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Induction of naming after observing visual stimuli and their names in children with autism

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ABSTRACT

A novel procedure to induce pairing naming, considered the emergence of tacts and selection of pictures after observing names and its corresponding pictures without specific consequences, was probed in 4 persons with autism who lacked this capability with a multiple probe design across participants. Five pictures were selected per set. The participants observed the pictures on a computer screen while the experimenter said the name of the picture. Then, the emission of untaught uninstructed tacts of the pictures was tested without reinforcement. The cycle was repeated until a criterion of 90% correct responses was achieved. Thereafter, in probes without reinforcement, the participants tacted the pictures without specific instructions and also when asked to name them, and selected the correct picture upon hearing their names. The procedure was repeated with two additional stimulus sets and the probed relations emerged always. Two children showed the emergence with fewer trials across sets, which indicate emergence induction. Thus, the procedure served to test whether the pairing naming capability was missing and induced the capability. The results may have important utility in teaching persons diagnosed with autism and other learning difficulties and for accelerating learning in all children.

1. Introduction

Naming is a verbal capability that consists of tacting an object and selecting it upon hearing its name derived from previous exposure to the object and the name (Horne & Lowe, 1996). Naming is essentially an overarching operant (e.g., Catania, 1998; Miguel & Petursdottir, 2009) in the sense that, (a) after a child is explicitly taught to tact an object, the operant consisting of selecting it upon hearing its name emerges (in other words, it appears without any explicit learning) or that (b) the tact emerges after learning to select the object upon hearing its name. In order to be considered as having the naming capability, a child must show the emergence of the tact and the object selection with different objects. The acquisition of this overarching operant allows the acquisition of the two operants after learning one. The acquisition of the naming capability may be the critical factor responsible for the rapid acquisition of the "vocabulary explosion" at about three years of age (Crystal, 2006; Hart & Risley, 1995; Horne & Lowe, 1996), because children may learn the two operants that define the name–object relations after little exposure to the two stimuli together. According to Horne and Lowe, naming is responsible for basic phenomena such as stimulus equivalence (e.g., Sidman & Tailby, 1982 – however, many researchers disagree with this

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interpretation; see the special issue of the Journal of Experimental Analysis of Behavior that included Horne and Lower's paper and comments on it) and categorization (Horne, Hughes, & Lowe, 2006; Horne, Lowe, & Harris, 2007; Horne, Lowe, & Randle, 2004; Lowe, Horne, Harris, & Randle, 2002; Lowe, Horne, & Hughes, 2005; Mahoney, Miguel, Ahearn, & Bell, 2011; Miguel, Petursdottir, Carr, & Michael, 2008). While there may be questions and inconsistency in findings about the relation of naming to equivalence and categorization, it is clear that naming appears to be a verbal behavior developmental capability that allows children to learn language incidentally (e.g., Feliciano, 2006; Gilic, 2005; Gilic & Greer, 2011; Greer & Longano, 2010; Greer & Speckman, 2009; Greer, Stolfi, Chavez-Brown, & Rivera-Valdez, 2005; Greer, Stolfi, & Pistoljevic, 2007).

Two studies have shown that some types or components of naming appear in typically-developing children before the age of two years: Lipkens, Hayes, and Hayes (1993) demonstrated naming with a 19-month old boy using drawings of common objects. Luciano, Gómez, and Rodríguez (2007) demonstrated that a 23-month old girl demonstrated initial instances of this capability with 3-dimensional objects presented one by one. Several researchers have studied the acquisition of naming. Pérez-González and Williams (2000) found that children with autism who received early intensive behavioral interventions did not demonstrate object selections after learning tacts or vice versa at an initial stage; thus, they did not have acquired the naming capability. After several months of intervention, they demonstrated the emergence of object selections after learning tacts, but they did not demonstrate the emergence of tacts after learning object selections; thus, they had the listener component of naming but they lacked the speaker component of naming (Greer & Ross, 2008). After additional months receiving the behavioral intervention, however, they demonstrated the emergence of each operant after learning the other operant, which are the two components of naming. Thus, the naming capability was acquired coincidentally with an early intensive behavioral intervention in children with autism. See similar results with unreinforced probes by Wynn and Smith (2003).

The studies cited above demonstrated the acquisition of naming but they did not identify the factors that facilitate its emergence, or how to promote naming in children who lack this capability. This was, however, the specific goal of a number of studies conducted within one program of research (e.g., Fiorile & Greer, 2007; Gilic, 2005; Gilic & Greer, 2011; Greer et al., 2005, 2007; Hawkins, Kingsdorf, Charnock, Szabo, & Gautreaux, 2009; Longano, 2008). These researchers developed a procedure that basically consisted of teaching identity matching to sample, object selection, uninstructed tacts, and instructed tacts (pure and impure, respectively – Greer & Ross, 2008, p. 63), with the same objects – a multiple exemplar instruction (MEI) – that resulted in the appearance of naming. After teaching 1–3 sets of five stimuli with this procedure, they observed that children with language delays demonstrated naming when probed with the original set they could not name at the start of the study as well as with novel sets of stimuli. In other words, the MEI procedure served to promote, or induce, the naming capability.

Of special importance is the fact that a child is initially unable to show a specific type of emergence and, after an elaborated procedure, the child shows that type of emergence (such as those just explained or in any type of emergence). Because the capacity of showing the emergence makes a significant difference in the way the child learns, the procedures that lead to demonstrate that type of emergence in a generalized way are crucial. The term *induction* is useful to describe the teaching procedures and the learning processes that are at work from the moment at which a child does not show a particular type of emergence to the moment at which the child demonstrates that emergence, in a generalized way, with any stimulus of a sort, after learning the corresponding abilities.

More recently, Hawkins et al. (2009) and Longano (2008) added an echoic component to the MEI procedure to test the role of the echoic in the induction of naming. The echoic component consisted of teaching participants to match cards with identical cards with an echoic response requirement: On each trial, the teacher gave a sample card and said the name of the picture in the card, and waited for the child to echo the teacher's response before allowing the child to select the identical comparison (e.g., the teacher gave a card with a horse and said "match horse with horse" and waited for the child to repeat "horse"). Hawkins et al. and Longano demonstrated that children who initially failed to demonstrate naming with the MEI procedure demonstrated naming after the echoic procedure was added by scoring high in probes of uninstructed tacts and instructed tacts and object selection. Thus, the echoic component increased the effectiveness of the MEI procedure for those children for whom the MEI training alone did not result in naming.

It is likely that the interactions among parents and children in typically developing children are similar to the processes used in the studies described above. It is also very likely that later on in development children can learn at a quicker pace and with fewer instructional components than with those used in these studies. Greer and Ross (2008) pointed out that a typically-developing child can observe an adult saying the name of an object and after just this observation both the tact and the object selection emerge without further teaching. This leads to a more complex form of naming that allows the child to learn quite faster than with the sophisticated procedures used in the studies explained above. For the purposes of the present study, this form of naming will be referred to as *pairing naming* (Pérez-González, Cereijo-Blanco, & Carnerero, 2014; Pérez-González, García-Conde, & Carnerero, 2011) or *full naming* (Greer & Ross, 2008, p. 149) in contrast with the form of naming in which a component is taught and the other is probed, which will be referred to as *tact–selection teaching naming*. Although we consider tact–selection teaching naming and pairing naming as two different capabilities, we are going to refer to them as two procedures that result in naming.

To better illustrate the concepts of *tact–selection teaching naming* and *pairing naming*, it is necessary to consider the following: First, naming as defined by Horne and Lowe (1996) is a capability that refers to the generalized emergence of two related operants – the tact and the object selection (see Fig. 1, top panel). In practical terms, the key characteristic is that if a person learns an operant (for example, with a typical discriminative procedure that includes reinforcement), then the other