

Teaching object imitation skills using a modified errorless teaching procedure

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Executive summary

Children with autism show deficits in three broad area- communication, social skills and behaviour deficits. Many learners on the spectrum lack the ability to imitate, considered to be pre-requisite to learning complex language and social interactions (Meshais, et al., 2020). Although imitation skills are prioritised in early intervention programmes, the effectiveness of ABA interventions in increasing these skills is not well researched (Soorya et al., 2003). This study aims at demonstrating the impact of a modified errorless teaching procedure on acquisition of object imitation skills for an early learner in KS2.

Introduction

The pupil is in KS2, is non- vocal and uses an AAC to communicate his needs. He requires partial to gestural guidance to use the AAC and is diagnosed with gross motor deficits thus requiring assistance in dressing and toileting.

The pupil is an early learner whose EHCP goals puts emphasis on generalisation and maintenance of skills. IEP goals focus on acquisition of a range of pre-requisite skills for complex skills that aim to increase his independence and improve his quality of life. Two areas that are prioritised as part of his IEP include imitation with objects and matching items or pictures, as these skills are essential to increase independence in the use of the AAC device, daily living activities and appropriate toy play. Over the past academic year, the pupil has acquired a range of tool skills (i.e., single step responses that form part of multiple step behaviours, such as attaching the Velcro when wearing one's shoes) McGreevy, P., Fry, T., & Cornwall, C. (2012).

However, the pupil's learning history indicates difficulties in generalising and

maintaining learnt skills. To ensure current targets are generalised, generalisation training is included within teaching trials and 2 generalisation test /probes are required as part of mastery criteria. A maintenance probe/test is also conducted after 3 days. To maintain skills, the target is placed within his mastered pile. This study focused on changes to teaching procedures which aided the acquisition of object imitation skills, considered to be building blocks for more complex skill required for independent living (Soorya, et al., 2003).

Method

Discrete Trial Instruction involves teaching single step responses through multiple representations and each correct single response is reinforced. Prompts are implemented to evoke the correct response in order to allow the learner to contact the positive reinforcement. Over the teaching trials, these prompts are faded to allow an independent response. One type of discrete trial teaching is the errorless teaching procedure which involves 4-steps initial prompt or teach, a transfer trial, presentation of mastered skills/ also called as distractors and final probe/test. The aim is to not allow errors and implement prompts to evoke correct target responses and thereby meet contingency of reinforcement (Carbone et al., 2013).

The above mentioned 4-step errorless teaching procedure was implemented to teach two object imitation targets. The effectiveness of teaching was determined through first trial probes conducted each day, prior to teaching the targets across the school day. The cold probe also helped the therapist determine the most appropriate prompt level for errorless teaching. A target was considered mastered when the learner demonstrated the correct response on first probe for 3 consecutive days, and a retention/maintenance probe after 2 days of no teaching. Two trials testing for generalisation of the response with novel person, setting or material were also conducted. The data indicated that the pupil was inconsistent in responding on first trial probes. Following an observation of the teaching and analysis of errors and data, it was noted that the pupil was looking away after the first step of teaching procedure and the prompts could not be faded as a result. A change in the errorless teaching steps was implemented to allow gradual fading of physical guidance while maintaining the pupil's motivation to actively respond and participate in learning. The prompt hierarchy was also altered to most to least intrusive prompts., starting with full physical guidance and gradually reducing the physical support to partial and then gestural guidance. Two additional steps were added into

the errorless teaching procedure, one trial each at the initial prompt/teach and transfer trial steps, thus providing the learner increased opportunity to practice a skill prior to prompt fading (See Appendix A).

Each trial where the pupil responded to the physical guidance was reinforced differentially with a tangible or edible chosen by the pupil (preference was determined prior to starting a teaching trial). This preferred item was delivered in varying quantities for correct responding dependent on the level of physical guidance required i.e., when full physical guidance was required a smaller/ lesser quantity of the preferred item was delivered and larger quantity delivered when therapist was able to fade prompts to partial physical guidance or gestural guidance. (See Appendix A). A time delay on most to least prompting on the final probe/test trial of the errorless teaching procedure was also included. Furthermore, to compete with pupil's loss of motivation, the frequency of reinforcement was increased to every trial with a current target presentation.

Results

Results for both targets indicated that the changes in the teaching procedure were effective. As seen in Figure 1, of the three targets, 1 (squeeze sponge) was mastered quicker. The remaining 2 targets (peel sticker and index finger in playdoh) required greater number of teaching trials owing to the fine motor skill required to imitate the target action i.e., pincer grip for peeling sticker and isolating the index finger for placing into the playdoh. The fourth target introduced 'pour kettle' was taught using the modified errorless teaching procedure from the outset and required fewer teaching trials as evidenced by the mastery date. A savings effect is thus demonstrated with the change in teaching procedure. The progress on the overall IEP goal following the intervention is also evidenced on the Program at Glance monitoring system used to indicate progress towards IEP goals (Figure 2). The above results are consistent with research by Fentress and Lerman (2012), which demonstrated that most to least prompting resulted in fewer errors. The increased teaching opportunity provided by additional presentation of the target at step 1 and 2 of the

References

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errorless teaching procedures incorporated the procedures associated with Mass Trial Teaching, which has shown to increase acquisition in early learners and allows the therapist to fade prompts systematically and consistently.

Furthermore, the above changes to teaching procedure were also implemented to another IEP goal for the learner-matching identical pictures (See Appendix B). Results in Figure 3 show that the change was effective, and the target was mastered after meeting the generalisation and maintenance probes. The application of the teaching procedure to another skill (identical matching) and the corresponding mastery of the skill replicated the results of the program change.

Discussion

The learner benefitted from the intervention, and this was observed across the targets within the IEP goal of object imitation as well as to another 'learn to learn' skill-matching. The results are in line with existing research regarding the effectiveness of most to least prompting in reducing learner errors (Libby, Weiss, Bancroft, and Ahearn,2008). While errorless teaching procedure uses prompts to evoke the correct response, the prompts are delivered by the therapist after completing the model, resulting in an inherent delay (Deshais, Phillips, et. al, 2020). Furthermore, most to least prompting can create prompt dependency (Cooper, Heron and Heward, 1987). A concurrent prompting procedure should be trialled to further improve acquisition rates.

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McGreevy, P., Fry, T., & Cornwall, C. (2012). Essential for Living. Orlando: McGreevy.

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Figure 1- Skills Tracker- VBB-MAPP Imitation 6-d

Target Skill	Date Introduced/ Known	Date Mastered
Squeeze sponge	10.10.19	13.11.19
Peel sticker	10.10.19	6.12.19
Index finger in play-doh	10.10.19	6.12.19
Stir food in pan	known	
Pour kettle	22.11.19	6.12.19
Spoon in cup		
Cup to mouth		

Figure 2- Program at Glance

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
				30.09.19	07.10.19	14.10.19	Half term	20.10.19	4.11.19	11.11.19	18.11.19	25.11.19	2.12.19	09.12.19	16.12.19
	Cognition and learning														
VB-MAPP Visual 6-g: Matches identical objects or pictures that are different sizes in a messy array of 6, for 10 items	1/1W Probe first and Last	4 new targets. Acquisition criteria: 3/3 on first and last probe of the day plus Yes on retention probe after 2 days, followed by 2 generalization probes.										program change			
VB-MAPP Imitation 6-d: Imitates actions with a specific object selected from an array of 3	1/1W Probe first and Last	3 targets. Acquisition criteria: 3/3 on first and last probe of the day plus Yes on retention probe after 2 days, followed by 2 generalization probes.											06.12.19		
	Communication and interaction														

Figure 3- Skills Tracker- VB-MAPP Visual 6g

Target Skill	Date Introduced/ Known	Date Mastered
Plate 3d-3d of variant size	03.06.19	07.06.19
Red wood block 3d-3d of variant size	03.06.19	11.06.19
Spoon 3d-3d of variant size	03.06.19	12.06.19
blue legs 3d-3d of variant size	10.06.19	known
book 3d-3d of variant size	11.06.19	17.06.19
bowl 3d-3d of variant size	12.06.19	18.06.19
Engine 3d-3d of variant size	17.06.19	19.06.19
Trampoline 2d-2d of variant size	19.06.19	12.07.19
Toilet 2d-2d of variant size	19.06.19	5.12.19
Bottle 2d-2d of variant size	19.06.19	24.06.19
Crisps 2d-2d variant size	25.06.19	12.07.19
Tree 2d-2d of variant size	15.07.19	5.12.19
Lunchbox 2d-2d of variant size	15.07.19	5.12.19

Appendix A

SUPERVISOR PROGRAMME CHANGE FORM

Learner: Date: 12.10.2019 Tutor:
 Programme: VB-MAPP Imitation 6-d Imitates with objects
 Target: All current targets

Antecedent: Stimulus Control/Motivation	Consequence: Reinforcement/Extinction/Punishment
<p>CHECK THOSE APPROPRIATE</p> <ul style="list-style-type: none"> ▪ Increase pairing ▪ Reduce the number of demands (Decrease VR) ▪ Provide higher rate of interspersing mastered skills with target skills ▪ Decrease the response effort ▪ Further reduce errors: Modify prompt procedure and prompt fade procedure ▪ Change the pace of instruction (ITI) ▪ Decrease session time ▪ Conduct a Sr+ assessment ▪ Increase the saliency of Sr+ ▪ Change the field of the stimuli ▪ Increase the number of teaching trials ▪ Change the physical environment ▪ Change the aim ▪ Teach pre-requisites skills ▪ Decrease the number of goals/objectives ▪ Build MO by deprivation of specific reinforcers ▪ Change the teaching procedure ▪ Other: 	<p>CHECK THOSE APPROPRIATE</p> <ul style="list-style-type: none"> ▪ Provide more valuable reinforcer ▪ Provide higher rate of reinforcement (lower VR) ▪ Reinforce immediately ▪ Provide greater magnitude of reinforcement ▪ Reinforce on transfer trials ▪ Better use of extinction ▪ Improved implementation of Differential Reinforcement ▪ Consider punishment contingency: Check with supervisor ▪ Other:

Brief Description of the Reasons for the Programme Change:

The learner is erroring on imitation with objects. Data indicates variability and no consistent responses on the three current targets. He repeats the action that is probed/taught first and looking away after first teaching trial (Teach of errorless teaching procedure).

Description of the Programme Change including why you chose the antecedent/consequence change:

Following observation and analysis, the following change is recommended in the teaching procedure:

- Initial prompt/Teach: Present target instruction and prompt the correct response using most to least intrusive prompt. Differentially reinforce i.e., provide a small quantity of edible (e.g., ½ cereal) for correct responding
- Initial Prompt/Teach 2: Present target instruction and prompt the correct response using most to least intrusive prompt. Differentially reinforce i.e., provide a small quantity of edible, for correct responding
- Transfer trial: Present target instruction and prompt the correct response using most to least intrusive prompt, fading an element of the prompt. Differentially reinforce for successful prompt fading.
- Transfer trial 2: Present target instruction and prompt the correct response using most to least intrusive prompt, further fading an element of the prompt. Differentially reinforce for successful prompt fading.
- Distractors: Present 1-3 distractors
- Final Probe: Present target instruction and allow 1-2 second for independent responding. Use most to least intrusive prompt to prevent errors. Differentially reinforce for correct responding.

Other antecedent manipulations to prevent errors

- Begin with pairing and manding.
- Establish motivation for a highly preferred item prior to placing demand.
- Maintain a fast pace of instruction.

Appendix B

SUPERVISOR PROGRAMME CHANGE FORM

Learner: Date: 25.11.19 Tutor:

Programme: VBMAPP Visual 5M- Matches Identical objects

Target: All current future targets

Antecedent: Stimulus Control/Motivation	Consequence: Reinforcement/Extinction/Punishment
<p>CHECK THOSE APPROPRIATE</p> <ul style="list-style-type: none"> • Increase pairing • Reduce the number of demands (Decrease VR) • Provide higher rate of interspersing mastered skills with target skills • Decrease the response effort • Further reduce errors: Modify prompt procedure and prompt fade procedure • Change the pace of instruction (ITI) • Decrease session time • Conduct a Sr+ assessment • Increase the saliency of Sr+ • Change the field of the stimuli • Increase the number of teaching trials • Change the physical environment • Change the aim • Teach pre-requisites skills • Decrease the number of goals/objectives • Build MO by deprivation of specific reinforcers • Change the teaching procedure • Other: 	<p>CHECK THOSE APPROPRIATE</p> <ul style="list-style-type: none"> • Provide more valuable reinforcer • Provide higher rate of reinforcement (lower VR) • Reinforce immediately • Provide greater magnitude of reinforcement • Reinforce on transfer trials • Better use of extinction • Improved implementation of Differential Reinforcement • Consider punishment contingency: Check with supervisor • Other:

Brief Description of the Reasons for the Programme Change:

The learner is erroring on identical matching. Data indicates variability and no consistent responses on the three current targets.

Description of the Programme Change including why you chose the antecedent/consequence change:

Following observation and analysis, the following change is recommended in the teaching procedure:

- Initial prompt/Teach: Present target instruction and prompt the correct response using most to least intrusive prompt. Differentially reinforce i.e., provide a small quantity of edible (e.g., ½ cereal) for correct responding
- Initial Prompt/Teach 2: Present target instruction and prompt the correct response using most to least intrusive prompt. Differentially reinforce i.e., provide a small quantity of edible, for correct responding
- Transfer trial: Present target instruction and prompt the correct response using most to least intrusive prompt, fading an element of the prompt. Differentially reinforce for successful prompt fading.
- Transfer trial 2: Present target instruction and prompt the correct response using most to least intrusive prompt, further fading an element of the prompt. Differentially reinforce for successful prompt fading.

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- Distractors: Present 1-3 distractors
- Final Probe: Present target instruction and allow 1-2 second for independent responding. Use most to least intrusive prompt to prevent errors. Differentially reinforce for correct responding.

Other antecedent manipulations to prevent errors

- Begin with pairing and manding.
- Establish motivation for a highly preferred item prior to placing demand.
- Maintain a fast pace of instruction.