

BAR- ILAN UNIVERSITY

**Lexical-semantic richness, utterance length, and linguistic
abnormalities among children with high-functioning autism
and children with typical development during free interaction
with a friend versus acquaintance**

Saray Guetta

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Abstract

Background. Delay in language development is a core characteristic of children with autistic spectrum disorder (ASD), including high-functioning children with ASD (HFASD), who have normal intelligence. Large variation in linguistic ability occurs in children with HFASD in areas of vocabulary, syntax, morphology and grammar, pronunciation, sound characteristics, and prosody (Boucher, 2012). Difficulties manifest in lack of lexical and morph-syntactic abilities (Condouris, Meyer, & Flusberg, 2003; Tager-Flusberg, 2003) and in use of language characterized by poor vocabulary, narrow confined utterances, and abnormalities such as neologism and echolalia (Boucher, 2003; Condouris et al., 2003; Kjelgaard & Tager-Flusberg, 2001). Acquisition of new words takes place during social interaction (Hoff & Tian, 2005; Tager-Flusberg et al., 2007), thereby pinpointing the importance of tracing linguistic patterns during interactions. However, to date, linguistic aspects that emerge in spontaneous interactions were mostly investigated in interactions with an adult, whereas language characteristics remain unclear for preschoolers diagnosed with HFASD in spontaneous interactions with a peer and especially with a friend. Findings suggests that children with HFASD exhibit better pragmatic capabilities including several conversational quality measures during interactions with friends in comparison to interactions with nonfriends (Bauminger-Zviely, Karin, Kimhi & Agam Ben Artzi, 2014).

Study aims. To narrow the gap in the literature, this study examined differences between preschoolers with HFASD and a control group of preschoolers with typical development regarding their lexical-semantic richness, utterance length, and

linguistic abnormalities during spontaneous social interactions with a friend versus with a non-friend peer, and the variables' links with age and cognitive ability.

Hypotheses. The preschoolers with HFASD were hypothesized as demonstrating lower lexical-semantic richness, shorter utterance length, and more language abnormalities than the control group during the spontaneous interactions with peers, regardless of friend status. Both the HFASD and the control groups were hypothesized as demonstrating better linguistic performance (higher lexical-semantic richness, longer utterance length, and fewer language abnormalities) when interacting with a friend than when interacting with a non-friend. In addition, lexical-semantic richness in both groups was hypothesized as correlating positively with chronological age (CA) and with cognitive ability (verbal, nonverbal, and general IQ).

Method. This study was part of a large-scale research study conducted at Bar-Ilan University (Agam Ben-Artzi, 2010; Kimhi, 2010). Participants included 51 Israeli preschoolers age 3-6 years and the language in question is Hebrew: 22 diagnosed previously with HFASD and 29 with typical development. Groups were matched based on CA, sex, verbal IQ, nonverbal IQ, general IQ and socioeconomic status (mother's education). Autism diagnosis in the study group was authenticated using the DSM-4 TR (APA, 2000) and ADI-R- The Autistic Diagnostic Interview- Revised (Rutter, Le Couteur & Lord, 2003). All 51 preschoolers interacted with one friend and one non-friend peer (identified from teacher and parent reports). The spontaneous speech produced by target participants in two 10-minute interactions were videotaped for each child during recess (snack) periods at preschool, using

Bauminger et al.s' (2008a, 2008b) procedure. Snack time was selected because it encouraged social conversations in a free and natural environment. During these 10-minute breaks, children were given a snack and an opportunity to play (symbolic game, box game and beads), talk, or do nothing. Two experienced and trained speech therapist who were blind to the children's group affiliation code indexes of lexical-semantic richness, utterance length, and linguistic abnormalities as follows.

Lexical-semantic richness. This variable included two measures: *Sum of Words:* This measure counted the sum of all words produced by each target participant during interaction. *Number of Different Words:* This measure of lexical richness counted the sum of different words produced by the target participant. Developed by Klee (1992) and first used in an Israeli population by Dromi and Davidzon (2002), this measure counts the diversity of words produced across several sub-categories: nouns (divided into concrete and abstract), verbs, adjectives, and pronouns.

Utterance length. The morpheme per utterance measure, based on the mean length of utterance, was developed by Brown (1973), and its Hebrew variation was validated by Dromi and Berman (1982). This measure examines the mean utterance length of young children using spontaneous language samples.

Linguistic abnormalities. This measure counts all utterances that contain neologism and echolalia – abnormalities that characterize the language deficit of children with ASD (Boucher, 2003; Tager-Flusberg, Condouris, & Meyer, 2003).

Results. The first hypothesis concerning group differences (HFASD vs. typical development) in linguistic measures was partially confirmed: During the spontaneous interaction with a friend, preschoolers with typical development

revealed significantly greater lexical-semantic richness (a larger word count and higher scores on most categories of word diversity – concrete nouns, verbs, and pronouns). However, no such significant group differences in lexical-semantic richness emerged during the interaction with a non-friend. Moreover, no significant group differences (HFASD vs. typical) emerged for either of the interaction types regarding utterance length or even regarding linguistic abnormalities (e.g., echolalia) that characterize the ASD deficit. Thus, no significant group differences emerged in the interaction with a non-friend peer.

Regarding the second hypothesis, among children with HFASD, no significant differences emerged between the two types of spontaneous interaction (with a friend vs. with a non-friend) in the lexical-semantic richness measures or in the utterance length; however, the target children did produce more neologisms (but not echolalia) during interaction with a friend compared to interaction with a non-friend. Within the group of children with typical development significant differences in measure of lexical-semantic richness (sum of words, number of different words, concrete nouns, verbs and pronouns, but not abstract nouns and adjectives) emerged between the two types of spontaneous interaction with a friend vs. with a non-friend in favor of interaction with the friend.

Regarding the third hypothesis, HFASD children who scored higher on verbal IQ test, produced more root words, nouns, concrete nouns, verbs and pronouns while interacting with non-friend. Furthermore, general IQ significantly correlated with three sub-categories of lexical- semantic richness: roots of words, verbs and adjectives in the HFASD group while interacting with non- friend. In the typical

group, during interaction with non- friend, age correlated positively with more number of verbs and adjectives. In addition, during interaction with a friend, age correlated positively with number of pronouns.

Discussion. The current study adds to the existing literature by examining, for the first time, the lexical-semantic capabilities, length of utterances, and linguistic abnormalities of preschoolers with HFASD during spontaneous interaction with a friend and with a non-friend peer. Findings showed that while interacting with a peer who is not a friend, no differences in lexical-semantic richness emerged between preschoolers with typical development and preschoolers with HFASD. These findings are encouraging, indicating that the linguistic abilities of children with HFASD are close to the norms of their typically developing age-mates. Likewise, children's utterance length was similar in the two groups, but scholars disagree about the accuracy of the Hebrew version of the morpheme per utterance measure. Therefore, further research should measure the length of utterance by using specific instruments that have been adapted to Hebrew.

Interestingly, the current findings revealed the effects of friendship on linguistic behavior only for the group with typical development. Friendship contributed to greater lexical-semantic richness of children with normal development than in interactions with a non-friend, but no such enhancement was evident for the children with HFASD. In fact, the preschoolers with HFASD demonstrated more idiosyncratic neologisms – a linguistic abnormality characterizing the ASD language deficit – when interacting with a friend than when interacting with a non-friend.

These findings pinpoint the difficulty of preschoolers with HFASD to gain linguistically from interaction with a friend, unlike the typically developing children.

The main limitations of this study are its relatively small sample of children with HFASD and relatively short interaction periods. Future research should use a larger sample and should also extend the time given to interactions. It is also recommended to check these characteristics over time and to examine whether differences between groups decrease with older age and greater exposure to written language.

Despite its limitations, this study offers an important contribution to the literature by examining spontaneous language abilities in young children with HFASD during interaction with peers and friends for the first time. This knowledge may provide direction for therapeutic intervention in the areas of language and communication. Measuring language ability among children with HFASD during social interactions is essential considering the fact that the diagnosis procedure of ASD does not require evidence regarding language abilities during spontaneous interaction with peers, which considers to be a distinct difficulty characterizing children with ASD. In addition, the current findings suggest that intervention programs for children with HFASD should include learning of specific of words and concepts related directly to friendship and relationships.