Do "autistic-like" personality traits predict prosody perception?

"Autistic traits" are personality characteristics found in the neurotypical (i.e., general, non-clinical) population that resemble mild variants of the behavioral and information processing tendencies associated with Autism Spectrum Conditions. Recently it has been shown that higher levels of these traits are associated with variation in a number of classic speech perception effects, such as the Ganong Effect (Stewart & Ota, 2008), the McGurk Effect (Ujiie et al., 2015), perceptual compensation for coarticulation (Yu, 2010; Kingston et al. 2015), and autistic traits have also been implicated in variation in speech production (Yu, 2016) and the processing of higher-level linguistic structure (Nieuwland et al, 2010; Xiang et al., 2013; Jun & Bishop, 2015).

The present study examines the role of autistic traits in predicting the perception of prosody in neurotypical native speakers of (American) English. The study was intended to further explore recent findings in Jun & Bishop (2015), who report variation in prosody's effect on listeners' resolution of syntactic ambiguities. In particular, Jun & Bishop investigated the role prosodic boundary location on the parsing of ambiguous relative clauses (RCs) in sentences with two possible NP attachment sites (e.g., *Someone shot the servant of the actress who was on the balcony*). In such sentences, it was predicted (based on Fodor, 2002) that a prosodic boundary after NP2 (*the actress*) should encourage a high attachment parsing of the RC (i.e., to NP1, *the servant*). What they found was a positive correlation between autistic traits and listeners' tendency to parse as predicted. Rather than indicating greater sensitivity to the prosodic boundary per se, however, Jun and Bishop argued that this pattern reflected less sensitivity to prosodic prominence, which is also known to influence attachment (Schafer et al., 1995; Lee & Watson, 2011), and conflicted with the boundary cue in their study.

The present experiment was designed to test the hypothesis that autistic traits influence prominence and boundary perception asymmetrically. A large group of participants (N=140) served as listeners in a "Rapid Prosody Transcription" task (Cole et al., 2010), in which they were required to make speeded identifications of (a) prominent words and (b) the locations of prosodic juncture, both in running speech. Materials consisted of approximately 10 minutes of political speech (recent "Weekly Addresses" recorded by President Barack Obama) that were phonologically transcribed for prosodic events using the ToBI (Tones and Break Indices) conventions for Mainstream American English (Beckman & Ayers-Elam, 1997). The goal of the analyses was then to predict listeners' prominence and boundary identifications based on phonological structure (pitch accent location and break size) and on listeners' own levels of autistic traits using three different published measures (Baron-Cohen et al. 2001a/b, Hurley et al., 2007). Basic predictions, based on Jun and Bishop's claims about their sentence processing results, were (a) that prominence perception should vary considerably, with some of this variation related to autistic traits, and (b) that boundary perception should be more uniform for the group, and less dependent on individual differences in autistic traits.

Preliminary results of this ongoing study mostly align with these predictions. First, there was a modest interaction between *accent status* and autistic traits, such that individuals with higher levels of autistic traits (on multiple measures) identified fewer pitch accented words as prominent. Second, there was also interaction between *accent type* and autistic traits; while pitch accents of higher pitch levels (ranging from L* to L+H*) tended to elicit a greater probability of perceived prominence for the group as a whole, this relationship became weaker as an individual's autistic traits increased. Both of these patterns are visible in Figure 1. Finally, similar interactions between boundary perception and autistic traits were not apparent; individuals did not very significantly in their identification of prosodic boundaries (neither intermediate nor intonational phrase boundaries) as a function of autistic traits (Figure 2). Preliminary findings thus reveal previously unknown variation in the perception of prosody related to autistic personality traits, although the influence appears to be limited to the perception of prominence. Additional implications of these findings are discussed.

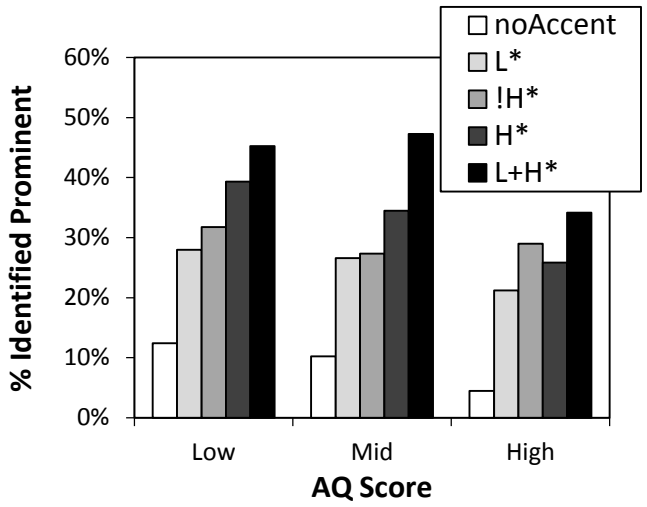

Fig 1. Percentage of words identified as prominent by listeners, as function of ToBI accent type. The figure shows listeners grouped by one measure of autistic traits, namely the AQ (Mid scores are those +/- 1 SD around the mean).

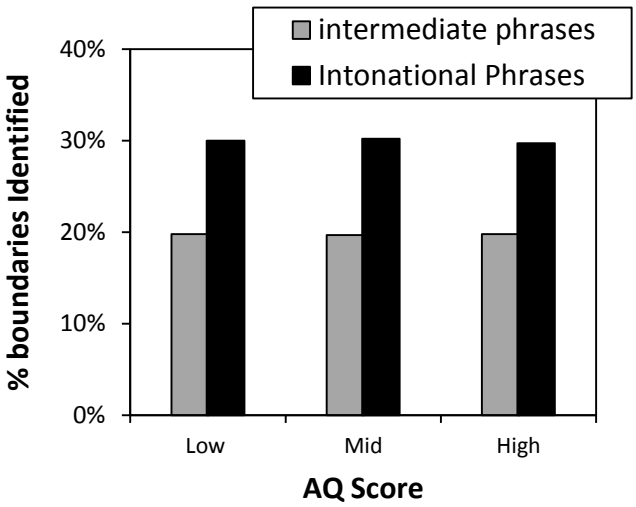

Fig 2. Percentage of prosodic boundaries identified by listeners, as a function of ToBI boundary type. The figure shows listeners grouped by one measure of autistic traits, namely the AQ (Mid scores are those +/- 1 SD around the mean).

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