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Factors influencing bilingual expressive vocabulary size in children with autism spectrum disorders

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ABSTRACT

This study explored bilingual exposure, language, social impairment and cognitive factors that could influence second language (L2) expressive vocabulary size as measured on the MacArthur–Bates Communicative Development Inventories (various languages) in 33 children (mean age = 60 months) diagnosed with ASD. In the 23 children with L2 vocabularies, recent language exposure estimates accounted for 69% of the variation in L2 vocabulary size, and the VABS-II expressive scale score explained an additional 13% of the difference. The complete sample was then subgrouped into three levels of L2 vocabulary size to compare children with no L2 vocabularies (NON-B, $n = 10$), low L2 word counts (LOW-B, $n = 11$) and high L2 counts (HIGH-B, $n = 12$), as determined by a median split procedure. The HIGH-B group had significantly larger L1 vocabularies than both the LOW-B ($p = .045$) and the NON-B ($p = .003$) groups, and higher VABS-II expressive scale scores than both the LOW-B ($p = .008$) and the NON-B ($p = .012$) groups. Social impairment did not significantly differ across groups and cognitive impairment did not preclude the development of L2 vocabularies. Expressive bilingualism in this population appears related to high levels of recent direct L2 exposure in combination with stronger dominant language abilities.

1. Introduction

A growing body of research has already shown that bilingual exposure does not negatively impact language development for children with a variety of diagnoses associated with language-learning delays including specific language impairment (Korkman et al., 2012; Paradis, Crago, Genesee, & Rice, 2003), Down syndrome (Feltmate & Kay-Raining Bird, 2008; Kay-Raining Bird et al., 2005), and ASD (Hambly & Fombonne, 2012; Ohashi et al., 2012; Petersen, Marinova-Todd, & Mirenda, 2012; Valicenti-McDermott et al., 2013). These studies also provide data to show that some children with significant impairments are acquiring two languages in childhood. The development of bilingualism in children with ASD, who present with social impairments often accompanied by language and cognitive delays, has only been minimally discussed in the research examining the effects of bilingual exposure. No study has examined the factors influencing the acquisition of second language vocabularies in children with ASD.

Published research shows that children with ASD have a wide range of bilingual outcomes in early childhood. Seung, Siddiqi, and Elder (2006) reported a case study of a child with ASD who went from monolingual single word use to bilingual

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sentence use across a two year period from ages 3–5. Kay-Raining Bird, Lamond, and Holden (2012) described a sample of children aged 2–22 years of age where 36% of bilingually exposed children were reported to "speak two languages equally well": the exact levels reached varied with the subjects' age since language levels were rated on a 1–5 scale relative to "a fluent adult or same-age peers." Petersen et al. (2012) provided data on vocabulary size for 14 English–Chinese bilinguals aged 43–73 months with homogenous exposure histories. Hambly and Fombonne (2012) found that 62% of the bilingually exposed children aged 38–76 months in their sample spoke words in a second language, but noted that only a few of them were reported to have bilingual phrase use.

Since bilingual acquisition is clearly possible for some children with ASD, it is clinically important to learn what factors contribute to the development of bilingual language abilities so that families can make evidence-based decisions about encouraging bilingualism in their young child with ASD. Studies of children with typical development and children with language impairment suggest that two main factors could contribute to bilingual outcomes for children with ASD: amount of exposure to the input languages and level of proficiency in a first language. Additionally, since no studies of bilingualism have been done in populations characterized by social impairments, the level of social impairment must also be explored as a factor.

First, current language exposure appears to relate more strongly to bilingual vocabulary size than does the timing of onset, such as from infancy vs. a later time in early childhood. Bedore et al. (2012) found in a very large sample of 1029 Spanish–English bilingual pre-kindergarten students with a range of bilingual proficiencies that current language exposure accounted for more of the variance in language dominance than the age of first exposure to a language. David and Wei (2008) reported a significant correlation between language exposure and vocabulary size, and found that the presence of translation equivalent word pairs related to language exposure with the most balanced lexicon found in children with more balanced input. In a study of 191 young children with a mean age of 59 months, Hammer et al. (2012) reported that children's vocabulary scores in each language were related to their exposure to and their usage of each language. A small number of reports suggest that this relationship between input and bilingual acquisition also holds for children with language impairments. Feltmate and Kay-Raining Bird (2008) suggested that current frequency of second language exposure could be a key factor in explaining levels of acquisition across two languages for the children with Down syndrome in their study, and they noted that the length of exposure over time did not predict any measure of second language ability. Gutiérrez-Clellen, Simon-Cereijido, and Sweet (2012) found that levels of English use predicted differences in English acquisition in bilingual children with specific language impairment (SLI).

Factors other than overall exposure need to be taken into account when describing bilingual environments. The communicative purpose of the language input also appears to play a role in second language outcome in typical development, with direct speech to the child playing a larger role than indirect speech: Oller (2010) found in a detailed case study using all-day recordings that language spoken directly to a child had dramatically more effect on vocabulary size than language that was overheard but not directed to him. Hoff et al. (2011) also discussed the communicative function of bilingual input (e.g., indirect exposure vs. child-directed speech) as well as the sources of input such as the one speaker: one language model vs. the one speaker: two languages model. Place and Hoff (2011) studied a large sample of children with naturally occurring bilingual exposure and found that unique sources of variance in children's language proficiency were due to exposure factors including the number of different speakers providing input and the native-level language proficiency of the speakers. Baron-Cohen and Staunton (1994) demonstrated a related situation in a sample of older children with ASD raised by mothers who spoke to them in accented, non-native English: children with ASD were more likely than their non-ASD siblings to retain their mothers' accents. These children may have been more influenced by direct caregiver language models than by indirect exposure from others in their home or from their peers at school.

These studies on bilingual input suggest that bilingualism in an ASD population should focus on estimates of direct speech to the child, rather than overall estimates of language use in the home, because there may be large amounts of second language use that are not directed to the child with ASD. Both Kremer-Sadlik (2005) and Yu (2013) discussed the phenomenon of children being raised as monolinguals in a bilingual home. Hambly and Fombonne (2012) also found that mothers of bilingually exposed children frequently spoke a non-native language to their child, which indicates that there may have been sources of L2 exposure indirectly in the home from overheard conversations between parents and other adults or siblings.

In addition to language exposure variables, children's language learning abilities clearly play a role in second language acquisition: children who have less severely impaired language skills are more likely to be more proficient in a second language than their peers with more severe language impairments. Verhoeven, Steenge, and van Balkom (2012) studied Turkish–Dutch bilingual children ages 7–11 with specific language impairment and found that second language proficiency levels could be explained by first language proficiency levels, even when controlling for working memory and non-verbal intelligence. Gutiérrez-Clellen et al. (2012) also found a similar relationship in their 8 month longitudinal study of English–Spanish preschoolers with specific language impairment: the children's Spanish first language skills were a key factor predicting English acquisition. These early studies of bilingual children with specific language impairment at different points in childhood suggest that there appears to be a close and enduring relationship between first and second language abilities in the context of language impairment that should also be found in children with ASD.

Some parents of children with ASD have expressed concerns that children with lower cognitive skills should only be exposed to one language (Kay-Raining Bird et al., 2012); and some parents and clinicians may believe that bilingual word use requires more advanced cognitive skills than required for monolingual word use. It is important to note that signs of