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VIDEO MODELING TO TEACH MAND FOR INFORMATION IN CHILDREN WITH AUTISM, BASED ON VERBAL BEHAVIOR APPROACH

BY

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Abstract

Introduction: Mand repertoire is fundamental for development of languageas communicative behavior. In particular, in Verbal Behavior Approach Mand for information specifies informations as reinforcement. In this study, we wanted to investigate the use of Videomodeling strategies to teach independent mands for information to children with ASD level 2.

Methods: Using ad adapted alternating treatment design we compared two different teaching conditions: Video Modeling Condition; and vocal model prompt Condition. Partecipants were four children with ASD aged between 4.5 and 6 years old.

Results: Using video modeling to teach and for information has shown has given good results, especially in children who have shown a difficulty in discriminating the echoic prompt. In fact, while children who took the vocal model prompt showed best performance in both condition, children who showed difficulties in discriminating the stimulus initially learned only mands taught by videomodeling, generalizing the learning to the other topography later.

Keywords: *Video modeling, video prompt, videobasedprocedures, Mand for Information, Asd, Autism, Applied Behavior Analysis, Verbal Behavior*

Introduction

A mand is a kind of verbal operant that is evoked by an establishing operation (EO) and reinforced by consequences specific to that EO (Skinner, 1957; Laraway, Snycerski, Michael, & Poling, 2003; Michael, 1988, 1993,2007).

The mand repertoire has considerable importance for language development and clinical implications. Its relevance arises from the evidence that it allows the speaker, through social mediation, to gain access to tangible, activities, actions, and information. Since the specific reinforcement corresponds to the person who is emitting mand motivation, the speaker is the direct beneficiary of this verbal instrument: it encourages the development of a communication repertoire itself. In addition, the mand emphasises speaker and listener roles that are indispensable for the increase of verbal skills (Sundberg & Michael, 2001). The *mand for information* is a particular type of mand that specifies some information as reinforcement (Sundberg & Michael, 2001). In other words, a person can ask someone about exact information that will allow him to get in touch with a favourite event (e.g., "Where is my hat?"). The difficulty of teaching the mand for information consists in increasing the reiforcing value of the information, a social reinforcement, to such a level that children will engage in the behavior of asking questions. Mand for information training with children has proven its effectiveness through many procedures that involve manipulation of MO of the child such as contriving EO to teach these mands and increasing the value of the information as a reinforcer (Betz, Higbee, & Pollard, 2010; Endicott & Higbee, 2007; Lechago, Carr, Grow, Love, & Almason, 2010; Shillingsburg, Valentino, Bowen, Bradley, & Zavatkay, 2011; Sundberg, Loeb, Hale, & Eigenheer, 2002; Williams, Donley, & Keller, 2000). All these studies use in addiction vocal prompt to help the child to identify the correct response when they didn't give it during the training. In last years it was demostred the efficacy of use of Video Modeling (VM) (Plavnick & Ferreri, 2011) in a lot of boundaries. VM was applied to teach different competences, including autonomy, play, and social and vocational skills (Charlop & Milstein, 1989; LeBlanc et al., 2003; Sigafoos et al., 2005; Rayner, Denholm, & Sigafoos, 2009; Taber-Doughty et al. 2011; Thomas et al. 2020) anditshowedpotentialbenefitsincludingtheremovalofsocialrequirementsinvolvedinmoretraditionalteaching situations (Sherer et al.,2001). VM involves the subject viewing a video that show someone engaged in completion or participation in a target behavior, and then giving the student the opportunity to engage in completion or participation in that behavior (Charlop & Milstein, 1989; Delano, 2007). Generally, VM includes showing a recorded video of a target response to the child, to teach him to emit a specific behavior (Bellini & Akullian, 2007). One of the benefits of VM is that it allows a child to emphasize the relevant stimulus characteristics of the instructional setting, reducing the irrelevant stimulus characteristics, and so decreasing the effects of the hyperselectivity (Hayes et al., 2015). Through VM the participant observes a sequence of stimuli that includes an evocative event, the responding model, and a listener that delivers the related consequences to the model behavior (Nikopoulos & Keenan, 2004; wert & Neisworth, 2003).

However, regarding mand training, and in particular training on the mand for information, the literature is rather defective. While direct vocal patterns (e.g., live patterns through voice prompts) have been used effectively to teach children about information demand, and VM strategies, they have not yet been specifically employed to train this skill. Video modeling would provide an alternative way to instruct clients to mand for information, potentially minimizing some of the effort currently involved in repeatedly contriving EOs during instruction (Dillon, 2007). In this study, we wanted to investigate the possibility of using VM strategiesto teach independent mands for information to children with autism Spettrum Disorder (ASD)level2,accordingtothediagnosticcriteriaof Diagnostic and statistical manual of mental disorders – DSM 5 (APA, 2013).

Methods

Participants

Participants in this study were 4 children (Nunzia, Federica, Marco and Salvatore) aged between 4.5 and 6 years old. All children were evaluated at the FINDS Neuropsychiatry Clinic and had been diagnosed with Autism Spectrum Disorder level 2 (DSM-5, 2014) thought the administration of ADOS 2 and ADI-R protocols. Inclusion criteria for study participation required: echoic skills for words and simple phrases; tacting repertorire for more than 250 words (nouns, verb, and adverbs included); spontaneous mands; and level 2 of the VB MAPP intraverbal repertoire, including intraverbal responses to fill-ins and “what?” and “where?” questions. All children had a mand repertoire consisting

of high rates of multiple-word vocal phrases but no prior skills of mands for information. Verbal abilities of children were assessed by administration of the VB MAPP, echoic abilities are tested using EESA sub test.

	Sub 1	Sub 2	Sub 3	Sub 4	Sub 5
Nunzia	25	27,5	25	8	2
Federica	25	27	26	6	1,5
Marco	25	26	26,5	6	1
Salvatore	25	30	26	8	1,5

Tab 1. Scores in EESA (VBMAPP)

Setting, session, and materials

All children had a treatment program based on the principles of applied behavior analysis, that took place in their house five times a week. Mand training was then carried out during treatment, for 3 sessions a day of variable duration, on average 10 minutes. The duration of the sessions was structured in a variable way to ensure the maintenance of the child’s EO for the target item and each session was dedicated to a specific topography of mand for information.

Video modeling was recorded using an iPhone XR smartphone and then sent to the respective trainers smartphone. As a VM strategy, we used a Basic video modeling that involves recording someone besides the learner engaging in the target behavior or skill. Model was an adult familiar with the learner (Bellini & Akullian, 2007; McCoy & Hermansen, 2007). Videos have an average duration of 30.7 seconds, in particular, video used for the mand "Where is?" has a duration of about 42 seconds; "What is " has a duration of about 20 seconds. From each video modeling, ashort video, that we will call cut-video prompt (cVP), was then extrapolated. In this video was shown only the model who emits the mand. All videos were shot by two individuals that used the same material used during the training: a box; an opaquer bag and reinforcers chosen according to assessment of preferences of each child. In particular, the box and the bag were standard for all children, the items and the character were child-specific. In the video two adult models show the sequence as those described in baseline for *Where is* condition and *What is* condition.

Dependent variables

Our dependent variable consisted in the mand for information of the child. The data collection used was the percentage of correct responses on the number of trials carried out, for each topography of mand *(Where is, What is*). Data were recording in vivo by trainer and an observer (post-graduated student who is pursuing for BCBA or BCaBA). Child responses given in EO condition and in prompt absence were considered as correct. In addition, spontaneous mands produced by children beyond specific training sessions were measured using frequency, over the duration of treatment.

Experimental design

We used an adaptedalternating design (Wolery, Gast, & Hammond, 2010) with an initial baseline for each participant was used to compare video modeling and vocal model prompt to mand training procedures on the acquisition and mastery of mands for all participants. The adapted alternating treatment design is useful for comparing the effects of two independent variables on two or more related but not identical dependent variables (Wolery et al., 2010). In fact, in the treatment phase, two topographies were taught using an alternating-treatment design randomizing between VM, and vocal model prompt to mand procedures. For each participant only the fastest training was then implemented. Seven days after they acquired criterion generalization and maintenance they were assessed. Mands for information “where?” and “what?” were targeted concurrently but in separate trial sessions.

Procedures

Preexperimental Assessment. In pre-experimental assessment we test participant on intraverbal and listener response to be sure that they could understand and follow the significance of the trained mand and the information given by the instructor in response of their mand. For "Where" condition each participant was presented with his preferred item, a box, a basket, and a bag. Randomly the therapist put his preferred item in one of these and asked to the child "Where is the item?" if the child responded correctly the therapist gave him the item, if not therapist gave the correct response and pass to another trial. To ensure that the participant could use the information provided in response to his mand correctly were tested also their listener responses in this way: each participant was presented with a box a basket and a bag than the therapist gave him an item and said "Put the item on/out of ….", if the child did it correctly he was reinforced with a his preferred item, if not therapist prompt the correct response and proceeded to another item. If the participant correctly followed a particular instruction three times, it was considered to be part of the participant's listener repertoire. In "What is" condition the therapist showed the child an opaque bag and put an item known to the child inside, then shaking the bag asked to the child "What is it?". If the child responded correctly he was reinforced, if not thereinforcement was not delivered and the therapist proceeded to the next trial. All participant showed at lest 90% of correct responses for each trial.

Preference Assessment. A multiple stimulus assessment without replacement (MSWO; DeLeon & Iwata, 1996) was used to identify children's preferences. Each child was presented with items identified by an indirect assessment. Parents and babysitters compiled a checklist of possible preferences of their child. From hierarchy of preferences of each child, the first seven preferences were identified.

Baseline. During baseline each child was placed in an antecedent condition to evoke target mand behavior. For example to evoke "Where is?" response, trainer left the child play with the preferred item, then he distracted child by asking him to close his eyes or look in another direction. In this way, the trainer could put the item in a box so that the item disappeared for child creating EO for questioning. To evoke "What is?" we put an item in an opaque bag when child didn't see and began to shake it in front of the child (Tab2). Finally, we recorded any mand behaviors for each kind of information emitted (Fig. 2). Also, we recorded any mands for information made by children outside the session. (Fig.2)

	Evocative Event	Programmed Consequence
Where Condition	Child is playing with a toy, therapist distracts the child and put toy in a box	Therapist says where is the toy and let child find and play with it
What is condition	Therapist shows an opaque bag to the child and shakes it in front of him	Therapist answers naming the item and gives it to the child

Tab 2. Evocative event and Programmed Consequence for each Condition

Vocal Model Prompt Condition (VMP).The procedures used were adapted from those described by Koegel et al (Koegel, Camarata, Valdez-Menchaca, & Koegel,1998; Koegel et al., 2014), the changes made, were necessary both to recreate the EO to mand for information and to reconstruct the situation showed in videomodeling. Here are described the procedure to teach the two mand for information (What is it?, and Where is it?):

"Where is + object" mand. We let the child play with the prefered item, then distracted him by asking, for example, to close his eyes or to look in another direction, and putting the item in a box. We waited for the child to request or search for the item and provided a vocal model prompt for the mand for three time with a delay of 5 seconds. If the child repeated the question (*Where is the …item..?*), the correct indication about where to look for the object was given and the box was opened, in this way the child was free to take back the desired object and play with it. If the child did not repeat the question after three consecutive prompts, or emitted a wrong intraverbal (that was considered as an error), he was given a distractor and resumed the sequence three times.

"What is it?" mand. A series of prefered items were placed in an opaque bag, and then we provided a vocal modelprompt to the child. If the child repeated the question (*What is it?),* the operator opened the bag, named the object and delivered it to the child. If the child did not repeat the question after three consecutive prompts, or emitted a wrong answer, he was given another item as a distractor and resumed the sequence three times.

Video Modeling condition (VM): During Videomodeling condition, the manipulation of EO was similar to in vivo mand training but included some variation associated. Before to create the EO the child was subjected to the vision of the VM previously created. The video was shown three times, after which the child was given the preferred item, then distracted him and put the item in the box, as for VMP condition. If the child asked for it or begin to search it (tha would be the sign for EO)he was shown the frame with cVP three times with 5 seconds latency. As soon as the child emitted the mand for correctinformation, the response and reinforcement were delivered. If the child did not emit any response or emited a wrong response proceeded with the placing the item out of site and admninistering a distractor. InitialVideoModeling and cVP were gradually fading during the training.

In both condition were delivered a differential reinforcement among correct response without and with prompt. When child responded correctly without vocal model prompt or without VM or cVP he could play with item for 1 minute, if he gave correct response after one of the prompt he could play only for 30 seconds.

In Videomodeling conditions, a no vocal model prompts were provided as needed. Fading was made through 5 seconds prompt delay both for video modeling, and vocal model prompt.

In ecah condition training during until child showed EO for the item used. In opposite, the session for this item ended and therapist tried with another one.

Generalization Probe. The tests of generalization were carried out with material and with interlocutors different from those used during the training, simulating evocative conditions specific to each question. In particular, the interlocutor was one of the two parents and the material was chosen incidentally following the motivation of the child at that time (Tab2). In addition, the frequency data for the three mand topographies were collected for information under evocative conditions in a natural environment (Fig.2). Each session of generalization had a duration of 1 hour, equivalent to the total duration of the home intervention, in which the frequency data for spontaneous mands were taken during the training.

Maintenance. Maintenance has been monitored through spontaneous mand frequency data after 10 dayssince training suspension. Data was collected during a 60-minute session.(fig.2)

Social validity. Social validity has been evaluated through an interview with students in ABA II level postgraduate specialization university course and ABA postgraduate specialized students. Data was collected anonymously. The students were recruited as data collector and trained using a Behavioral Skills Training (Parsons M.B., et al., 2012) for data collection. The interview included 6 questions on the following points: treatment objectives, procedures employed, results obtained, time to administer procedures, and satisfaction with the time to obtain results. The answers were given on the basis of a 5-point Likert scale ranging from “1- strongly agree” to “5- strongly disagree”.

Interobserver Agreement. The IOA has been calculated between the 3 trainers and 1 observer (mastering level I) present during treatment sessions. The IOA has been calculated using the smaller score/larger score *100 formula, on the occurrence percentage of the child’s manding behaviour in each treatment session and on the independent manding frequency for maintenance and generalization. The IOA was 100% during the baseline for all four baselines, between 95-99%; 97-100%; 96-100%; 97-99% during treatment sessions and on average 97%, 96% and 95%; 96% during generalization sessions; 95%, 98%, 96% and 96% during maintenance sessions.

Procedural integrity. The procedural integrity has been guaranteed through BST staff training, during which trainers received the whole written protocol, showed the video and in-vivo procedure for each condition and for each operant. They were asked to replicate it, first in role-playing conditions, and then on children under the supervision of one of the experimenters. At the end of each trial, the trainers received a supervisor feedback on their performance. The degree of procedural agreement between the investigators was 100%. Treatment was initiated when procedural concordance was reached (Application of EO condition, training, prompt delivery, possible correction of error and R+ delivery) of at least 90% in all phases.

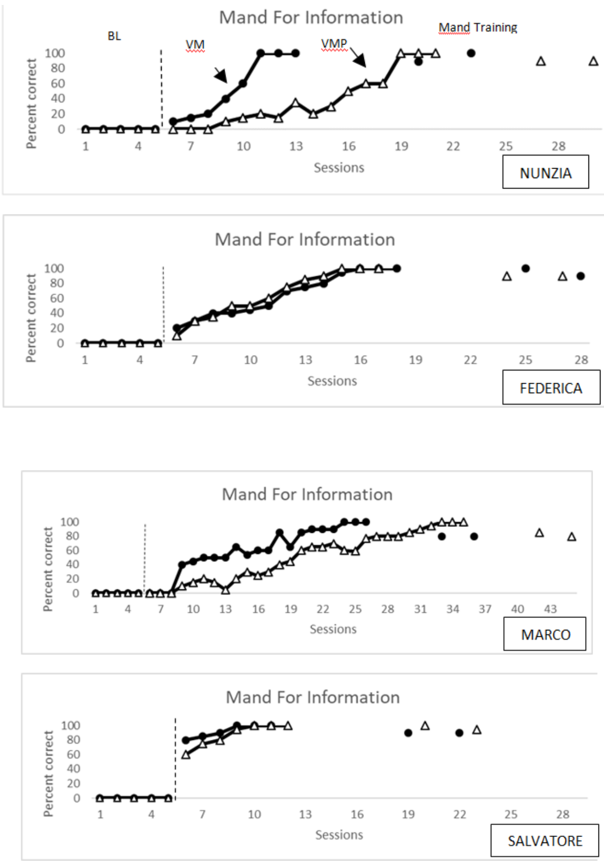

Fig.1 - Percentage of Mand for information completed correctly and independently (without prompt or model) for Nunzia (top row), Federica (second row), Marco (third row), and Salvatore (bottom row). VM= video modeling training; VMP = vocal model prompt training; gen=generalization; mant= manteinance

Results

The figure shows the percentage of correct responses given by the child in absence of any prompts. As regards Nunzia, a more rapid acquisition (fewer trials) revealed for topography trained through the Video modeling. Moreover graph shows also a subsequent increase of the mand teached with vocal model prompt. This result is also replicated for Marco, regardless of the mand topography trained. In the other two cases there was an similar increase in manding skills both during the VM and VMP.

In particular, Nunzia used 13 trials to reach the criterion for the "Where is + object?" mand taught through VM, 21 trials for the "What is?" trained with VMP.Federica engaged 17 trials to achieve criterion for the "What is?" mand, 18 Trials for the "Where is?" mand respectively with VM and VMP.

Marco reached criterion after 27 trials for the "Where is" mand trained through VM and 36for "What is" trained with VMP. Salvatore, finally, showed a similar trend in acquisition of both "What is" and "Where is" mand (11 and 12 trials), trained respectively using VM and the VMP. In particular, Salvatore showed an rapid increase from the early sessions.

With regard to fig. 2, it shows a trend of spontaneous use of mand for information (including all topographies) during home-based treatment phases, where the specific training mand was not done, hence outside specific mand training sessions. All the children showed a gradual spontaneity in use of mand for information during the entire session, generalizing spontaneously to other material with the examiner and in the same context. In generalization tests, on the other hand, the frequency of spontaneous mands in evocative incidental situations with parents and in different contexts was evaluated. The maintenance, indeed, was evaluated after seven days since suspension of treatment. All children showed generalization skills and skill maintenance even after stopping training.

Discussion

The use of Video modeling in its different variants has been included among the best practice for the treatment of children with ASD (Wong et al., 2015). Among the different procedures of VM, currently used for implementation of different skills, (especially daily skills, social skills, and Verbal behavior) in subjects with ASD or /and with intellectual disabilities, the most studied are surely basic Videomodeling in which a model shows the correct behavior or a sequence of correct behavior. Our research wanted to extend results obtained from previous research on the use of Video modeling to teach mand and conversational skills (Charlop and Milstein, 1989; LeBlanc et al., 2003;Nikopoulous and Keenan, 2004) particullary on teaching of mand for information because of the lack of studies on this behavior. Our data showed that both Videomodeling and Vocal model prompt can produce fast improvement in a childs' behavior of mand for information, so these results confirm what previously emerged in the literature regarding VM ability to enhance the learning competence of Verbal behavior (Wert& Neisworth, 2003; Plavnick & Ferreri, 2011). Particullary two subject, Federica and Salvatore had shown similar performance in acquiring the mand both with videomodeling than vocal model prompt, while Nunzia And Marco had shown initial difficulties with vocal model prompt because of they responded to it giving wrong intraverbal response, showing a lack of discrimination of the funcion of speaker verbal beahvior. In these cases videomodeling and the cut-videoprompt that suggest the correct mand would facilitate the execution of the correct tasks.

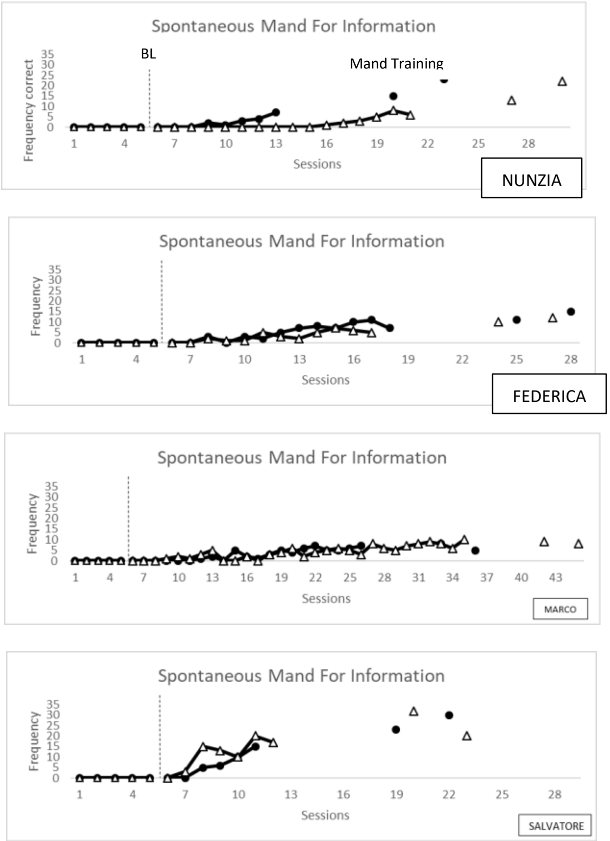

Fig.2 – Frequency of spontaneous Mand for Information Frequenza dei Mand per treatment session (60 minutes) (outside mand training) for Nunzia (top row), Federica (second row), Marco (third row), and Salvatore (bottom row).

Particullary the use of VM has been shown to be more effective than vocal model prompt in subjects with an associated moderate disability that showed lack of discrimination of antecedent stimuli. While it is possible that subjects with higher functional profiles show a discreet facilitation both from the exposure to videomodeling (Lee et al., 2017) than the simply exposure to vocal model prompt, subjects with difficulty in stimulus discrimination process the vocal model prompt as SD for other responses (Intraverbal or Listener) as they had learned in the past. They seems to be facilitated when see all sequence and see the model acting the behavior. In fact, this best performance found in two of four subjects shown when use of VM was implemented, could be justified by a dual information channel. On the hand, VM provided the learner with accurate and consistent exemplars of the target behavior being performed (Hong et. al., 2016), allowing him to get an overall view of the conversational exchanges. On the other hand, the prompt cut focused on the specific response requested by the subject, and it would facilitate evocation of the correct response to a specific Discriminative Stimulus. Moreover, VM would be more facilitating because of would allow the child to observe the contingencies between the antecedents, certain behaviours, and their consequences before finally before experiencing it.

We also wanted to verify the maintenance and generalization in natural contexts. All participants showed a generalization in untrained contexts for the mands learned, when material similar to that employed during training was used. Moreover, they have been able to generalize these skills in the absence of additional prompts with figures other than trainers. All participants showed at least 70% of the percentage of correct responses in the follow-up tests (at 7 days) for the operant considered.

Most studies tested VM to train different skills on adolescent or young adults (Hong et al.,2016; Aljehani & Bennett, 2019; Gardner & Wolfe, 2013). In our study, instead, we considered children aged between 4.5 and 6 years old to verify the effectiveness of VM also on younger participants.

Parents and therapists of observed children have given a strong consensus to the social validity of the skills taught during training, as a socially significant skill for their child. They have found greater easiness in teaching this ability through use of VM, especially in those children of the selected sample, with which vocal model prompt was not effective. The main difficulties observed were found in the preparation of the videos and in the choice of material that must be accurate selected, so as to keep the EO high and strong for the information to be requested, and at the same time it had to be simple to ensure the understanding of the concept associated with questioning. These critical attribute of VM makes it not very ecological and pragmatic to use different from vocal model prompt that can be more fast and smart as teaching strategy for some children. However, VM proved to be very effective with those children who instead showed difficulty in recognizing the function of the trainer vocal model prompt. It could be a question for future research that could investigate under what circumstances and with characteristics of the children, VM could be employed as best teaching strategy for mand for information.

In this regard, future research could be structured towards an invetigation structured on children capability of disciminate the echoic prompt, on the use of video modeling in anticipation of the traditional training for the information mand (Koegel et al., 2014) as a facilitator of the mand for information acquisition.

One of the main limitations of the study derives from the intrinsic difficulties of each information request, due to the understanding of informations and to evocation of its Eo. The training randomization of different operant topographies, among teaching method (VM and VMP) through subjects, tried to control this difficulty. It could be tied to the underlying knowledge necessary for the understanding of the data, even if all the children showed previous capacity in discriminating between persons, places, and objects and the main topological concepts as above, below, inside, and out.

Declarations

FundingThe authors have no funding to disclose

Conflicts of interest/Competinginterests The authors declare that they have no conflict of interest.

Ethics approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Consent to participate Informed consent was obtained from all individual participants included in the study, in the case of children under 16 written informed consent was obtained from the parents.

Consent for publication A written consent to publish was given to author from parents of each partecipant.

Availability of data and material All data generated or analysed during this study are included in this published article (and its supplementary information files). The other data set not available in the article and video modeling and video prompt are available from the corresponding author on reasonable request.

Video modeling to teach Mand for Information in children with Autism, based on Verbal Behavior Approach

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