TEACHING INTRAVERBAL BEHAVIOUR TO A SUBJECT WITH AUTISM SPECTRUM DISORDER

Giovanni Maria Guazzo, and Consiglia Nappo

IRFRI-Gruppo FORTE, Salerno

ABSTRACT

Intraverbal is a verbal response controlled by a preceding verbal stimulus that does not correspond precisely to the response produced. Intraverbal skills, therefore, play a fundamental role in children's social interactions, as a conversation is nothing more than a long chain of intraverbals, when control of the verbal exchange passes from one participant to another and vice versa: answering questions, singing songs, telling stories and describing stimuli in their absence, etc.

This study aimed to demonstrate the effectiveness of the intraverbal teaching procedure in teaching children with autism spectrum disorder (ASD) or other intellectual disabilities to respond to social questions, thereby improving interpersonal relationships.

Keywords: Autism spectrum disorder, Verbal behaviour, Verbal operants, Intraverbal

INTRODUCTION

Skinner (1957) defines language as verbal behaviour, i.e. a type of operant behaviour shaped and maintained by consequences mediated by the environment. In a verbal episode, the "speaker" emits verbal behaviour and the "listener" provides a stimulus to reinforce the speaker's behaviour. According to Skinner (1957), there are different types of verbal behaviour, including (Guazzo, 2021; Ingvarsson, 2011):

Mand (Request): These represent request behaviours that are under the control of motivational operation (MO) and therefore represent requests to obtain desired reinforcers. In summary, MO is the antecedent, the behaviour specifies the reinforcer, and the consequence is defined by the reinforcer specified by the motivational operation (e.g., asking for the "ball" because you want it and getting the "ball").

Tact (labelling): represents the naming, labelling, identification of objects, actions, events, and characteristics. The discriminative stimulus is non-verbal; the behaviour is the specification of the object seen, and there is no purpose in obtaining the stimulus. Therefore, the reinforcer is non-specific and can be associated with social reinforcement (e.g. saying "ball" because you see it).

Echoic (vocal imitation): These represent vocal imitation, i.e. repeating exactly what has been heard. The antecedent is a verbal discriminative stimulus, the behaviour is the point-to-point repetition of the verbal discriminative stimulus (SD), and the consequence is a non-specific reinforcer plus social reinforcement (e.g., saying "ball" after someone else has said the same word).

Intraverbal (response to questions): These represent responses to questions in conversations in which the words are controlled by other words spoken by someone else. The antecedent is a verbal discriminative stimulus; the behaviour is verbal; it is linked to the SD but has no point-to-point correspondence. The consequence is social reinforcement and a non-specific reinforcer (e.g., saying "ball" when asked, "Can you tell me something you play with?"). (Goldsmith, LeBlanc & Sautter, 2007; Jennings, Vladescu, Miguel, Reeve & Sidener, 2022).

Furthermore, the listener (or listener behaviour, even if receptive and non-verbal) is the execution of instructions or motor actions in response to a request made by someone else. The antecedent is a verbal discriminative stimulus, the behaviour is non-verbal (e.g. "take", "touch", "give"), and the consequence is non-specific reinforcement plus social reinforcement (e.g. touching a "ball" after the request "touch the ball").

Among the various verbal behaviours, the most crucial operant for this study is intraverbal behaviour, in which a verbal response is emitted in the presence of a verbal stimulus. The response is maintained by social reinforcement (e.g., a child says "motorbike" in response to the verbal instruction "name a means of transport that has two wheels", and a therapist provides verbal reinforcement).

"Verbal behaviour", therefore, includes speakers and listeners in a social interaction, whereby speakers gain access to reinforcement and control their environment through the behaviour of listeners: the antecedent event is a verbal discriminative stimulus, which does not, however, correspond to the form of the response.

The first intraverbal forms acquired by children consist of responses to verbal stimuli, such as "fill in the blanks" (e.g., saying "Go!" after hearing "Ready, set, ...") and answering questions like "What is your

name?" In a later stage of development, more complex intraverbal forms are acquired, such as discrimination with compound stimuli (e.g., saying "dog" to "name a domestic animal") or conditioned verbal discrimination, where the word "domestic" alters the evocative function of the word "animal". Both words exert joint control over the response. This phenomenon is also referred to as intraverbal under *multiple convergent control*, where multiple verbal stimuli influence the strength of a response (Axe, 2008; Michael, Palmer, & Sundberg, 2011; Sundberg, 2016; Pérez-González, 2020). Lowenkron (1991) introduced the concept of *Joint Control*, which refers to a situation in which a single behaviour is influenced by two or more stimuli acting together. This means that an echoic, repetitive (auto-echoic) and tact response is evoked by the combination of these stimuli, not just by one in isolation. Essentially, it is a type of multiple control in which stimuli converge to evoke a single response. In other words, joint control refers to the simultaneous application of multiple verbal operants to achieve a specific goal, improving the child's ability to engage in more sophisticated verbal or listening behaviours. This approach is particularly effective in teaching tasks that require memory, sequencing, integration of multiple steps or components, identification of missing objects in a set, and reporting past experiences or observations: for example, following a recipe, following instructions, remembering a phone number, selecting an object (the child picks up the "red pen" when asked to pick up a "red pen"; this is an example of joint control because his action is controlled simultaneously by the verbal signal (pick up the red pen) and the visual signal (identification of the red pen).

The intraverbal can also be involved in discrimination, where a verbal stimulus evokes multiple responses (e.g., saying "Car, Ship, Aeroplane" in response to the verbal instruction "name some means of transport"). In this case, the responses are said to be emitted under *multiple divergent control*. Furthermore, it is also possible for both types of control to occur (e.g., saying 'Car, Bus and Bicycle' in response to the verbal request 'name some means of transport with wheels'). Intraverbal control is therefore both divergent and convergent (Axe, 2008; Michael, Palmer, & Sundberg, 2011; Sundberg, 2016; Perez-Gonzalez, Garcıa-Asenjo, Williams & Carnerero, 2007).

Intraverbal skills play a fundamental role in children's social interactions, as a conversation is essentially a long chain of intraverbals, where control of the verbal exchange passes from one participant to another and vice versa. Therefore, without intraverbals, we have no conversation and our ability to speak, however functional, cannot fulfil its social role. Intraverbal control is involved in many common behaviours, such as singing songs, describing activities, telling stories, giving explanations, talking about past events, answering questions posed with interrogative pronouns ("What?", "Who?", "Where?", 'When?', 'Which?') (Almås, Smith, Eldevik, S. & Eikeseth, 2022).

A common problem for many children with ASD or other types of intellectual disabilities is the inability to acquire a functional intraverbal repertoire, despite having acquired a considerable repertoire of mands, tacts and listening skills. That is, the verbal discriminative stimuli that should evoke an intraverbal response are not recognised. So, how can we teach intraverbals to children with ASD and improve their social skills?

This study aims to demonstrate that the use of the intraverbal transfer procedure (picture prompt and progressive image fading) can be used to teach a child with ASD to respond correctly to 10 questions with "Who?", "Where?" and "What?". The procedure consisted of presenting the child with an image depicting the target verbal response in conjunction with the antecedent verbal stimulus (question) and subsequently fading the prompt. As soon as the subject gave the correct response, in the absence of the picture prompt, differential reinforcement was provided.

METHOD

Participant

Marco is a child with ASD, aged around seven, who came to our attention at around the age of five. Treatment has been ongoing since May 2023. On admission, he had significant relational and communicative difficulties and deficits in fine and gross motor skills. His overall developmental profile was significantly delayed for his chronological age. As can be seen from Fig. 1, when the VB-MAPP (Verbal Behavior Milestones Assessment and Placement Program; Sundberg, 2008) was administered, he made requests (e.g., he said "Colours" if he wanted colours) and named objects (e.g., he said "Colours" if he saw colours). Still, he was unable to say "Colours" if someone asked him, "What do you need to colour?".

After the preference assessment and pairing phase, treatment focused on enhancing the mand repertoire and expanding the tact repertoire before moving on to teaching intraverbal communication.
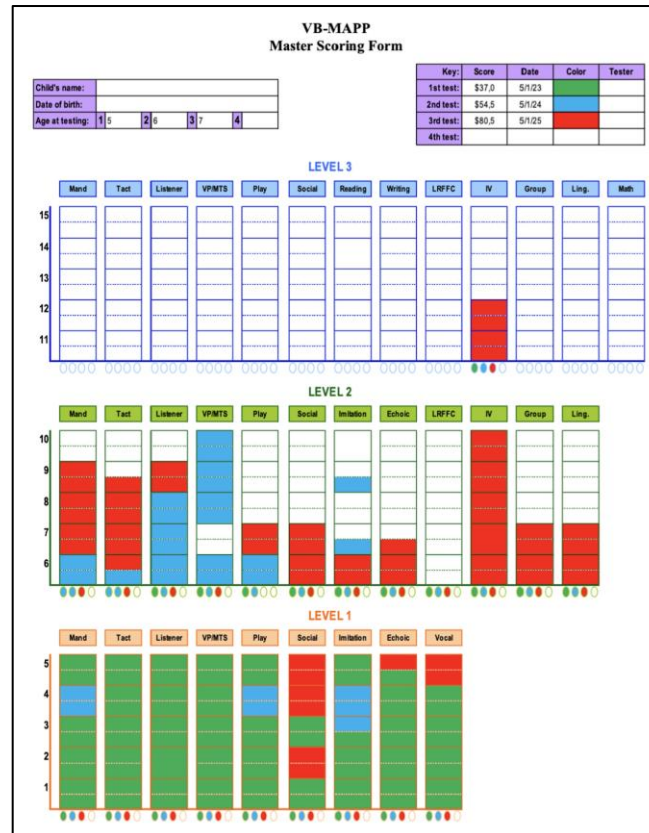
Fig. 1 – VB-MAPP grid with scores recorded in May 2023, May 2024 and May 2025, showing the expansion of intraverbal scores.

Materials

The training took place at home, where the child was following an ABA (Applied Behaviour Analysis) programme for a total of eight hours per week. The materials used were pictures representing the target intraverbal responses shown in Table 1.

Procedure

The training took place five to eight times a week, with ten learning sessions (also spread over different days) for each session. During the training, the child was taught to give the correct response to each question using a "picture prompt" with subsequent fading of the prompt (intraverbal transfer).

WHO?	WHAT?	WHERE?
Who sells medicines?	What do you use to cut bread?	Where do you do your homework?
Who teaches at school?	What do you use to brush your teeth?	Where do you watch TV?
Who won the championship?	What do you wear on your feet?	Where do birds fly?
Who cuts your hair?	What do you eat for breakfast?	Where do you sleep?
Who makes the bau-bau?	What do you use to eat pasta?	Where do you play with other children?
Who makes pizzas?	What do you use to tell the time?	Where do you get money?
Who takes you to school?	What do you use to drink?	Where do you throw rubbish?
Who sells stickers?	What do you use when it rains?	Where do you buy toys?
Who eats grass?	What do you use to call your friends?	Where do fish live?
Who fixes the car?	What do you wear to go to bed?	Where do you eat pizza?

Tab. 1 – Questions, using the interrogative pronouns 'WHO?', 'WHAT?' and 'WHERE?', asked the child during the intervention on intraverbal responses.

The first teaching session began with 'Who?' because this type of question allows us to distinguish between different people and associate a name with an individual. Furthermore, it was a relatively easy skill for Marco to acquire because we used familiar names and people with whom the child interacted on a regular basis. Answering the question "Who?" provides a solid foundation for learning other verbal operants, helping to develop skills that can promote language development and be "Who?" provides a solid foundation for learning other verbal operants, helping to develop skills that can promote language development and be applied immediately in social contexts.

In the "Who?" question session, a prompt was presented for each of the ten questions. In the next session, however, a two-second delay prompt was inserted for each question. If the response was given within two seconds of the question being asked, the child was reinforced, and the next question was presented. If, on the other hand, the response was inappropriate or not given within two seconds, the prompt was still provided, but it was not recorded as a correct response in the data collection.

In subsequent sessions, the waiting time for presenting the picture prompt was gradually increased to a maximum of five seconds. Once 100% of the responses were correct without prompts, the same procedure was followed for the next set of questions with "What?" and "Where?".

Experimental design

We employed an experimental design with varying criteria to monitor the effects of the educational intervention on the subject. In practice, the baseline level was measured (Table 2), and an initial parameter of coded behaviour was established, based on which a more challenging one was subsequently defined and employed in an experimental design with varying criteria to monitor the effects of the educational intervention on the subject. In practice, the baseline level was measured (Table 2), and an initial parameter of coded behaviour was established, based on which a more challenging one was subsequently defined. This was continued until the final parameter was reached (all ten correct responses for each set of questions), taking each phase as the baseline for the next phase (Guazzo, 2021).

BASELINE					
WHO?	1	1	1	1	1
WHAT?	0	0	0	0	0
WHERE?	0	0	0	0	0

Tab. 2 – Baseline for correct answers to questions asked with the interrogative pronouns 'WHO?', 'WHAT?' and 'WHERE?'

After the baseline, further measurements were taken, each time setting a higher criterion to be achieved quickly. The subsequent criteria required three correct answers for questions with "WHO?" (first criterion), then five correct answers (second criterion), then eight correct answers (third criterion) and finally ten correct answers (fourth and final criterion). On the other hand, for questions with "WHAT" and "WHERE", six criteria (two, four, five, seven, eight, and ten) were established, using the same operating methods consistently due to the greater difficulty in distinguishing between questions (Fig. 2).
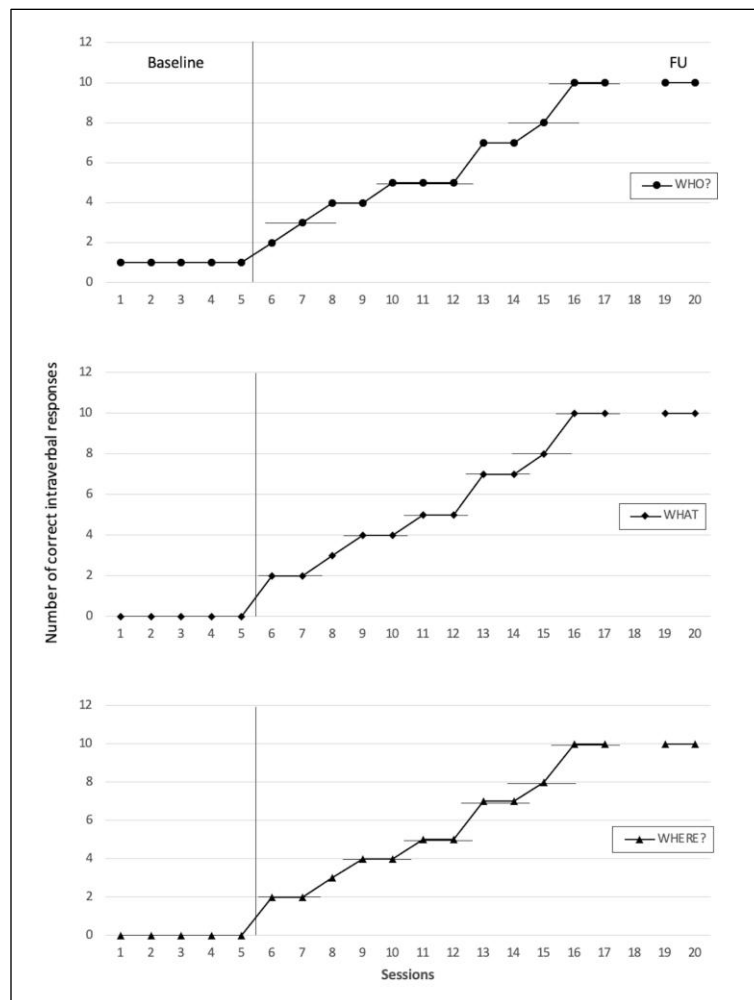
Fig. 2 – Comparison between correct intraverbal responses to questions with the interrogative pronouns 'WHO?', 'WHAT?' and 'WHERE?'.

CONCLUSIONS

The data collected were summarised in the graph in Fig. 2, where the sessions carried out are shown on the x-axis and the number of correct answers on the y-axis. Visual analysis of the graph reveals that in the baseline phase, i.e., before treatment was introduced, there were zero correct responses to the "What?" and "Where?" questions, and only one proper response to the "Who?" question. During treatment, which began with session "6", all criteria for the different sets of questions were met.

This study aimed to expand the intraverbal behaviour of a child with ASD who, despite having a good command of some Mands and Tacts, did not respond adequately to questions asked using the interrogative pronouns "Who?", "What?" and "Where?". The procedure chosen was transfer from tact to intraverbal with prompting/fading to increase the emission of the target behaviour. This procedure is one of several proposed in the literature for intraverbal training, which includes transferring from echolalia to intraverbal, transferring from tact to intraverbal, and cues-pause-point (Ingvarsson, 2011; Finkel & Williams, 2001; Vedora, Meunier, one of several proposed in the literature for intraverbal training, which includes transferring from echolalia to intraverbal, transferring from tact to intraverbal, and cues-pause-point (Ingvarsson, 2011; Finkel & Williams, 2001; Vedora, Meunier, & Mackay, 2009).

In conclusion, the analysis of data from the study reveals that the application of the tact-to-intraverbal transfer procedure, combined with prompting/fading, not only facilitates the expansion of intraverbals but also enhances the functional communication level in social interactions the analysis of data from the study reveals that the application of the tact-to-intraverbal transfer procedure, combined with prompting/fading, not only facilitates the expansion of intraverbals but also enhances the functional communication level in social interactions with peers. Better generalisation of the stimulus also emerged, as the child is now able to respond to questions asked in a manner different from those learned (Ingvarsson, Tiger, Hanley, & Stephenson, 2007). The child can respond to questions asked in ways other than those learned (Ingvarsson, Tiger, Hanley & Stephenson, 2007).

REFERENCES

Almås, I.K., Smith, D.P., Eldevik, S., & Eikeseth, S. (2022). Emergent Intraverbal and Reverse Intraverbal Behavior Following Listener Training in Children with Autism Spectrum Disorder. *Analysis Verbal Behav* **38**, 1–23. doi: 10.1007/s40616-021-00164-3

Axe, J.B. (2008). Conditional discrimination in the intraverbal relation: A review and recommendations for future research. The Analysis of Verbal Behavior, 24, 159–174. doi: 10.1007/BF03393064

Finkel, A.S., & Williams, R.L. (2001). A comparison of textual and echoic prompts on the acquisition of intraverbal behavior in a six-year-old boy with autism. *The Analysis of Verbal Behavior*, 18, 16-70. DOI: 10.1007/BF03392971

Goldsmith, T.R., LeBlanc, L.A., & Sautter, R.A. (2007). Teaching intraverbal behavior to children with autism. *Research in Autism Specrtum Disorders*, 1, 1-13. Doi: 10.1016/j.rasd.2006.07.001

Guazzo, G.M., (2021). *L'ABA in azione. Una guida operativa per insegnanti, terapisti e genitori*. Roma: Anicia.

Ingvarsson, E.T. (2011). Further evaluation of prompting tactics for establishing intraverbal responding in children with autism. *The Analysis of Verbal Behavior*, 27, 75-93. doi: 10.1007/BF03393093.

Ingvarsson, E.T., & Hollobaugh, T. (2010). Acquisition of intraverbal behavior: teaching children with autism to mand for answers to questions. *Journal of Applied Behavior Analysis*, 43, 1-17.

Ingvarsson, E.T., Tiger, J.H., Hanley, G.P., & Stephenson, K.M. (2007). An evaluation of intraverbal training to generate socially appropriate responses to novel questions. *Journal of Applied Behavior Analysis*, 40, 411-429. doi: 10.1901/jaba.2007.40-411.

Jennings, A.M., Vladescu, J.C., Miguel, C.F., Reeve, K.F., & Sidener, T.M. (2022). A systematic review of empirical intraverbal research: 2015–2020. *Behavioral Interventions*, 37(1), 1–27. doi: 10.1002/bin.1815

Lowenkron, B. (1991). Joint control and the generalization of selection-based verbal behavior. *Analysis of Verbal Behavior*, 9,121–126. doi: 10.1007/BF03392866

Michael, J., Palmer, D.C., & Sundberg, M.L. (2011). The multiple control of verbal behavior. *The Analysis of Verbal Behavior*, 27, 3-22. doi: 10.1007/BF03393089

Perez-Gonzalez, L.A. (2020). Discriminative Processes Involved in Reasoning: Emergence of Intraverbals. Conductual, 8, 2, 78-107.

Perez-Gonzalez, L.A., Garcıa-Asenjo, L., Williams, G., & Carnerero, J.J. (2007). Emergence on intraverbal antonyms in children with pervasive developmental disorder. *Journal of Applied Behavior Analysis*, 40, 697–701. Doi: 10.1901/jaba.2007.697-701

Skinner, B. F., (1957), *Verbal Behavior*. Englewood Cliffs, NJ: Prentice – Hill.

Sundberg, M.L. (2008). *VB-MAPP. **Verbal Behavior Milestones Assessment and Placement Program**. Concord, CA: AVB Press.*

Sundberg, M.L. (2016). Verbal Stimulus Control and the Intraverbal Relation. *Analysis Verbal Behav.*, 32(2):107-124. doi: 10.1007/s40616-016-0065-3

Sundberg, M.L., & Sundberg, C.A. (2011). Intraverbal behavior and verbal condition discriminations in typically developing children and children with autism. *The Analysis of Verbal Behavior*, 27, 23-43. doi: 10.1007/BF03393090

Vedora, J., Meunier, L., & Mackay, H. (2009). Teaching intraverbal behavior to children with autism: A comparison of textual and echoic prompts. *The Analysis of Verbal Behavior*, 25, 79-86. doi: 10.1007/BF03393072