Teaching individuals with autism receptive labeling skills involving conditional discriminations: A comparison of mass trial and intermixing before random rotation, random rotation only, and combined blocking[☆]

Elizabeth J. Holmes [a,b], Svein Eikeseth [c,*], Kimberly A. Schulze [a]

[a] Department of Community Psychology, Counseling, and Family Therapy, St. Cloud State University, United States
[b] UK Young Autism Project, United Kingdom
[c] Department of Behavioral Science, Oslo and Akershus University College, Norway

A B S T R A C T

This study compared the efficacy of three different discrimination training procedures for teaching receptive labeling skills involving conditional discrimination to two adults and one child with autism, using an adapted alternating treatment design. The three training procedures were; Structured Mix before Random Rotation, Random Rotation Only, and Combined Blocking. Across participants, the Random Rotation Only procedure was most effective, followed by the Structured Mix before Random Rotation procedure, and the Combined Blocking procedure. For two of the participants, the Combined Blocking procedure produced the lowest percentage of error trials, and for all three participants, the Random Rotation Only procedure was associated with the highest percentage of error trials. Maintenance probes demonstrated that labels in each condition were maintained across two weeks.

© 2014 Elsevier Ltd. All rights reserved.

1. Introduction

Discrimination and stimulus control are fundamental processes underlying the acquisition of virtually any important behaviors such as communication, social skills, play, and academic performances. Some of the seminal work on stimulus control and discrimination training in applied settings was conducted in the 1960s and 70s by Lovaas, Schreibman and colleagues, when they developed and evaluated procedures to teach communication and imitation to individuals with autism (Lovaas, 1977; Lovaas & Newsom, 1976; Lovaas & Schreibman, 1971; Lovaas, Berberich, Perloff, & Schaeffer, 1966; Schreibman, 1975). Today, procedures to establish discrimination and stimulus control are a fundamental part of any contemporary behavioral intervention program, and analysis shows that relatively simple skills (e.g., receptive identification of objects) may involve rather complex discriminations (Eikeseth, Smith, & Klintwall, 2014).

Lovaas (2003) outlined a discrimination training procedures designed to break down the discriminations into multiple, less complex steps, and to introduce steps to gradually increase the complexity of the task as the simpler discriminations are acquired. When teaching receptive labeling of objects, for example, the first step (Step 1) outlined by Lovaas (2003) involved placing only one object on the table (without any distractors). The teacher then names it, and a correct response is to identify (e.g., by pointing, touching or giving to the teacher) the object named by the teacher within three-to-five seconds after hearing its name. The stimulus (or stimuli) on the table is called comparison stimulus (i) and the name spoken by the teacher is called the sample stimulus. This training continues until mastery (see below). Next (Step 2), the first comparison stimulus is removed and a second comparison stimulus is placed on the table. The teacher then names it, and training continues until mastery. In Step 3, both objects (comparison stimuli) are placed on the table and the teacher names object 1 only until mastery. In Step 4, both objects are again placed on the table and the teacher now names object 2. Mastery criterion for Steps 1 through 4 is 90% correct responding when the right left position of the objects on the table is semi random (when only one object is present (Steps 1 and 2), the left right position of this object varies across trials). These steps are labeled *Mass Trial*.

In Step 5, both comparison stimuli are placed on the table, and mastery requires correct responding when the right left position of the comparison stimuli on the table is semi random. In Step 5^4, the teacher names object 1 until *four* correct consecutive responses occur. Next, the teacher names object 2 until *four* correct consecutive responses. In Step 5^3, the teacher names object 1 until *three* correct consecutive responses, and sample stimulus 2 until *three* correct consecutive responses are emitted. In Step 5^2, the teacher names object 1 until *two* correct consecutive responses and object 2 until *two* correct consecutive responses. This step is labeled *Intermixing of Stimuli* (Lovaas, 2003).

The 6th and final step is called *Random Rotation* (Lovaas, 2003). Here, both comparison stimuli are placed on the table, the left right position across trials is random, and objects 1 and 2 are named in a semi random order across trials, until 90% mastery is achieved.

Researchers have questioned whether the initial two training steps where the target comparison stimulus is presented without a distractor is necessary, or if training should start with the target comparison stimulus together with a distractor comparison stimulus. This possibility was examined by Gutierrez et al. (2009) when teaching receptive labeling skills to three preschool aged children with autism, using an adapted alternating treatment design. Their listening repertoire was not reported, but all three participants were able to speak single words communicatively. Results showed that the participants required more training when the procedure incorporated the use of the no distracter training steps. The author noted, however, that this finding could be attributed to the inclusion of the no distracter steps, since this incorporates additional trials to achieve mastery. In any case, the results clearly indicate that the inclusion of the steps without the distractor did not enhance the rate of acquisition of the receptive labeling skills.

Other investigators have suggested that all of the steps involving Mass Trial and Intermixing of Stimuli should be omitted, and that training should start with Random Rotation. This is because during Mass Trialling and Intermixing of Stimuli, the learner may achieve a high level of correct responding without discriminating the sample stimulus (i.e., the object names spoken by the teacher), and as a consequence, faulty stimulus control may emerge (Green, 2001). To avoid this, it has been suggested that training should start with Random Rotation because correct responding during this condition requires discrimination of both the sample and comparison stimuli. Grow, Carr, Kodak, Jostad, and Kisamore (2011) examined this possibility while teaching receptive labels to three children with autism, using an adapted alternating treatment design. Results showed that the Random Rotation Only procedure was effective for seven of the eight training sets across participants, whereas the mass trial and intermixing stimuli before Random Rotation procedure was effective for four of the eight training sets. Furthermore, the mass trial and intermixing stimuli before Random Rotation produced error patterns that required additional training components during four of the eight training sets. Error patterns also occurred initially during the Random Rotation Only procedure, but the participants subsequently acquired the discriminations without the additional training components. At three-week follow-up, better maintenance was observed for the Random Rotation Only procedure as compared to the mass trial and intermixing stimuli before Random Rotation procedure in four of the eight training sets, and similar levels were observed for the other four training sets.

A different procedure designed to establish discrimination of both the sample and the comparison stimuli, and hence to facilitate the acquisition of conditional discrimination has been called Combined Blocking (Williams, Perez-Gonzalez, & Queiroz, 2005). This procedure builds on research by Saunders and Spradlin (1989, 1990, 1993), Smeets and Striefel (1994), and Perez-Gonzalez and Williams (2002). The participant in the Williams et al. (2005) was a 14-year old boy with autism. He could request items using sentences (e.g., "I want to eat candy"), name more than 60 objects and actions, but had a history of failing to learn receptive colors. His score on the Peabody Picture Vocabulary Test was 2.2 years. Results indicated that the Combined Blocking procedure was effective in teaching color discrimination.

The Combined Blocking procedure was as follows: Steps 1 through 3 involved presenting the sample stimuli (i.e., "black" and "white" spoken by the teacher) in blocks of trials, while the location of the comparison stimuli (a black card and a white card) was always fixed: During Step 1, the experimenter asked the child to touch the same color until the child produced 10 consecutive correct responses. Then the experimenter asked the child to touch the other color until 10 consecutive correct responses. This procedure was repeated until the child gave 10 consecutive correct responses in each of four consecutive blocks (i.e., 10 correct trials with white, 10 with black, 10 with white, and 10 correct trials with black). The procedure in Step 2 was identical to that of Step 1, except that blocks were 5 trials instead of 10 trials. Mastery was defined as correct responding to 30 consecutive trials (i.e., 5 correct trials with white, 5 with black, 5 with white, and 5 correct trials with black). Step 3 was identical that of Step 2, except that requests to touch colors changed after either two or three trials, randomly.