

Title: The Role of Verbal Working Memory in Conversational Discourse in Boys with Idiopathic ASD and FXS+ASD

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Introduction: Conversational discourse is a complex daily activity that requires the simultaneous execution of several skills, including maintaining the topic, offering new information, and asking contingent questions. However, discourse is difficult for children with autism spectrum disorder (ASD), both idiopathic and FXS-associated (FXS+ASD); many children with these disorders change the topic abruptly, echo their conversation partner, and perseverate on topics or phrases. It is likely that successful discourse is supported by intact verbal working memory, which is a component of executive functions that refers to ability to store and manipulate linguistic information. Verbal working memory is associated with various aspects of social skills, including pragmatic judgment, discourse comprehension, theory of mind, etc. in children with ASD (Akbar et al., 2013; Gabig, 2008; Hill et al., 2015; Kouklari et al., 2018; Schuh et al., 2016). Associations between verbal working memory and language have not been thoroughly examined in FXS+ASD, though one study reported an association between verbal working memory and vocabulary growth (Pierpont et al., 2011). Connections between verbal working memory and language- and pragmatic-related skills in school-age children with ASD and FXS+ASD have implications for potential connections between verbal working memory and conversational discourse skills, which has not yet been examined. Specifically, Kouklari et al. (2018) proposed that during an interaction, verbal working memory may be important to concurrently hold information regarding the perspectives of the speaker and the listener. This study sought to address this gap by examining verbal working memory as a predictor of discourse strengths (e.g., asking questions) and impairments (e.g., interrupting) within boys with idiopathic ASD and FXS+ASD.

Method: Drawn from a larger study, data were available for 27 boys with FXS+ASD and 22 boys with idiopathic ASD between the ages of nine and 16 years. Participants completed a 10-minute, semi-structured conversation sample, which was transcribed in Systematic Analysis of Language Transcripts software. A discourse coding scheme was developed based on published measures and coding systems (Landa, 2013; Martin et al., 2012; Roberts et al., 2007) and applied to the transcripts. The coding scheme included five strengths: topic initiation, offering new information, asking reciprocal questions, acknowledging the examiner, and elaborating on the examiner's statements; and five impairments: echolalia, topic changes, interrupting, topic perseveration, and utterance perseveration. Coders were reliable and blind to diagnosis. Strengths and impairments were summed separately and divided by the total number of utterances to yield proportions. Verbal working memory was measured using a sentence imitation task. Participants listened to and repeated 30 pre-recorded sentences. Errors were calculated by counting each word-level deviation. The total number of errors was divided by the total number of attempted words to create a proportion. We examined group differences for the proportions of strengths, impairments, and sentence imitation task errors using independent samples *t*-tests. We next examined how verbal working memory uniquely impacted discourse within each group. Verbal working memory was included as predictor of discourse strengths and impairments, resulting in two simple linear regression models per group. Significant main effects were followed-up to assess the effects of verbal working memory on specific aspects of discourse.

Results: Boys with idiopathic ASD produced a higher proportion of discourse strengths (34.50% of utterances, $SD=21.84\%$) than boys with FXS+ASD (21.53% of utterances, $SD=13.74\%$), $t(33.88)=-2.42$, $p = .021$. Boys with idiopathic ASD also produced a lower proportion of impairments (7.91%, $SD=8.00\%$) than boys with FXS+ASD (19.62%, $SD=10.85$), $t(47)=4.51$, $p = .000$. Boys with idiopathic ASD also produced fewer errors ($M=0.96$, $SD=0.04$) than boys with FXS+ASD ($M=0.68$, $SD=0.26$) in the sentence imitation task, $t(27.33)=-5.55$, $p = .000$. For the boys with idiopathic ASD, verbal working memory was not predictive of the proportion of strengths, $p = .470$, or impairments $p = .216$. For boys with FXS+ASD verbal working memory was predictive of the proportion of strengths, $F(1,25)=4.34$, $p = .045$, but not the overall proportion of impairments, $p = .872$. Follow-up regressions were conducted for each individual strength code. Verbal working memory was only predictive of offering information, $p = .016$.

Discussion: Verbal working memory predicted the ability to offer new information for boys with FXS+ASD. It may be the case that the ability to offer additional, contingent, and topic-appropriate information is supported by the ability to hold and manipulate information that was previously exchanged in the conversation. However, verbal working memory was not similarly predictive of

discourse in boys with idiopathic ASD. This may be because three boys with idiopathic ASD performed significantly better on the verbal working memory task and had less variability in their verbal working memory performance. It is also possible that conversational discourse strengths and impairments of boys with idiopathic ASD may be driven by other factors, such as ASD severity, anxiety, or other domains of executive functions (e.g., inhibition or cognitive flexibility), which should be explored in future work. Additional conclusions and implications will be discussed in the poster.

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