Following Ohala’s hypothesis that sound change (SC) results from listeners’ failure to normalize variation in speech, Yu (2010) investigated individual differences in perceptual compensation (PC) in order to identify the most likely innovators of SC. It found that people who minimally compensate tend to be low on the Autism Spectrum Quotient (AQ), which are related to social traits that facilitate the spread of new variants, suggesting the low AQs are likely to introduce as well as propagate potential changes. However, its assumption that PC failure must result in misperception can be challenged. Higher-level information, such as lexical knowledge, provides listeners with plenty of chances to correct potential misperception. For example, the Ganong effect demonstrated that an ambiguous sound between /k/ and /g/ in _ift tends to be perceived as embedded in a real word gift rather than kift (Ganong, 1980), suggesting lexical information can shift perceptual boundaries. In the case of coarticulation, even if a listener fails to compensate, lexical information can help to resolve ambiguity and restore the intended sound. Therefore, an innovator should not only be a minimal compensator, but also poor at using other information to normalize variation.

To explore the relation between linguistic behaviors and social profiles, this study investigated how individuals with different AQ differ in their degree of PC and lexical effects (LE). 101 people took a screening test using the AQ questionnaire (Baron-Cohen et al., 2001), from which the top and bottom portions were selected to form a high AQ group (mean=34.47, sd=4.0) and a low AQ group (mean=12.87, sd=2.8) (15 people in each). PC and LE were tested using two identification tasks. The stimuli in the PC task were alga-arda, which were deliberately set to be different from those in Yu (2010). The Ganong effect paradigm was used to measure the degree of LE using the classic kiss-gift stimuli. In addition, since Yu (2010) found attention-switching ability correlates with PC, a Stroop task was used to evaluate participants’ ability to control attention and suppress interference (Stroop 1935). The research questions are: 1) whether the relation between AQ and PC can be generalized to other linguistic contexts; 2) whether people with different AQ also differ in LE; 3) how individuals’ PC relates to LE. The findings help to answer whether individuals with certain social traits tend to introduce and spread new sound.

For both identification tasks, individual’s identification functions were obtained by calculating the percentage of /ga/ or /gi/ responses at each step. 2 people were excluded from analyses involving LE since they were incorrect more than 50% at endpoints for both continua. To compare between groups, data of PC were subject to 2 (contexts) x 9 (steps) x 2 (groups) mixed ANOVA using the group average /ga/ responses as the dependent factor. An interaction between GROUP and CONTEXT (F(1, 28)=8.84, p=0.006) was found, suggesting that the differences of /ga/ responses in the two contexts, which indicate the degree of PC, differ between the two groups. Specifically, the high AQ group exhibited greater PC than the low AQ group, consistent with Yu’s (2010) finding of a positive correlation between AQ and PC. A similar analysis was done on LE. Interaction between GROUP and CONTEXT was not significant (F(1, 26)=3.525, p=0.072), although the degree of LE was numerally lower in the low AQ group. Given a similar pattern of PC and LE across the two groups, a Spearman correlation was conducted between the two tasks, using identification shift (IS; difference between the two identification functions) as indicators of degree of PC and LE. A positive correlation was obtained between the two factors (r=0.373, p=0.025,
n=28), confirming that individuals compensating less are also less subject to the lexical influence. To further identify the individuals who have both low PC and LE, the averages of IS in PC and LE were calculated and those with PC/LE below the averages were categorized as having low PC/LE. Out of 14 people in each group, 8 from the low AQ group and 2 from the high AQ group fell into this category, suggesting that people who show low PC and LE are more likely to have low AQ. Finally, the relationship between Stroop task and PC and LE was examined with Spearman correlation. The Stroop scores were found to correlate with PC (r=0.320, p=0.042, n=30) and marginally with LE (r=0.303, p=0.058, n=28). Since lower score indicates better ability to control attention, the positive correlation suggests that people with better such ability are less influenced by contextual information. To exclude the influence of this ability on the group difference in PC, the group difference was further analyzed by conducting an ANCOVA with the PC as the dependent variable and the Stroop scores as the covariate. The p-value remained the same (p=0.006) and no main effect of the Stroop scores was found (F=2.94, p>0.05). This suggests the attention control ability does not explain the group difference in PC.

Taken together, the results show that people with low AQS indeed compensate less than the high AQS, although not all of them necessarily tend to misperceive since some are good at making use of lexical information. Nevertheless, people who do worse in both types of normalization, that is, tend to take the face value of a coarticulated sound despite of the phonetic and lexical contexts, are likely to score low on the autistic spectrum. On the one hand, these people may introduce new variants through constant misperception; on the other hand, since low AQ is associated with personality traits that contribute to frequent social interactions and well-connected social networks, most of these people are in a good position to spread the new variants. They seem to be the best candidates as innovators of SC.

However, precaution needs to be taken in reaching this conclusion for several reasons. First, the correlation between the Stroop task and LE points to the possibility of task-specific artifacts: the identification task requires the listeners to focus their attention on the phone level and may involve suppression of contextual influence; this may explain why people with better ability to control attention are better at identifying the exact signals. Although this factor cannot explain the group difference in PC, it draws attention to the discrepancy between lab experiments and daily communication. It will be interesting to see if the same patterns will hold when distraction tasks are present simultaneously with the perception tasks. Second, it is assumed here that variation is factored out as noise and the stored representations are categorical. Yet, literature on exemplar models demonstrated that listeners have access to and store more detailed phonetic information in memory, including the previously assumed “noise” (Pierrehumbert 2001). The exact nature of the stored representations, however, is not clear. For both PC and LE, it can either be the perception resulting from normalization (noise already factored out), or contain richer information of coarticulation. If the latter case is true, individual differences in PC and LE may not matter to sound change, since no matter how much one factors out the variation in categorization, the stored information and production will be the same. Further studies are called for to examine the actual production of people with different AQS. This study, although not answering all these questions, provides a great opportunity to raise challenges to the previously held assumptions and work out ways to address these problems, therefore makes contribution to the next step in this line of study.
References


