Teaching picture naming to two adolescents with autism spectrum disorders using systematic instruction and speech-generating devices

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ABSTRACT

We evaluated an intervention aimed at teaching two adolescents with autism spectrum disorders (ASDs) to name pictures using speech-generating devices (SGDs). The effects of intervention were evaluated in two studies using multiple-probe across participants designs. Intervention—consisting of time delay, least-to-most prompting, and differential reinforcement—was implemented to teach the participants to select icons from the SGD that corresponded to images they were shown and asked to name. Intervention was associated with an increase in correct picture naming for both students. Students learned to name 12 pictures in response to both open-ended (*What do you see?*) and closed-ended (*What is this?*) questions in Study 1 and learned to name another set of 18 pictures in Study 2. These results suggest that use of systematic instructional procedures and SGD technology may enable students with limited speech to participate in, and benefit from, this common educational activity.

1. Introduction

Picture naming is a common educational activity that is often used to teach new vocabulary and develop pre-literacy skills (Stoner, Beck, Dennis, & Parette, 2011). For example, the teacher might show students line drawings or photographs and ask *What is this?* or *What do you see?* Correct responses are typically followed by praise (*Yes, that's right.*), whereas incorrect selections and non-responses might be followed by corrective feedback and prompts (*No, this is a stop sign. Say stop sign.*). Acquisition of such picture naming responses is an important educational priority that might impact on students' overall language development (Snow, 2007).

Unfortunately, students with autism spectrum disorders (ASDs) may be excluded from such activities if they lack the ability to respond consistently with intelligible speech. To overcome this potential barrier to participation, it may be

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possible to teach such students to respond using alternative forms of communication, such as a speech-generating device (SGD). For example, when shown a picture of a penguin and asked *What is this?*, the student could be taught to select the corresponding [but not necessarily identical] icon from the SGD display and thereby produce relevant, albeit synthetic, speech-output (e.g., "*It's a penguin.*"). Such teaching scenarios involve conditional discriminations (or non-identity matching tasks) that are typically required for effective use of SGDs, but often difficult to teach to children with ASD (Duker, Didden, & Sigafoos, 2004; Reichle, York, & Sigafoos, 1991).

Fortunately, several studies have demonstrated successful procedures for teaching students with ASD and limited language ability to use SGDs as an alternative communication mode (see van der Meer & Rispoli, 2010 for a review). In these studies, SGD use—including the required conditional discriminations—has successfully been taught using well-established systematic instructional strategies, such as time delay, least-to-most prompting, and differential reinforcement (Duker et al., 2004). However, the vast majority of existing studies have focused on teaching individuals to request preferred objects, involved limited picture discrimination training, and few studies to date have made use of emerging SGD technologies, such as iPads® and the iPod Touch®.

In one relevant study, van der Meer, Kagohara, et al. (2011) used time delay, response prompting, and differential reinforcement in an attempt to teach two adolescents (13 and 14 years old) and one young adult (23 years old) to request snacks and toys. The participants had severe intellectual disability, autistic-like behavior, and, at most, spoke only a few single words. The SGD consisted of an iPod Touch® with Proloquo2Go™ software (Sennott & Bowker, 2009). The display on the iPod Touch® was configured with three line drawings representing snacks, toys, and social interaction. Touching the drawings produced corresponding synthesized speech output (i.e., "*I want a snack please.*", "*Can I play with a toy?*", and "*What's new with you?*"). To teach the SGD-based requesting response, snacks and/or toys were offered for 10 s and the participant was expected to select the icon that corresponded to the type of items offered (i.e., touch the snack icon when offered snacks and touch the play icon when offered toys). If a correct request did not occur within 10 s, physical guidance was used to prompt a request and then the person received access to snacks or toys. With these procedures, the two adolescents learned to make requests and discriminate among the screen icons, but the young adult participant did not make any progress. While the results of this study were promising for two of the three participants, it remains unclear if similar instructional procedures would be effective for teaching other SGD-based communication, such as picture naming, which would seem to require more complex conditional discriminations.

Indeed, there is some reason to be skeptical of this possibility given the differences between requesting and naming, not only in terms of the more complex conditional discriminations involved in picture naming, but also in terms of motivational variables. Skinner (1957) argued that requests (or mands) are of direct benefit to the speaker, whereas naming (or tacting) is mainly of benefit to the listener. Mands can therefore be seen as a more instrumental communicative act, whereas tacting is more socially oriented. Thus, for students with the impaired social interaction patterns and social skills deficits associated with ASD (American Psychiatric Association, 2000; Matson, Wilkins, & Fodstad, 2010), the motivation to request could be higher than the motivation to name pictures. This, in turn, could make requesting easier to teach than picture naming. Furthermore, the typical paradigm for teaching requesting to students with autism and other developmental disabilities involves natural reinforcement. That is, requests are typically followed by the student gaining access to the requested (and usually highly preferred) object or activity. Picture naming, in contrast, is typically associated with contrived or instructional reinforcement (Skinner, 1982), which is potentially less effective (Drasgow, Halle, & Sigafoos, 1999; Reichle, Lindamood, & Sigafoos, 1986).

Given such differences between requesting and picture naming, an important question is whether the same systematic instructional strategies that have been successfully used to teach SGD-based requesting could be effectively applied to teach picture naming. To address this question, we evaluated the effects of implementing a systematic instructional package—consisting of time delay, least-to-most prompting, and differential reinforcement—for teaching two adolescents with ASD to name pictures using an iPod Touch® (Study 1) and an iPad® (Study 2) as the SGDs. Two studies are reported involving different types of images that students were asked to name. The collective aim of these two studies was to teach each student to name pictures when presented with relevant instructional questions (e.g., *What is this?*; *What do you see?*). In Study 2, we also examined the effect on speech of teaching SGD use, given evidence that such training might influence natural speech production (Sigafoos, Didden, & O'Reilly, 2003).

2. General method

2.1. Overview

Two studies were conducted to teach two adolescents with ASD to name pictures using an iPod Touch® (Study 1) and an iPad® (Study 2). Both of these devices were configured to operate as SGDs. In Study 1, the intervention focused on teaching participants to use an iPod Touch® to name 12 line drawings under two conditions (a) when shown a worksheet containing four photographs and given an open-ended instruction (*What do you see?*) and (b) when shown a single photograph and given a closed-ended instruction (*What is this?*). Study 2 focused on expanding the participants' vocabulary by teaching an additional set of 18 line drawings presented in a commonly used picture book and using an iPad® as the SGD.