Language Preference of a Multilingual Individual With Disabilities Using a Speech Generating Device

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Abstract

Individuals with disabilities who are English learners (ELs) and communicate using speech generating devices (SGDs) may demonstrate a preference for instructional language and language output of their SGDs. The influence of interventionist language on the preference of SGD language output and frequency of mands was examined using an alternating-treatments design with an embedded concurrent-chain arrangement with a 10-year-old with Down syndrome whose heritage language was Spanish. Language preference assessment for ELs is recommended because heritage language may be preferred for children with disabilities who use SGDs.

Keywords English learner · Developmental disabilities · Speech generating device · Language preference

In 2015, 3,800,000 students enrolled in public schools in the United States were identified as English learners (ELs), or students with a first language other than English, and 14.7% of them received special education services (Aguilar, White, Fragale, & Chan, 2016; National Center for Education Statistics, 2017). A growing body of evidence suggests that selecting a language of instruction without considering the student's heritage language impacts intervention effectiveness, assessment results, and standardized test scores (Soto & Yu, 2014). Multilingual students require frequent, systematic, and explicit instruction that supports language development while incorporating their culture and heritage language used at home and in their communities in order to produce desired language outcomes (Klinger, Boelé, Linan-Thompson, & Rodriguez, 2014).

Research Highlights

- The participant manded most frequently using the Spanish-language SGD.
- SGD language preference and mand frequency were independent of interventionist language.
- Training for behavior analysts and educators in multicultural competencies should include language preference.
- Systematic language preference assessment is recommended for all students who are ELs and use SGDs.

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Language preferences may be affected by differences in multilingual expectations across settings and people (Soto & Yu, 2014). Preferences may also be affected by families' views on disability and cultural expectations about communication, the acceptability of technology to augment communication, and misunderstandings about educational practices (Cheatham & Hart Barnett, 2017). For example, expectations in schools may be to communicate in the language of the cultural majority, which may not reflect the language preferences of that student or the preservation of his or her cultural heritage.

Language preference research for ELs who use augmentative and alternative communication is limited. However, a study by Aguilar et al. (2016) examined the instructional language preference of an EL student using a single-button speech generating device (SGD). The participant demonstrated a strong preference for Spanish instruction despite receiving English-only instruction in school. These findings suggest that language should be assessed for preference, regardless of modality, and the presumption of language assimilation in academic settings should be challenged.

As an extension of Aguilar et al.'s (2016) work, the purpose of the present study is to identify the participant's preference for SGD language output (i.e., the participant's voice). This study assesses the effects of language exposure on manding (Skinner, 1957) for a child with Down syndrome who was an EL and used an SGD. Language preference was operationally defined as the most frequently selected language output. Our

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primary research question was, Is there a functional relation between interventionist language (English, Spanish, or control) and the frequency of participant manding and selection of language using an SGD?

Method

Participant and Setting

Jorge was a 10-year-old Latino male with Down syndrome who used an SGD. His family spoke Spanish, but he attended an English-only elementary school with no Spanish-speaking staff or teachers. Jorge primarily communicated with teachers and family using facial expressions and gestures. Jorge's SGD for daily use was a Prentke Romich Company Accent® programmed with LAMP/Words For Life® with UNIDAD® (Attainment Company, 2011) to enable Spanish or English that remained on manufacturer default settings.¹ Voice output was programmed in synthesized speech, and grid overlay was 1 cm × 1 cm squares with colored line drawings. Jorge manded using one- to three-word phrases with this device during sessions with clinic-based speech therapists but did not independently use this SGD during preintervention sessions in the behavior clinic.

All sessions took place in a university clinic therapy room (2.4 m × 2.4 m), with a table, three chairs, storage cabinet for study materials, computer, and camera for video recording.

Experimental Design and Materials

Design An alternating-treatments design with an embedded concurrent-chain arrangement was used to compare the effects of three interventionist language conditions on the choice of SGD language output. Sessions occurred once a week and included all conditions. Condition order was determined by a random number generator (Google®) prior to each session.

Materials Three iPads® (two second generation and one fourth generation) with the GoTalk NOW Lite iPad app (Attainment Company) were used.² Guided access was turned on to prevent Jorge from using other iPad functions. Each iPad produced the same volume of speech output, displayed identical pictures, and had identical cases with colors corresponding to each language (orange for Spanish, green for English, and purple for the control). The location of the iPads on the table was systematically varied to control for positional bias. Four 5 cm × 6 cm rectangular color photos of highly preferred

edibles were displayed on each iPad. Each icon corresponded to the following digitized, recorded male human speech in either English or Spanish: “goldfish,” “marshmallow,” “fruit snacks,” and “orange” in English and “galletas de pez,” “bombones,” “gomitas,” and “naranja” in Spanish. The control device had matching icons without vocal output. Word translation and food items used in the preference assessment were based on parent input. To facilitate discrimination between conditions, the color of the interventionist's shirt, poster board, and iPad case matched and corresponded to the language output for that condition.

Response Measurement

SGD voice output language and frequency of mands were coded for each mand session. Item selection was operationalized as Jorge touching an icon with his finger that corresponded to one of the three options (Spanish, English, or control). If an icon was touched with an arm or an elbow, it was not coded and no edible was provided.

Procedures

Preexperiment Prior to the experiment, the authors conducted a color and conditional discrimination assessment, as well as a preference assessment. During the color and conditional discrimination assessments, color match activities were conducted over three sessions (10 trials per session) to ensure Jorge could both match and discriminate colors (purple, orange, and green). Using a discrete-trial format across multiple stimuli, Jorge had 100% correct independent responding. A paired-stimulus preference assessment was conducted to identify four highly preferred food items to serve as putative reinforcers during language correspondence analysis (Fisher et al., 1992).

Language Correspondence Analysis The experimental portion of the study consisted of the language correspondence analysis, which included a presession and a manding period. Three 6-min sessions per day (one session per language condition) were conducted, divided into a 1-min presession period and a 5-min manding period. Sessions were conducted weekly for 7 weeks.

Presession. The purpose of presession was to introduce the language to be used by the interventionist during the manding session. Jorge received no instructions from the interventionist prior to the start of each session. The interventionist entered the room wearing a shirt whose color corresponded to either the English, Spanish, or control condition. A corresponding colored poster board was placed behind the interventionist at the participant's eye level. Jorge played with toys, and no SGDs were available. Every 15 s for 1 min, the interventionist provided

¹ The Accent 1000 and LAMP Words for Life are trademarks of the Prentke Romich Company (PRC), 1022 Heyl Road Wooster, OH 44691, USA.

² The iPad is a registered trademark of Apple Inc., 1 Infinite Loop, Cupertino, CA 95014, USA.

verbal statements (i.e., “I like you.”) in the designated language (English or Spanish) or remained silent (control). Scripted phrases were matched for the number of syllables and content, but phrase accuracy between languages took precedence over syllabic structure (statements are available from the authors upon request). After 1 min elapsed, a researcher removed the toys.

Mand session. This condition immediately followed the presession period. The three SGDs were placed on the table in a horizontal line 15 cm in front of Jorge, and he was able to request an edible item from any of the three devices for 5 min. Each SGD corresponded to one of the three available language outputs (English, Spanish, or control). Once a request was made, all devices were removed and the selected edible was provided. Following edible consumption, the devices were placed on the table in a different linear configuration. Throughout the mand session, the interventionist spoke to Jorge in the same language used in the presession period. After 5 min, the devices were removed from the table and the interventionist left the room for 1–3 min. A research assistant removed the colored poster from the wall and provided toys to Jorge during a break between sessions. Following the break, the sequence of presession and mand session was repeated until all three conditions (English, Spanish, or control) were completed. Research assistants did not engage in any vocal behavior during presession or manding session as to not affect SGD selection.

Interobserver Agreement and Procedural Fidelity

Interobserver agreement (IOA) on SGD selection was calculated for 43% of sessions and was 99% overall (range 96%–100%). IOA was calculated by dividing the number of intervals with agreement by the intervals of agreements plus intervals with disagreements and multiplying the total by 100 to yield a percentage. Procedural fidelity of the interventionist’s actions was calculated for 53% of sessions by comparing the interventionist’s actions to a 12-item task list. Procedural fidelity was 98% (range 91%–100%) and was calculated by dividing the number of correct task analysis steps by total task analysis steps and then multiplying the total by 100 to yield a percentage. IOA on procedural fidelity was calculated for 43% of sessions for 99.2% (range 95%–100%) agreement.

Results

Participant Mands by SGD Language Output

Figure 1 depicts Jorge’s performance across conditions. Jorge manded 234 times total for an average of 33.43 mands per

session (11.14 per condition). Jorge manded more frequently per session in Spanish ($M = 25.57$) than either English ($M = 3.86$) or the control ($M = 4.00$). Jorge made 76.50% of total mands in Spanish, compared to 11.54% and 11.97% for English and the control, respectively. Jorge averaged 35.33 Spanish mands per session over the final three sessions compared to 2.67 requests each in English and the control during that same period.

Participant Mands by Interventionist Language

Figure 1 also shows the frequency of Jorge’s mands when the interventionist spoke Spanish ($M = 12.71$), English ($M = 10.43$), or the control ($M = 10.29$). Frequency of mands was independent of interventionist language: 38.03% when the instructor spoke Spanish, 31.20% when the instructor spoke English, and 30.77% when the instructor did not speak (the control).

Conditional probabilities of the first mand were calculated in order to identify the mand language made by Jorge independent of reinforcement for each language condition and are depicted in Table 1. Interventionist language had a negligible influence on mand language. The order of highest probability combinations for conditions and first mand language were the control condition with Spanish-first mand ($P = 0.86$), Spanish condition with Spanish-first mand ($P = 0.71$), and English condition with Spanish-first mand ($P = 0.57$). Given the substantially higher frequency of mands made in Spanish, the data on how often Jorge matched the instructor’s language in a given condition were inconclusive.

Discussion

This study examined the effects of language exposure (English, Spanish, and a control) on language choice and frequency of manding for a child with Down syndrome who was an EL and used an SGD. The results indicated a preference for Spanish-language output independent of interventionist language. Jorge’s consistency of responding at high rates in his heritage language when given the choice of English, Spanish, or no output demonstrates that language preference supports the higher frequency of manding. Incorporating language preferences in educational planning may provide additional learning opportunities for multilingual students in special education. Cheatham and Hart Barnett (2017) discuss several misconceptions held by general and special education teachers, which include students with disabilities cannot be bilingual and that English should be the only language of instruction. Learning multiple languages simultaneously or sequentially neither causes language delays nor hinders language development, and individuals with developmental disabilities can have greater opportunities for inclusion in schools

Figure 1. The frequency of SGD use for manding by the language of output and interventionist language.

and communities if they are multilingual (Cheatham & Hart Barnett, 2017). Multilingualism has not been shown to cause confusion in the language learning of the individual, negatively impact overall language development, or decrease the rate of learning a second language (Soto & Yu, 2014). Specifically, bilingual individuals with Down syndrome performed similarly to their monolingual peers with Down syndrome on language tests and language samples (Bird et al., 2005).

Fong, Catagnus, Brodhead, Quigley, and Field (2016) emphasize the need to increase cultural competence in behavior-analytic practices by professionals working with culturally diverse populations. Ethically, Board Certified Behavior Analysts (BCBAs) are bound to provide the most effective treatment for behavior change (Fong et al., 2016). BCBAs must consider culture as a major influence on the effectiveness of all assessments and interventions based on social validity, treatment adherence, and generalizability of strategies to home and community settings. Practically, interventionists should be competent in teaching individuals who use SGDs, including linguistic ability to provide modeling with an SGD, language expansion, and use of regional dialectic characteristics of the heritage language.

The number of mands made by Jorge across conditions remained high throughout the study. This consistency in responding across conditions suggests that Jorge did not

experience satiation. There was one condition in which Jorge did not request any edibles. Because this was a singular occurrence, no conclusions about why this occurred can be drawn.

There were several limitations to this study. Due to geographic and population limitations, there was a single participant in a highly structured clinical setting. Assessment of Jorge's heritage language and English comprehension were not conducted by the researchers. Informal assessment through play and collaborative information sharing with family and school-based speech-language pathologists indicated he had limited understanding of one- to two-step directions in English at school and in Spanish at home. Due to this limitation, full-color photographs were used as the icons on Jorge's clinical SGDs after probing his receptive identification of preferred foods. The researchers attempted to control for the color of stimuli affecting behavior; however, it is unclear if a preference may have affected responding. Finally, the tool used to randomize experimental conditions resulted in the Spanish condition occurring more frequently as the first interventionist language.

Though the preference for language output was evaluated, other measures of social validity were not formally assessed. Future research should include social validity measures to assess acceptability of treatment, families' views on the use of Spanish and English as instructional languages, and use of SGDs by parents of children who speak a language that differs from the cultural majority.

Future research should evaluate the role of other environmental variables on verbal behavior that may affect the emission of a mand or other verbal operants (e.g., tact) while using an SGD. These areas include (a) the impact of audience control (the investigators' presence in the room) on responding; (b) the role of motivating operations, including satiation and deprivation, in altering the reinforcer's value and effect on the likelihood of the occurrence of behavior that has resulted in

Table 1 Conditional probabilities of participant's first response by interventionist language condition

Condition	Participant's first response		
	English	Control	Spanish
English	0.14	0.14	0.57
Control	0.00	0.14	0.86
Spanish	0.29	0.00	0.71

$P(\text{Interventionist Language} \mid \text{Participant First Response Language})$

past reinforcement; and (c) the impact of stimulus control in the environment on the use of SGDs to mand.

Matching language output of the SGD to the communication partner's preferred language has the potential to increase social interaction and access to reinforcement and to enable the individual to communicate across environments (e.g., home, school, and employment; Soto & Yu, 2014). The relationship between preferred language and communication frequency for ELs is an emerging area of study, and few studies investigate language preference for children who are ELs, have a developmental disability, and use SGDs. BCBAs who work with diverse, multilingual populations should advise one another on culturally competent and effective procedures. Culturally competent practice incorporates the use of language preference for individuals using SGDs and ultimately improves language outcomes.

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Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflicts of interest.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Informed consent Informed consent was obtained from all individual participants in the study and their parents/guardians.

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