

PROVIDING AN ECHOIC MODEL IN TESTS FOR STIMULUS EQUIVALENCE TO INCREASE CORRECT RESPONSES TO TRIALS

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The current study examined the effects of three experimental conditions on the acquisition of symmetry relations. Participants were presented with a match-to-sample test for the emergence of symmetry relations when the vocal antecedent 'match' was presented in condition 1, 'match (name) with (name)' was presented in condition 2 and 'match (name) with (name)' along with an echoic of the name emitted from the participant in condition 3. Participants were taught to match A-B and A-C and then tested for the emergent relations B-C and C-B. Participants comprised of five males aged between 10 and 14 years of age, all with a diagnosis of an autism spectrum disorder, who attended a CABAS® school in England. Results showed that correct responding increased in condition 2 for all participants although not to criterion levels and that 4 out of 5 participants achieved criterion levels for the emergence of symmetry relations when the echoic was emitted by the participant.

Literature review

- Stimulus equivalence is demonstrated when a participant accurately responds to an untrained stimulus displaying the properties of reflexivity, symmetry and transitivity' (Eikseth & Smith, 1992; Sidman et al. 1982).
- Reflexivity is demonstrated when participants without direct training, are able to match a stimulus of a potential category to a matching stimulus.
- 'Symmetry is shown when the sample and comparison stimuli in a match to sample discrimination can be reversed and have the same function' (Eikseth and Smith, 1992, page 123)
- Lastly, transitivity is classed as when a participant is directly taught using learn units (Greer & McDonough, 1999) to match. For example A1 to B1, then the participant is taught B1 to C1. They are then probed if they can match A1 to C1 without being taught directly and no consequence. (Eikseth and Smith, 1992)
- Jackson et al (2013) tested three conditions with three males aged 8-14 years old diagnosed with an autism spectrum disorder. The three conditions were match, match (name), match (stimuli name) with an echoic of the stimuli required from the participant. Each participant was taught A-B and A-C, once criteria was met, the untrained relations were probed B-A and C-A. The results showed that two of the participants for symmetry for the condition when an echoic was provided.

Method

Participants

- Five participants took part in this study; their ages ranged from 10 - 14 years old across three different classes. They all attended a CABAS® School, a school for children with an autism spectrum disorder.
- The table below displays individual verbal behaviour for each participant.

Participant	Level of Verbal behaviour	National Curriculum levels and exemplar programs	Capabilities present-transformation of stimulus function across mands and tacts
1	Emergent reader, emergent writer, speaker and listener.	P7- follows instructions containing four key words	Y
2	Emergent reader and emergent writer, speaker and listener.	P6-follows instructions containing 3 key words including 2 adjectives and a noun.	Y
3	Emergent reader, listener, speaker and pre-writer.	P5- answers question to what and who.	Y
4	Reader, speaker, writer and listener.	P5-follows 1 step instruction containing 2 key words.	Y
5	Reader, speaker, writer and listener.	P7- completes a sentence.	Y

Setting

- The study was replicated at Jigsaw CABAS® School; opening hours were 9:15 am to 3:45 Monday to Friday.
- The study was conducted in quiet rooms in the school including the lunchroom, empty classrooms and the common room. Each room had table and chairs within whereby the participant sat opposite or adjacent the experimenter.

Materials

- The target stimuli were presented on 5cm x5cm in black and white. The stimuli were contrived and individual.
- During the study 6 sets were resourced with 2 targets per set; participants only targeted 2 stimuli per set.

Targets and sets

Set 1	Set 2	Set 3	Set 4	Set 5	Set 6
Pez and zog	Faj and Fip	Haz and not	Buk and tep	Dill and Vek	Com and Hus

Definition of behaviour

The dependent variable in this study was responses to trials in the test for stimulus equivalence. A-C and A-B relations were taught and once the pupil met criterion, C-A, B-A, B-C and C-B were probed (see Figure 1).

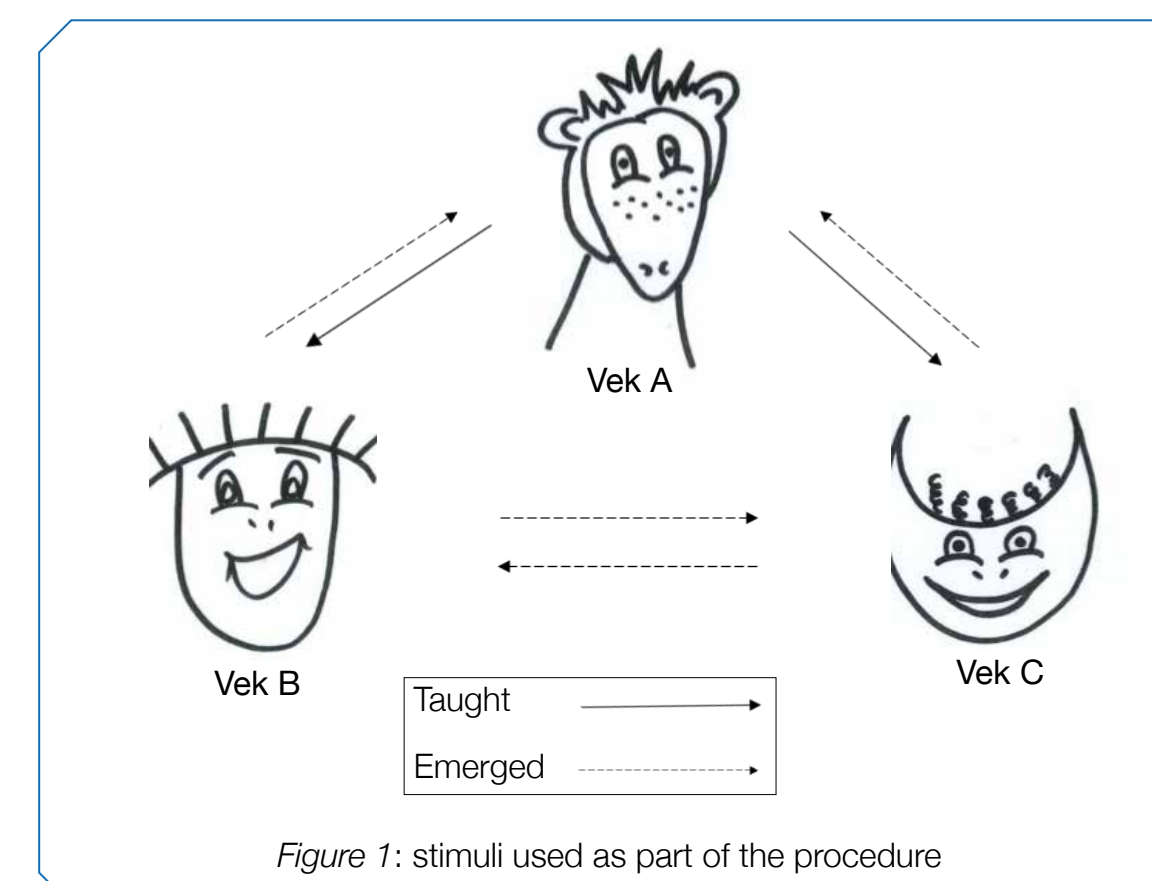


Figure 1: stimuli used as part of the procedure

Data Collection

- Data were collected in teaching sessions through learn units (Greer & McDonough, 1999) as event recording. Each session comprised of 10 learn unit presentations. If the pupil scored 10/10 the first time this was scored as criterion or if the pupil scored 9/10 across two consecutive sessions this was scored as criteria.
- Pure Probes were conducted at the beginning of the study, with criteria of 90% (27 out of 30 trials).

Procedure

Probe

- For each condition a pure probe for naming each stimulus were conducted for each participant. Next a pure- probe was conducted for A-B, A-C, B-A, C-A, B-C and C-B for 5 sessions before and after teaching sessions.
- The stimuli were presented on the table in a field size of two; a foil was presented from another set. Within this pure probe, the participant was handed the stimuli and given the vocal antecedent 'match'. No consequence was given.
- The data were recorded as a + for a correct response or - for an incorrect response.

Training

- In training sessions, the participants were provided with learn units for A-B for set one. A foil was present again from the other category group (Pez) in a field size of two. The experimenter gave the vocal antecedent 'match' the participant then matched the stimuli correctly. A consequence was provided of reinforcement or a correction. The correction procedure remained consistent throughout the training conditions.
- Criteria were set for 9/10 across two consecutive sessions or 10/10 correct responses for one session. Once the participants met criteria on this condition the participants were trained in A-C relation in the same way.
- Once this was at criterion levels, the second condition involved the pupil matching A-B when given the vocal antecedent 'match_' where they were provided with the name of the stimuli, the participant was required to match correctly and any occurrences of echoic behaviour was recorded. The criteria remained at 9/10 across two consecutive sessions or 10/10 correct responses for one session.

Procedure (cont)

- Again once criterion was met, A-C was taught in the same way. The third condition involved matching A-B and an echoic of the stimuli was given, the antecedent was 'match_' and an echoic. For this condition if the echoic from the participant was not correct this was marked as incorrect, regardless if the matching was correct. Criteria were set for 9/10 across two consecutive sessions or 10/10 correct responses for one session. Once the participants met criteria on this condition the participants were trained in A-C relation in the same way.

Post probe

- When criterion was met for A-B and A-C the untaught relations were probed for B-A and C-A for 5 sessions in the same procedure as the pre-probe.

Design

This study used a counterbalanced multiple probe design

Inter-observer agreement

- IOA was collected by having a second observer record data alongside but independently from the experimenter.
- An agreement was recorded if both observers recorded the same response (either correct + or incorrect -).
- The total number of agreements was then divided by the total number of agreements and disagreements and multiplied by 100.
- IOA was calculated for 43 out of 45 sessions and agreement ranged between 97%-100%.

Results

- Results show that none of the participants responded correctly at criterion levels (90% accuracy, 27 out of 30 correct responses to trials) for the emergence of symmetry relations when the yoked learn unit for the echoic was not present.
- Overall, correct responses to trials for each participant were lowest in condition 1 where the antecedent was the presentation of the picture along with the vocalisation 'match' and out of 30 opportunities to respond participants 1 to 5 answered correctly to 23, 17, 12, 18 and 19 trials respectively.
- In condition 2, correct responses increased when compared to condition 1 for each participant when the names of the stimuli were presented as part of the antecedent. Correct responses to trials for participants 1-5 were 26, 22, 19, 23 and 20 respectively. However, despite an increase in correct responses for all participants when compared to condition 1, none of the participants responded at criterion levels for this condition.
- Finally, in condition 3 where the addition of the yoked learn unit for the echoic was present four out of five participants reached criterion levels. Correct responses to trials for participants 1 to 5 were 29, 26, 28, 28, 29 respectively. Although participant 2 did not reach the pre-determined criterion levels.

Discussion

- These results therefore provide further support to the findings obtained by Eikseth and Smith (1992) and Saunders (1990).
- The study has some limitations that could be addressed in future research. Primarily, in terms of procedural limitations it could be postulated that the order of the testing for each participant should have been counterbalanced to account for any practice effects.
- To conclude, the results of this study demonstrate that when the name was provided along with the participants emitting an echoic response correct responding increased to criterion levels for four out of the five participants.

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