

Miguel, C. F., & Petursdottir, A. I. (2009). Naming and frames of coordination. In R. A. Rehfeldt, & Barnes-Holmes, Y. (Eds.), *Derived relational responding: Applications for learners with autism and other developmental disabilities* (pp. 129-144). Oakland, CA: New Harbinger Publications.

Nuzzolo-Gomez, R., & Greer, R. D. (2004). Emergence of untaught mands or tacts of novel adjective-object pairs as a function of instructional history. *The Analysis of Verbal Behavior, 20,* 63–76. doi:10.1007/bf03392995

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.

Petursdottir, A. I., Lepper, T. L., & Peterson, S. P. (2014). Effects of collateral response requirements and exemplar training on listener training outcomes in children. *The Psychological Record, 64,* 703-717.

Pinker, S. (1999). *Words and rules.* New York, NY: HarperCollins Publishers.

Ribeiro, D. M., Elias, N. C., Goyos, C., & Miguel, C. F. (2010). The effects of listener training on the emergence of tact and mand signs by individuals with intellectual disabilities. *The Analysis of Verbal Behavior, 26,* 65-72.

Schlinger H. D. (2008). Listening is behaving verbally. *The Behavior Analyst, 31,* 145-161. doi:10.1007/bf03392168

Skinner, B. F. (1957). *Verbal Behavior.* New York, NY: Appleton-Century-Crofts.

Sparrow, S. S., Cicchetti, D. V., & Balla, D. A. (2005). *Vineland Adaptive Behavior Scales*. Circle Pines, MN: American Guidance Service.

Twyman, J. (1996). The functional independence of impure mands and tacts of abstract stimulus properties. *The Analysis of Verbal Behavior, 13,* 1-19.

Wise, J. C., Sevcik, R. A., Morris, R. D., Lovett, M. W., & Wolf, M. (2007). The relationship among receptive and expressive vocabulary, listening comprehension, pre-reading skills, word identification skills, and reading comprehension by children with reading disabilities. *Journal of Speech, Language, and Hearing Research, 50,* 1093-1109.