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RUNNING HEADING: REACTIONS TO TYPICAL AND ATYPICAL SPEECH

Stereotypes, self-report, and physiological reactions to typical and atypical speech.

By

Juliet Hansen

A thesis submitted in partial fulfillment

of the requirements for the degree of

Master of Science in the Department of Communication Sciences and Disorders

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Committee Approval

To the Graduate Faculty:

The members of the committee appointed to examine the thesis of Juliet Hansen find it satisfactory and recommend that it be accepted.

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RE: regarding study number IRB-FY2016-71 : Relationship of stereotypes, self-report, and autonomic responses in adults to typical and atypical speech

Dear Ms. Hansen:

I have reviewed your your responses to earlier concerns for a request for expedited approval of the study listed above. This is to confirm that I have approved your application.

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You may conduct your study as described in your application effective immediately. The study is subject to renewal on or before Sep 17, 2016, unless closed before that date.

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Sincerely,

Ralph Baergen, PhD, MPH. CIF
Human Subjects Chair

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Abstract

Purpose: Explore listener responses (stereotype, emotional state, and physiological) to fluent, dysarthric, and stuttered speech.

Method: Nineteen fluent adults participated. Each answered stereotype questionnaires regarding three vignettes illustrating speech categories. They watched randomized videos while attached to electrodes, which tracked skin conductance (SC) and heart rate (HR) as physiological responses. After each video they answered state response questions using a bipolar adjective scale.

Outcomes & Results: Responses to dysarthria and stuttering vignettes demonstrated similar assignment of personal attributes with both rated more negatively compared to fluent speech. Subtle differences in stereotype judgments coincided with state emotional response differences, such as, participants felt more anxiety, worse mood, and less patience after viewing stuttering as compared to dysarthria. Dysarthria and fluent speech demonstrated increased HR and decreased SC. Stuttered speech elicited an increase in both HR and SC.

Conclusions: A possible general stereotype towards disordered speech is indicated with nuanced differences between disorders. With this information, discussions of stereotypes, and inherent responses of listeners with clients can help to develop strategies for improving communication interactions. Future research should include communication disorders beyond stuttering and dysarthria.

Chapter 1

Introduction

A large corpus of literature exists on attitudes, beliefs, and stereotypes toward people who stutter (PWS). For example, searching the PubMed database for published articles on this topic - using search terms: stutter* attitude*, stutter* belief*, and stutter* stereotyp* - yields over 400 related hits. While there were likely overlaps based on the search terms used, the vast majority of the studies only examined the disorder of stuttering compared to a fluent counterpart. To the best of our knowledge only a small handful of studies included a second disorder category in their comparisons with this area of research (Allard & Williams, 2008; McKinnon, Hess, & Landry, 1986; Williams & Dietrich, 1996; Williams & Dietrich, 2001).

Investigations into stereotypes towards PWS, using vignettes of hypothetical individuals who stutter compared to fluent peers, consistently find that PWS are judged as being more nervous, tense, and avoiding as opposed to calm, relaxed, and approaching (Woods & Williams, 1976). Initially, this area of research targeted Speech-Language Pathologists' attitudes and beliefs about PWS to examine comfort and perceived skill while treating clients in this population (Cooper & Cooper, 1996; Lass, Ruscello, Panncacker, Schmitt, & Everly-Myers, 1989; Yairi & Williams, 1970). It has since evolved to examine other professions such as schoolteachers (Irani, Abdalla, & Gabel, 2012; Irani & Gabel, 2008), school administrators (Lass, Ruscello, Pannbacker, Schmitt, Kiser, Mussa, & Lockhart, 1994), professors (Dorsey & Guenther, 2000), students (St. Louis, et al., 2014), different ages (Evans, Healey, Kawai, & Rowland, 2008; Flynn & St. Louis, 2011), different genders (St. Louis, 2012), and people who have (Doody, Kalinowski, Armson, & Stuart, 1993) and have not had direct contact with PWS (Craig,

Tran, & Craig, 2003). This line of inquiry has also expanded to examine the formulation of stereotypes and self-stigmas in PWS (Blood, Blood, Tellis, & Gabel, 2003; Boyle, 2013) and global perceptions of PWS utilizing the Public Opinion Survey of Human Attributes- Stuttering (POSHA-S) scale undergoing standardization (Ip, St. Louis, Myers, & Xue, 2012; Przepiorka, Blachnio, St. Louis, & Wozniak, 2012; St. Louis, Williams, Ware, Guendouzi, & Reichel, 2014). Again, a vast majority of these studies only examined PWS compared to a portrayal of a fluent speaker.

In hopes of positively changing participants' attitudes and beliefs about PWS, researchers have also educated participants about stuttering then reassessed their judgments. For instance, Langevin and Narasimha Prasad (2012) had children participate in an educational program about stuttering and bullying. They found that all children demonstrated significant improvements on the questionnaires (Peer Attitudes Toward Children who Stutter (PATCS) and the Provictim scale), with higher changes in scores for those children who did not know someone who stutters after having participated in the education program. Flynn and St. Louis (2011) studied changes in adolescent attitudes toward stuttering after a live oral or recorded video presentation on stuttering. They determined that attitudes can be improved, at least temporarily, toward stuttering in both types of educational experiences but more so via a live presentation. Abdalla, St. Louis, Schuele, and Kelly (2014) looked at changing adult attitudes toward stuttering, specifically in teachers, using an educational documentary video. Through their study it was determined, like with children and adolescents, that it is possible to modify attitudes towards PWS. Though these studies have demonstrated that it is possible to change a

stereotype with education across a variety of ages, it is still uncertain as to the longevity of these changes.

A parallel line of research to attitudes, beliefs, and stereotypes towards PWS has been examining how participants judge personality attributes of fluent speakers and speakers who stutter during audiovisual presentations. Each of these studies revealed different influences on listener perspectives, such as the negative impact of eye contact and stuttering (Tatchell, Van den Berg, & Lerman, 1983), the negative impact of using verbal avoidance behaviors (Von Tiling, 2011; Von Tiling, & Von Gundenberg, 2012), and that increased familiarity with a person with a fluency disorder can impact perceptions (Farrell, Blanchet, & Tillery, 2015). In general stuttered speech elicits a more negative assignment of personal attributes and a less favorable perception of the situation. However, without comparing these attitudes and beliefs towards other disorders one is left wondering; *"are these findings specific to stuttering or more global stereotypes?"*.

Researchers have also used similar audiovisual presentations of fluent and stuttered speech to examine eye-gaze behaviors of participants during the video observations. Bowers, Crawcour, Saltuklaroglu, and Kalinowski (2010) reported that participants looked away from the eyes of a PWS more frequently in the stuttered speech condition as compared to the same speaker in a fluent condition. Results of this study indicated a decreased observation of eye regions with an increased observation on the nose region where nostril flaring was the prominent visually evident stuttering behavior. Similar results of decreased observation time and frequency spent viewing eye regions of speakers who stutter as compared to typically fluent speakers have also been found by other researchers (Hudock et al., 2015; Zhang & Kalinowski, 2012). All three of these

studies reported decreased observations of eye regions for the stuttered stimuli and increased observations of the visually evident associated stuttering behaviors. Interestingly, by examining eye gaze behaviors during segmented fluent and stuttered periods of the stuttered stimuli, Hudock et al., (2015) reported that participants initially viewed visually evident stuttering behaviors as stuttering moments began, but then consciously redirected their gaze to outside regions, as to not stare at the stuttering behaviors. This demonstrates an inherent behavioral response that is cognitively overridden possibly due to emotional or social factors. All three of these studies noted the emotionality that is inferred from decreased eye gaze as a result of stuttered speech. It was postulated that these behavioral responses are potentially a result of emotional and cognitive factors in a listener. By studying inherent reactions, such as physiological responses concurrently with emotional state responses and cognitive attitudes and beliefs towards speakers, we can learn more about why these behavioral reactions occur and how they may be cognitively overridden to enhance the quality of communication exchanges.

Researchers have also utilized state-emotional responses and physiological measures to infer emotional state and autonomic system responses (inherent reactions) to stuttering and fluent speech. There is a small but growing body of evidence that demonstrates that when presented with stuttered speech a strong negative emotional response is elicited in listeners (Guntupalli, et al., 2006; Guntupalli, Everhart, Kalinowski, Nanjundeswaran, & Saltuklaroglu, 2007; Hudock, Altieri, Seikel, & Pretzer, 2014). In these studies, participants were presented with short videos of fluent speech or stuttered speech and then used a likert style scale to rate their emotional state in several categories, typically before and after each video. This enabled researchers to determine

how differences in speech, specifically stuttered or fluent, impacted the emotional state of a listener. Findings consistently demonstrated that listeners feel more unhappy, nervous, uncomfortable, avoiding, and annoyed when viewing stuttered speech compared to fluent speech (Guntupalli, et al., 2007). Participants' heart-rates (HR) and skin conductances (SC) were also recorded during baseline phases and video presentations to determine the impact of stuttered speech on their autonomic nervous system.

Guntupalli, et al. (2006) began this particular line of inquiry, specifically looking at physiological responses of listeners, in an attempt to determine the genesis of the negative stereotypes toward stuttering. They found that listeners experience a significant increase in SC and a significant deceleration of HR when exposed to stuttered speech. Such a type of response indicated physiological arousal in the listener to stuttered speech suggesting a more attentive state during stuttering than during fluent speech. This type of response has been equated to the level of arousal that occurs when individuals watch surgery take place. Additionally, it was postulated that this physiological arousal could be the emotional genesis for listener's negative stereotypes of PWS. Guntupalli, et al (2007) then studied emotional state responses and physiological responses of listeners together to cast further light on the origin of the negative stereotype and further determine impact of stuttering on listeners. Again it was found that listeners experience a deceleration of HR and increase in SC when exposed to stuttered speech as compared to fluent speech. Zhang, Kalinowski, Saltuklaroglu, & Hudock (2010) then wanted to determine if similar physiological responses occurred in PWS. They, indeed, found this to be true that PWS experience increased SC with a deceleration in HR when presented with stuttered speech. All of these studies demonstrate a state of physiological arousal associated with the

autonomic nervous system most typically considered to be a physiological pause where the listener must pay more attention to the stimulus at hand (Buck & Buck, 1970).

Again, many of these areas of research have only examined stuttering compared to fluency and have not included other speech disorders in their comparisons. As a step in this process to examine if it is a specific stuttering stereotype, or if it might be a more general stereotype towards people with differences or communication disorders, it is beneficial to first examine the auditory and visual disruptive behaviors of stuttering to primarily auditory, verbal production deficits, as is seen in dysarthria. Stuttered speech is characterized by disruptions such as blocks, repetitions, and prolongations with associated secondary behaviors such as, but not limited to, lip tension and protrusions, reduced eye contact, excessive blinking, head jerking, nostril flaring, and extremity movements (Bloodstein & Bernstein-Ratner, 2008). On the other hand, speakers with dysarthria experience a weakness, or dyscoordination of speech structures that can result in slowed speech and/or breathy, harsh, or hoarse vocal quality with few/no secondary behaviors (Duffy, 2012).

Similar to research determining listener emotional response to stuttered speech, Lass, Ruscello, Harkins, and Blankenship (1993) examined listener emotional response to dysarthric speech compared to fluent speech. They found similar results that indicated that listeners rated dysarthric speech more negatively than fluent speech. Of the few articles that have compared stuttering to other speech disorders, McKinnon, Hess, and Landry (1986) compared listener reactions to audio recordings of stuttering, hypernasality, lateral lisping, and fluent speech. It was determined that overall listeners experience negative emotional responses to disordered speech with no difference

determined between stuttering, hypernasality, and lisping. Hudock, et al. (2014) compared self-reported emotional and physiological reactions to fluent, stuttered, and dysarthric speech. They found that stuttering causes more negative reactions than dysarthria in listeners. However, over all, both dysarthria and stuttering were considered to be more negative than fluent presentations. The physiological responses were in line with Guntupalli, et al (2007) for both stuttering and dysarthria with little difference found between the two. These findings lend credence to the possibility of a global stereotype for disordered speech with listeners experiencing similar negative emotional responses and similar physiological responses to more speech disorders beyond stuttering.

This large body of research, related to cognitive stereotypes, has primarily examined one specific population, stuttering, and has revealed consistent findings leading to what is known as the "stuttering stereotype". However, in the few studies that have examined other populations in comparison to stuttering, we begin to see the possibility of a general stereotype towards people with other communication disorders. Similar to the studies regarding stereotypes, the examination of listener's physiological response have only been examined in conjunction with stuttered speech. We are left with the following questions: is there truly a general stereotype toward disordered speech or differences? And is there a difference in stereotypes, emotional state response, and physiological response in listeners when examining stuttering to other populations? Therefore it is pertinent to examine stereotypes, state-emotional responses, and physiological arousal to stuttering and dysarthia to further determine differences across various communication disorders. Based on previous studies, we hypothesize similar stereotype responses to stuttered speech and similar physiological responses. Additionally, we suspect similar

stereotype responses to dysarthria as compared to stuttering based on similar research. Given the visual differences between the disorders we postulate potential subtle differences in state and physiological responses between the groups. The aim of this study was to examine differences in stereotype, emotional state, and physiological responses between fluent, stuttered, and dysarthric speech.

Chapter 2

Methods

Participants

Twenty-two typically developing fluent adults (9 males and 13 females), ages 18-63 years (mean= 30.21, standard deviation (SD) = 15.18) participated in the study. All of the participants reported normal hearing, normal or corrected vision, and English as their native language. Each were typically developing with no self-reported intellectual, emotional, psychological, neurological, reading, speech, or language deficits. Participants had only limited personal, peer, or professional experience with individuals who have communication disorders. Three participants were excluded from analysis, two for familiarity with stimuli speakers and one for disclosing diagnosed ASD after participation. All participants signed an informed consent document (approved by the Idaho State University Human Subjects Committee) before beginning the experiment.

Stimuli

Vignettes of hypothetical fluent, stuttering, and dysarthric speakers for stereotype assessment were in a similar style to vignettes used by Betz, Blood, and Blood (2008), *see Appendix A.* Betz, et al. (2008) presented vignettes of preschool aged children, ours were changed to adult aged individuals in their mid-forties, an average of the video stimuli speakers. Self-reported response questions were obtained and modified from Guntupalli et al., (2007) and have been used in prior studies (e.g., Hudock et al., 2014). The video stimuli consisted of six speakers (i.e., 2: Fluent Speakers, People who Stutter, and Speakers with Parkinsonian Dysarthria) orally reading 7th grade level texts as they maintained direct gaze with the teleprompter in the Idaho State University television

studio. Speakers were filmed with a black background and a shoulder width level of focus that allowed capture of secondary stuttering behaviors that occurred at the level of the face.

Apparatus

The audiovisual stimulus was presented on an Optiplex (model 9010) computer via E-PRIME 2.0 stimulus presentation software on a 27-inch widescreen Samsung HDTV monitor. Before placing electrodes, participants washed hands to maintain consistent skin hydration then abraded the electrode locations using alcohol swabs for a consistent oil to skin ratio. Then participants had BIOPAC MP 150 electrodes adhered to the skin of two middle phalanges of their left hand to document skin conductance (SC). The electrodes were attached to the remote transducer BIONOMADIX (MODEL BN-TX). Electrocardiogram (ECG) information was collected from BIOPAC on left and right clavicle placements and one left inferior rib placement per the manufacturers specifications.

Procedure

Participants were provided with brief descriptions regarding the instrumentation and procedures prior to starting the experiment. Each then signed an informed consent document. The participants were then presented with a randomized sequence of the three stereotypes assessments (i.e., fluent, dysarthric, or stuttered). After each narrative the participants responded to a likert style bipolar adjective scale, similar to that created by Woods and Williams (1976), *see Appendix B*. Before beginning the next portion of the study where they were hooked up to the electrodes then shown the video stimuli. E-prime version 2.0 study script was then started which presented descriptive text requesting that

the participants remain calm and still for the baseline phase. Participants then responded to six baseline state response questions, which was then followed by presentation of a randomized 30-second audiovisual clip of the stimuli speaker. After each video presentation participants responded to the eight state response questions (*Appendix C*) that was then followed by another baseline period prior to the next video presentation. Sequence of stimuli presentation was randomized via www.randomizer.org.

Analysis

To analyze state-emotional responses, difference values were first obtained. This was done by subtracting response data collected after each video presentation from baseline responses obtained previous to stimuli presentations. Similar difference values were obtained to analyze the physiological data. Previous literature has analyzed HR and SC independently instead of as covariates (Bowers, et al., 2010; Guntupalli, et al., 2006; Guntupalli, et al., 2007; Guntupalli, et al., 2012) thus the same method was utilized here. Repeated measures analyses of variance (ANOVA) were conducted to examine items on the stereotype assessment, state-emotional response differences, and physiological arousal. If significant differences were revealed, researchers utilized post-hoc comparisons with Bonferroni adjustments. Additionally, orthogonal single planned degree of freedom (df) contrast comparisons were utilized to examine the source of the main-effects for the state-emotional responses and physiological arousal. These four comparisons included 1) Fluent (F) to combined disfluent (equally weighted dysarthria and stuttering items) (C), 2) F to Dysarthric (D), 3) F to Stuttered (S) , and 4) D to S.

Chapter 3

Results

Stereotypes

Participants' mean ratings, standard errors (*SE*), and 95% confidence-intervals (CI) are presented in *Appendix D*. Graphical representation of mean ratings with SE error bars are presented in *figure 1.* Results of the repeated measures analysis of variance (ANOVA) are presented in *table 1*. Statistically significant differences were revealed for questions 1-8, 11, 18, 21, 24, and 25 (withdrawn/outgoing, tense/relaxed, avoiding/approaching, afraid/confident, introverted/extroverted, nervous/calm, self-conscious/self-assured, shy/bold, intelligent/dull, secure/insecure, talkative/reticent, and anxious/composed). Post-hoc comparisons with Bonferroni adjustments were utilized to examine the source of the significant main-effects for the stereotype questions. Results revealed significant differences ($p < .05$) between participants' responses on the fluent stereotype assessment to both the dysarthria and stuttering assessments for questions 1-8, 21, and 24. Additionally, differences between responses on the fluent assessment and the dysarthria assessment were revealed for attributes shy/bold (item 11) and anxious/composed (item 25). One difference between the fluent and stuttering assessments was also revealed for attribute intelligent/dull (item 18). No significant differences between dysarthria and stuttering were revealed for any of the questions. General trends indicated that fluent passages were rated higher/more positively than stuttering or dysarthria. No trends were noted regarding the rating of stuttering versus dysarthria; both were found to be rated similarly across all questions.

State responses

Descriptive statistics of the difference values are presented in *figures 2, 3, and Appendix E* (means, *SE*, and 95% CI). *Table 2* presents inferential statistical results with post-hoc comparisons. Statistically significant differences were revealed for the main-effect of group in anxiety, comfort, interaction, naturalness, and effort, with mood and patience approaching significance. For the main-effect of speaker, statistically significant results were found for the attributes anxiety, interaction, patience, naturalness, and effort. Statistically significant interaction-effects between group x speaker were revealed for naturalness and effort. Trends indicate that when presented with fluent speech, listeners felt calmer, more comfortable, more patient, less tense, and consider the speech to be more natural than dysarthric speech and stuttered speech. There were some nuanced differences between stuttering and dysarthria. Participants reported being more anxious, in a worse mood, and less patient after viewing the stuttered stimuli as compared to the dysarthric stimuli. Main effects were then examined using orthogonal single planned df contrast comparisons for speaker groups, presented in *table 3*. Not surprisingly, fluent speech was judged to be the most natural with least effort, then dysarthia was less natural and more effortful, and stuttering was the most unnatural and effortful.

Physiology

Mean SC group difference values with SE are presented in *figure 4*. A 3 X 2 repeated measures ANOVA was conducted to examine differences between participants SC as a function of group and speaker. Results revealed statistically significant differences for group [F (2, 24) = 21.482, $p < .001$]. No significant differences were revealed for speaker or for the interactions between group x speaker ($p > .05$). Single df

orthogonal planned contrast comparisons were then undertaken to examine the source of the main effect. Differences were revealed between the F to C (p = .020), F to D (p = .031), F to S (p < .001), and D to S (p < .001).

Mean HR differences by speaker with SE are presented in *figure 5.* A 3 x 2 repeated measures ANOVA revealed significant differences between HR difference values for group [F (2, 36) = 2.862, p = .058], speaker [F (2, 18) = 16.142, p < .001], and an interaction between group x speaker [F (2, 36) = 17.617, p = .014]. To examine the effect of group we utilized single df orthogonal planned contrast comparisons of; F to C (p = .025), F to D (p = .029), F to S (p = .085), and D to S (p > .05). As indicated significant differences were found between the fluent to disordered and fluent to dysarthria, but only a trend toward a significant difference was revealed between fluent to stuttering and no difference was revealed between dysarthria to stuttering.

Chapter 4

Discussion

Results from the current study indicate many similarities in participants' stereotypes and some self-reported emotional responses to both speakers with dysarthria and PWS, thereby supporting the notion of a possible general stereotype towards people with communication disorders instead of a stuttering specific stereotype. Interestingly, some specific differences were revealed between judged personality attributes (i.e., stereotype questions), self-reported emotional state, and physiological reactions between the speakers with dysarthria and PWS.

Stereotype

Stereotype responses revealed significant differences between fluent speech and both dysarthria and stuttering. Fluent speech was generally perceived more positively than both stuttering and dysarthria, which is in line with the research that has been previously conducted regarding stereotypes. For both stuttering and dysarthria, participants perceived the hypothetical individual to be more withdrawn, tense, avoiding, afraid, introverted, nervous, self-conscious, quiet, shy, reticent and anxious (numbers 1-8, 11, 24, 25). Again, these particular characteristics align with previous research (Betz, et al., 2008; Cooper & Cooper, 1996; Dorsey & Guenther, 2000; Flynn & St. Louis, 2011; Lass, et al., 1989; St. Louis, 2012; St. Louis & Lass, 1981; Yairi & Williams, 1970). These general similarities between our study and previous literature, with stuttering and dysarthria studied separately, begins to shed light on the "stuttering stereotype". Given that the vast majority has only looked at stuttering versus fluent speech, there is the idea that there is a specific stereotype associated with stuttering. However, as we begin to see

with the general perceptions of stuttering and dysarthria to fluent speech in our study and in the few that have studied other disorders along with stuttering (Allard & Williams, 2008; McKinnon, et al., 1986), there is potential for a general stereotype toward disordered speech with nuanced differences between disorders.

Nuanced differences between stuttering and dysarthria become apparent when observing the directionality of trends for the statistically significant responses. Stuttering was rated to be the most tense, afraid, nervous, self-conscious, and reticent, followed by dysarthria then fluent the least. Dysarthria was rated to be the most withdrawn, avoiding, introverted, quiet, shy, and anxious, followed by stuttering and then fluent the least. Surprisingly, fluent was rated as the most dull with no difference between stuttering and dysarthria, which has not been seen in other studies. It is interesting that stuttering is not rated the most negative in all categories. This is similar to results from Allard and Williams (2008) when they looked at four different disorders, where the other compared disorders were rated more negatively in some areas as compared to stuttering. Different to our study, they found that stuttering was only rated highly negative in the category of self-esteem but with similar results to voice and language disorders, ultimately stuttering was not rated the most negative in any category.

It is surprising that fluent speech was rated the dullest in the category of intelligence. We propose the possibility of error in participant interpretation of word meaning. It is possible that dull was interpreted to mean “boring” as opposed to “unintelligent”. With this interpretation, the participants may have felt that someone with a communication disorder is more interesting than an individual without a communication disorder. Though more research would have to be done to determine if

this is indeed what occurred. More surprising, however, is that dysarthria was rated to be more withdrawn, avoiding, introverted, quiet, shy, and anxious as compared to stuttering. In the narrative read, dysarthria was described as being "parkinsonian" in nature. It is possible our participants have a greater knowledge of Parkinson's, i.e. that it is a developed disorder where initially an individual with it begins life with full function and then degenerates over time. If that is true, they may have utilized aspects of theory of mind, where the participants put themselves into the situation presented. If they determined that, they themselves, would be more withdrawn, avoiding, etc. in that situation, they could have attributed those same attributes to the hypothetical individual. Such an interpretation can logically be based on how fluent speakers rate their beliefs and attitudes when they are asked to put themselves in the shoes of PWS (Banarjee, Casenhiser, Hedinger, Kittilstved, & Saltuklaroglu, 2016; Zhang, Saltuklaroglu, Hough, and Kalinowski, 2009). The same could be true for how they perceived stuttering. If they put themselves in the situation, thinking of themselves as "repeating sounds and words", "blocks where it seems they are gasping for air", and body movements associated with the stutter, they potentially would feel that they, themselves, would be tenser, more afraid, self-conscious, etc. then attributing these same characteristics to others. It is highly probable that in studies similar to ours, where participants with little exposure to these disorders are asked to read about an individual and then rate their personality, theory of mind may contribute to the stereotype formed.

State responses

As we move from stereotype results where we see the potential impact of theory of mind and projecting attributes to others, when we look at the state-emotional responses

we can see the potential impact of embodied empathy on those exposed to disordered speech. The self-report state-emotional responses revealed significant differences for all questions except for tension. Overall trends in responses indicated that listeners felt the most positive when exposed to fluent speech, less positive when exposed to dysarthric speech, and the most negative when exposed to stuttered speech. This overall trend aligns with the research conducted by Hudock, et al. (2014) who found a similar trend, that listeners felt the most positive during fluent speech, less positive during dysarthric speech, and the most negative during stuttered speech. In our study, on the six bipolar adjectives, participants rated themselves being more annoyed, unpleasant, anxious, tense, and avoiding while observing the stuttered and dysarthric speech compared to the fluent speech. Our findings for stuttering, replicated that of Guntupalli, et al. (2007).

On the whole, after observing disordered speech participants reported being more anxious, in a worse mood, exhibiting a decreased desire to interact, and less comfortable and patient. The most notable differences between stuttering and dysarthria were that participants also reported being more anxious, in a worse mood, and less patient after viewing the stuttered stimuli as compared to the dysarthric stimuli. Additionally, participants felt that stuttering was less natural and more effortful than dysarthria. While the negative emotional responses to both the stuttered stimuli and the dysarthric stimuli give additional support for a general negative perception of disordered, the more negative response to stuttering begins to illustrate important differences in listener reactions when exposed to disordered speech through audiovisual means over just reading about it.

Previous research has provided descriptions of the function of the mirror neuron system and its role in developing embodied empathy (Bowers, et al., 2010; Guntupalli, et

al., 2007). In brief, it is a neural network that creates a link between perceptions and production of emotion through a similar coding process for both (Carr, Iacoboni, Dubeau, Mazziota, & Lenzi, 2003). Thus, this system has a possible impact on what happens emotionally when a person observes disordered speech. An individual may see the struggle for communication and through an empathic response feel negative emotion. Therefore, we see similar negative emotions related to both stuttering and dysarthria. The differences between the two, with stuttering over all being rated more negatively may be attributed to a number of factors. For instance, even though care was taken to record stimuli in a shoulder width frame to avoid the influence of secondary behaviors, in previous research the stuttering stimuli still demonstrated facial secondary behaviors such as excessive eye blinking or nostril flaring (Guntupalli, et al., 2007; Zhang, et al., 2010). In our study the videos of the stuttering stimuli were different than previously used and the facial secondary behaviors were less apparent. There was evidence of some lip posturing and occasional extended eye blinking. Even with less severe secondary behaviors in the face, there is still a negative impact on the listener. In addition to influence of secondary behaviors, it was noted that differences in severity of stimuli has a role in listener response. When the severity of the speech samples were compared between the dysarthric and stuttering stimuli, the speech disruptions were remarkably more severe in the stuttering samples than in the dysarthric samples. We propose that when the severity of speech disruptions increases the emotional response in a listener becomes more negative.

Physiology

Similar to previous research the current study revealed significant differences for HR and SC measures. During the presentation of the fluent stimuli, there was an observed increase in HR which is similar to previous studies (Guntupalli, et al., 2007; Guntupalli, et al., 2012). As in those same studies, during the presentation of the stuttered stimuli SC increased which indicates that participants experienced some emotional arousal. However, unlike previous studies the increase in SC during our study was very minimal which may demonstrate that our participants did not experience as much arousal as previously observed. When looking at HR for the stuttered condition, past research has identified a deceleration when viewing unpleasant stimuli, but our study found a trend for an increase in HR (Guntupalli et al., 2007; Zhang et al., 2010). Results from the physiological data for stuttering indicate autonomic arousal similar to that exhibited during fight or flight responses as opposed to the freezing response (decrease in HR, increase in SC) commonly reported in this area of study (Guntupalli, et al., 2006; Guntupalli, et al., 2007; Zhang, et al., 2010). An additional difference was noted in SC for the fluent condition. Our study observed a decrease in SC while others have noted an increase. Hudock, et al. (2014) found similar physiological arousal to stuttering when listeners observed dysarthria, an increase in SC and decrease in HR. The participants in our study experienced the opposite with a decrease in SC and an increase in HR. Interestingly, the decrease in SC during the dysarthria presentations was greater than the decrease observed in the fluent presentations. The trend for HR was also noteworthy, with the greatest increase occurring for stuttering and the least increase occurring for dysarthria.

In our study, the physiological results may demonstrate a contamination of age for the stimuli speakers. The speakers for the stuttering stimuli were much younger than the speakers with dysarthria. It is possible that given the difference in age, the participants felt calmer when listening to the speakers with dysarthria. Additionally, as previously mentioned, the severity of the stuttering stimuli was greater than the severity of the dysarthric stimuli. In previous studies, the stuttering stimuli used was moderate to severe in nature with moments of fluency interspersed throughout (Guntupalli, 2007). However, one of the stimuli speakers in this study presented severe stuttering with disfluencies on mostly every syllable. This could explain why listeners experienced a fight or flight response toward the stuttered stimuli. Potentially, with more intermittent stuttering listeners experience the increased attentive state (decreased HR, increased SC) paid to the aberrant stuttering moments and as severity increases listeners may experience a physiological desire to leave the presence of or aid the speaker more when there is the continuous aberrant interruptions.

Chapter 5

Clinical Implications

This information is vital to helping all clients with fluency disorders, not limited to stuttering, to know the importance of preparing their listener. Using the information from this study clinicians can educate clients about potential reactions to their speech and develop strategies, such as disclosure, to decrease negative reactions and improve communication interactions. These strategies and techniques help the listener to recognize that more effort and patience will be utilized to understand the message being delivered. Additionally, clinicians can train listeners in how to best help and interact with communication partners with disordered speech.

Chapter 6

Conclusion

Stuttering and Dysarthria are communication disorders that are characterized by disfluent events that occur during speaking situations. While similar in that speakers have no control over when these events occur, these two disorders differ in manifestation. Dysarthria is associated with paralysis or weakness of the vocal mechanism, which can lead to slowed speech and/or hoarse vocal quality with infrequent secondary behaviors. Stuttering on the other hand is characterized not only by speech disruptions (i.e. blocks, repetitions, etc) but includes associated secondary behaviors that vary across individuals. Though different in manifestation, our results indicate that listeners with little exposure to either disorder experience similar negative responses with some nuanced differences between observations of speakers within the disorder categories. Most prominently, our results call into question the stuttering specific stereotype. We pose the question what if there is not a specific stuttering stereotype, but rather a more general stereotype towards people with communications differences and disorders.

Chapter 7

Limitations and Future Research

Limitations to this study were observed primarily in the severity and age differences between the stuttering and dysarthria speech samples. Also, the participants were primarily college students from the Southeast Idaho region. Future studies should compare similar severity levels and ages of speakers to assure that results are not because of those differences. Including participants from beyond this region would be advised.

To further this vein of research, it would be pertinent to expand observations to disorders beyond stuttering and dysarthria. This would determine if there is accuracy in our conclusions that there is a general stereotypes towards communication disorders. Additionally, this would expand knowledge of how listener responses to fluency disorders compare to non-fluency disorders and provide insight for therapy of clients with all types of communication disorders.

References

Abdalla, F., St. Louis, K. O., Schuele, C. M., Kelly, E. (2014). Modifying attitudes of arab school teachers toward stuttering. *Language, Speech, & Hearing Services in Schools, 45*(1), 14-25. doi:10.1044/2013_LSHSS-13-0012

Allard, E. R., & Williams, D. F. (2008). Listeners' perceptions of speech and language disorders. *Journal of Communication Disorders, 41*(2), 108-123. doi:10.1016/j.jcomdis.2007.05.002

Banerjee, S., Casenhiser, D., Hedinger, T., Kittilstved, T., & Saltuklaroglu, T. (2016). The perceived impact of stuttering on personality as measured by the NEO-FFI-3. *Logopedics Phoniatrics Vocology,* 1-7. doi:10.3109/14015439.2016.1152504

Betz, I. R., Blood, G. W., & Blood, I. M. (2008). University students' perceptions of pre-school and kindergarten children who stutter. *Journal of Communication Disorders, 41*(3), 259-273. doi:10.1016/j.jcomdis.2007.10.003

Biernat, M. & Dovidio, J. F. (2000). Stigma and stereotypes. In T. F. Heatherton, R. E. Kleck, M. R. Hebl, & J. G. Hull (Eds.), *The Social Psychology of Stigma* (88-125). New York, NY: Guilford Press.

Blood, G. W., Blood, I. M., Tellis, G. M., & Gabel, R. M. (2003). A preliminary study of self-esteem, stigma, and disclosure in adolescent who stutter. *Journal of Fluency Disorders, 28*(2), 143-159. doi:10.1016/S0094-730X(03)00010-X

Bloodstein, O. (1995). *A Handbook on Stuttering*. San Diego, CA: Singular.

Bowers, A. L., Crawcour, S. C., Saltuklaroglu, T., & Kalinowski, J. (2010). Gaze aversion to stuttered speech: A pilot study investigating differential visual attention to stuttered and fluent speech. *International Journal of Language & Communication Disorders, 45*(2), 133-144. doi:10.3109/13682820902763951

Boyle, M. P. (2013). Psychological characteristics and perceptions of stuttering of adults who stutter with and without support group experience. *Journal of Fluency Disorders, 38*(4), 368-381. doi:10.1016/j.jfludis.2013.09.001

Boyle, M. P., Blood, G. W., & Blood, I. M. (2009). Effects of perceived causality on perceptions of persons who stutter. *Journal of Fluency Disorders, 34*(3), 201-218. doi:10.1016/j.jfludis.2009.09.003

Buck, R.W., & Buck, M. (1970). Skin conductance, heart rate, and attention to the environment in two stressful situations. *Psychonomic Science, 18*(2), 95-96.

Carr, I., Iacoboni, M., Dubeau, M. C., Mazziota, J. C., & Lenzi, G. I. (2003). Neural mechanisms of empathy in humans: A relay from neural systems for imitation to limbic áreas. *Preceedings of the National Academy of Sciences, USA,* 100, 5497-5502.

Cooper, E. B. & Cooper, C. S. (1996). Clinician attitudes towards stuttering: Two decades of change. *Journal of Fluency Disorders, 21*(2), 119-135. doi:10.1016/0094-730X(96)00018-6

Craig, A., Iran, Y., & Craig, M. (2003). Stereotypes towards stuttering for those who have naver had direct contact with people who stutter: A randomized and stratified study. *Perceptual and Motor Skills, 97*(1), 235- 245. doi: 10.2466/pms.2003.97.1.235

Doody, I., Kalinowski, J., Armson, J., & Stuart, A. (1993). Stereotypes of stutterers and nonstutterers in three rural communities in Newfoundland. *Journal of Fluency Disorders, 18*(4), 363-373.

Dorsey, M., & Guenther, R. K. (2000). Attitudes of professors and students toward college students who stutter. *Journal of Fluency Disorders, 25*(1), 77–83. doi:10.1016/S0094-730X(99)00026-1

Duffy, J. R. (2012). *Motor speech disorders.* St. Louis, MI: Elsevier.

Evans, D., Healey, E. C., Kawai, N., & Rowland, S. (2008). Middle school students' perceptions of a peer who stutters. *Journal of Fluency Disorders, 33*(3), 203-219. doi: 10.1016/j.jfludis.2008.06.002

Farrell, L.M., Blanchet, P. G., & Tillery, K. L. (2014). Effects of video exposure to cluttering on undergraduate students' perceptions of a person who clutters. *International Journal of Language & Communication Disorders, 50*(3), 347-357. doi:10.1111/1460-6984.12139

Flynn, T. W., & St. Louis, K. O. (2011). Changing adolescent attitudes toward stuttering. *Journal of Fluency Disorders, 36*(2), 110-121. doi:10.1016/j.jfludis.2011.04.002

Guntupalli, V. K., Everhart, D. E., Kalinowski, J., Nanjundeswaran, C., & Saltuklaroglu, T. (2007). Emotional and physiological responses of fluent listeners while watching the speech of adults who stutter. *International Journal of Language & Communication Disorders, 42*(2), 113-149. doi:10.1080/10610270600850036

Guntupalli, V. K., Kalinowski, J., Nanjundeswaran, C., Saltuklaroglu, T., & Everhart, D. E. (2006). Psychophysiological responses of adults who do not stutter while listening to stuttering. *International Journal of Psychophysiology*, 62(1), 1-8.

Guntupalli, V. K., Nanjundeswaran, C., Dayalu, V. N., & Kalinowski, J. (2012). Autonomic and emotional responses to graduate student clinicians in speech-language pathology to stuttered speech. *International Journal of Language & Communication Disorders, 47*(5), 603-608.

Hudock, D., Altieri, N., Seikel, A. T., & Pretzer, G. (2014). *Reactions to typical and disordered speech.* Poster session presented at Idaho State University Research Day, Pocatello, ID.

Hudock, D., Stuart, A., Saltuklaroglu, T., Jianliang, Z., Murray, N., Kalinowski, J., & Altieri, N. (2015). Segmented analysis of eye gaze behaviors of fluent and stuttered speech. *Canadian Journal of Speech-Language Pathology & Audiology, 39*(2), 134-145.

Ip, M. L., St. Louis, K. O., Myers, F. L., & Xue, S. A. (2012). Stuttering attitudes in Hong Kong and adjacent mainland China. *International Journal of Speech-Language Pathology, 14*(6), 543-556. doi: 10.3109/17549507.2012.712158

Irani, F., Abdalla, F., Gabel, R. (2012). Arab and American teachers' attitudes toward people who stutter: A comparative study. *Contemporary Issues in Communication Science and Disorders, 39*(39), 12-20. doi: 1092-5171/12/3901-0012

Irani, F., & Gabel, R. (2008). Schoolteachers' attitudes towards people who stutter: Results of a mail survey. *Canadian Journal of Speech-Language Pathology & Audiology, 32*(3), 129-134.

Kalinowski, J., & Saltuklaroglu, T. (2006). *Stuttering*. San Diego, CA: Plural.

Langevin, M., & Narasimha Prasad, N. G. (2012). A stuttering education and bullying awareness and prevention resource: A feasibility study. *Language, Speech & Hearing Services in Schools, 43*(3), 344-358. doi: http://dx.doi.org/0161-1461(2012/11-0031)

Lass, N. J., Ruscello, D. M., Harkins, K. E., & Blankenship, B. L. (1993). A comparative study of adolescents' perceptions of normal-speaking and dysarthric children. *Journal of Communication Disorders, 26*, 3–12.

Lass, N. J., Ruscello, D. M., Pannbacker, M., Schmitt, J. F., & Everly-Myers, D. S. (1989). Speech–language pathologists' perceptions of child and adult female and male stutterer. *Journal of Fluency Disorders, 14*(2), 127–134.

Lass, N. J., Ruscello, D. M., Pannbacker, M., Schmitt, J. F., Kiser, A. M., Mussa, A. M., & Lockhart, P. (1994). School administrators' perceptions of people who stutter. *Language, Speech, and Hearing Services in Schools, 25*(2), 90-93. doi: 10.1044/0161-1461.2502.90

McKinnon, S. L., Hess, C. W., & Landry, R. G. (1986). Reactions of college students to speech disorders. *Journal of Communication Disorders, 19*(1), 75-82.

Przepiorka, A. M., Blachnio, A., St. Louis, K. O., & Wozniak, T. (2012). Public attitudes toward stuttering in Poland. *International Journal of Language & Communication Disorders, 48*(6), 703-714. doi: 10.1111/1460-6984.12041

St. Louis, K. O. (2012). Male versus female attitudes toward stuttering. *Journal of Communication Disorders, 45*(3), 246-253. doi:10.1016/j.jcomdis.2011.12.005

St. Louis, K. O., & Lass, N. J. (1981). A survey of communicative disorders students' attitudes toward stuttering. *Journal of Fluency Disorders, 6*(1), 49–79.

St. Louis, K. O., Przepiorka, A. M., Best-Guldborg, A., Williams, M. J. Blachnio, A., Guendouzi, J., … & Ware, M. B. (2013). Comparing attitudes of students: Professional, intracultural, and international comparisons. *Journal of Fluency Disorders, 39*, 34-50.

St. Louis, K. O., Williams, M. J., Ware, M. B., Guendouzi, J., & Reichel, I. K. (2014). The Public Opinion Survey of Human Attributes-Stutttering (PSHA-S) and Bipolar Adjective Scale (BAS): Aspects of validity. *Journal of Communication Disorders, 50*, 36-50. doi: 10.1016/j.jcomdis.2014.04.001

Van Riper, C. (1971). *The Nature of Stuttering*. Englewood Cliffs, NJ: Prentice-Hall.

Von Tiling, J. (2011). Listener perceptions of stuttering, prolonged speech, and verbal avoidance behaviors. *Journal of Communication Disorders, 44*(2), 161-172. doi:10.1016/j.jcomdis.2010.09.002

Williams, D. F., & Dietrich, S. (1996). Effects of speech and language disorders on raters' perceptions. *Journal of Communication Disorders, 29*(1), 1-12. doi:10.1016/0021-9924(94)00014-X

Williams, D. F., & Dietrich, S. (2001). Perceptions of communicative disorders: Verification and specification of rater variables. *Journal of Communication Disorders, 34*(4), 355-366. doi:10.1016/S0021-9924(01)00055-7

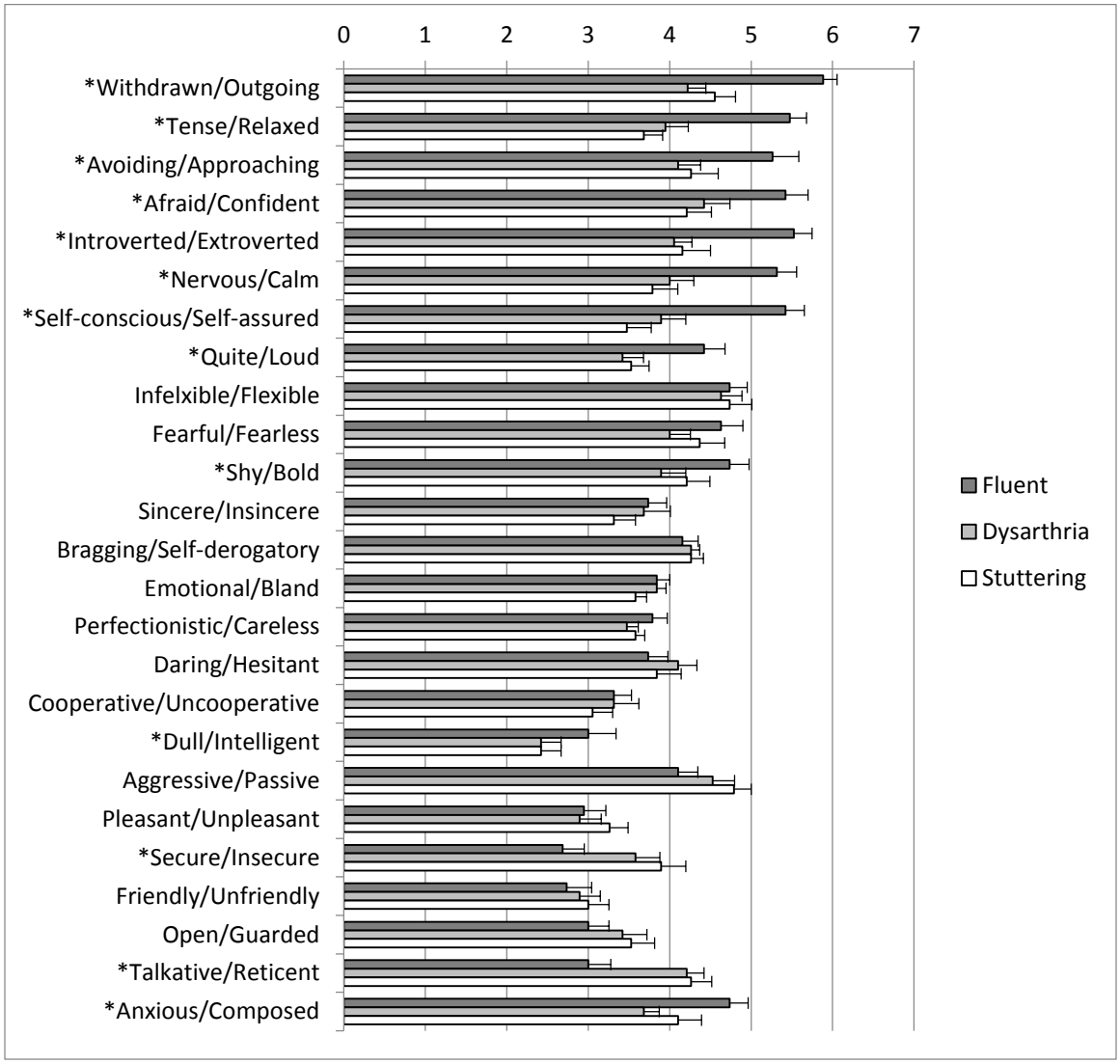
Woods, C. L. & Williams, D. E. (1976). Traits attributed to stuttering and normally fluent males. *Journal of Speech, Language, and Hearing Research, 19*, 267-278. doi:10.1044/jshr.1902.267

Yairi, E., & Williams, D. E. (1970). Speech clinicians' stereotypes of elementary school boys who stutter. *Journal of Communication Disorders, 3*(3), 161-170.

Zhang, J., Kalinowski, J., Saltuklaroglu, T., & Hudock, D. (2010). Stuttered and fluent speakers' heart rate and skin conductance in response to fluent and stuttered speech. *International Journal of Language & Communication Disorders, 45*(6), 670-680. doi:10.3109/13682820903391385

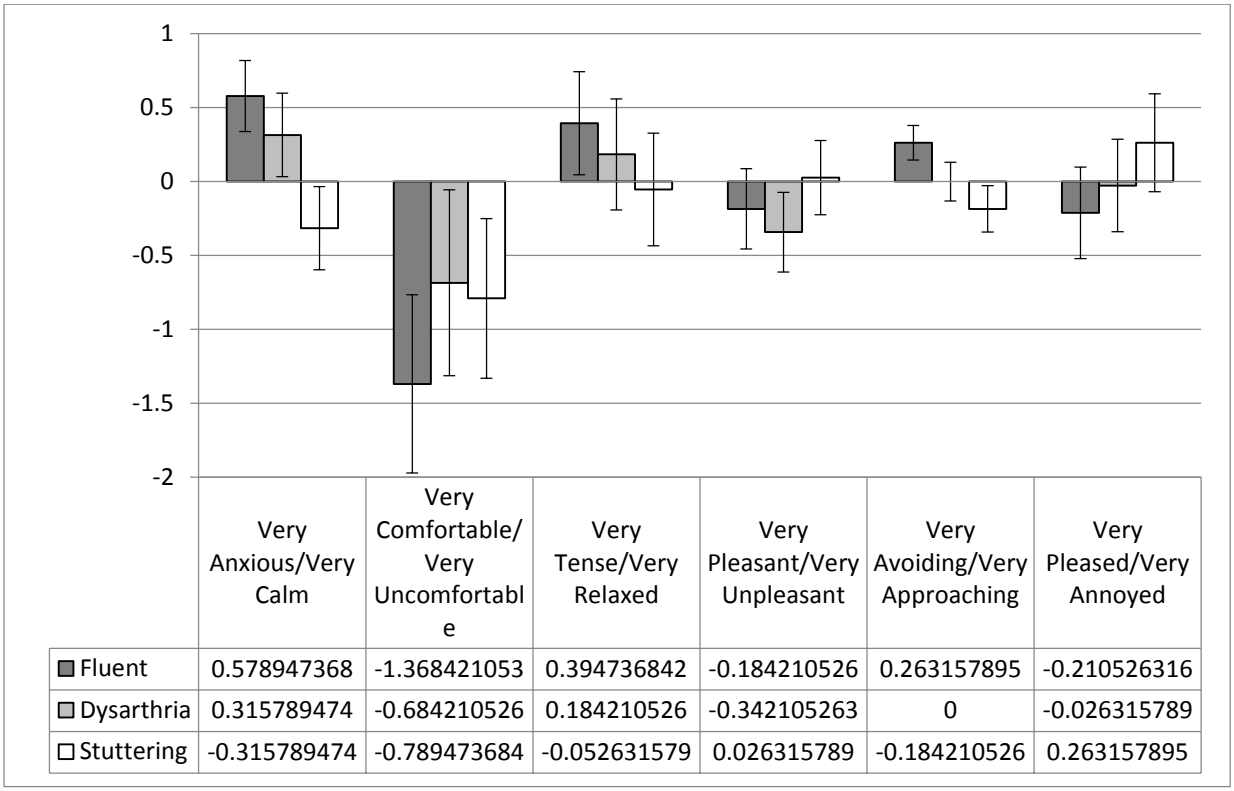
Zhang, J., Saltuklaroglu, T., Hough, M., & Kalinowski, J. (2009). Jobs, sex, love, and lifestyle: When nonstutterers assume the roles of stutterers. *Folia Phoniatrica et Logopaedica, 61*(1), 18-23. doi:10.1159/000187621

Figure 1: Mean ratings and standard errors (SE) for stereotype assessments



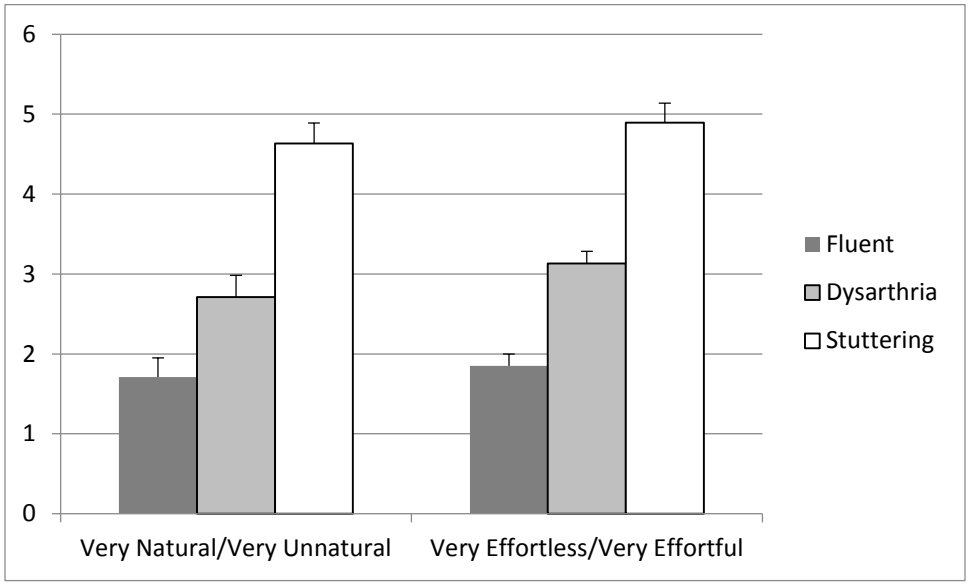
Note: * indicates statistically significant responses of < .05

Figure 2. Mean differences and standard errors for self-report state-emotional response questions 1-6.



	Very Anxious/Very Calm	Very Comfortable/ Very Uncomfortable	Very Tense/Very Relaxed	Very Pleasant/Very Unpleasant	Very Avoiding/Very Approaching	Very Pleased/Very Annoyed
Fluent	0.578947368	-1.368421053	0.394736842	-0.184210526	0.263157895	-0.210526316
Dysarthria	0.315789474	-0.684210526	0.184210526	-0.342105263	0	-0.026315789
Stuttering	-0.315789474	-0.789473684	-0.052631579	0.026315789	-0.184210526	0.263157895

Figure 3. Mean ratings and SE for self-report emotional state response questions 7 and 8.



Note. These questions were not included in base line measures for state responses. Thus we present mean ratings as opposed to differences.

Figure 4: Mean differences and SE for SC.

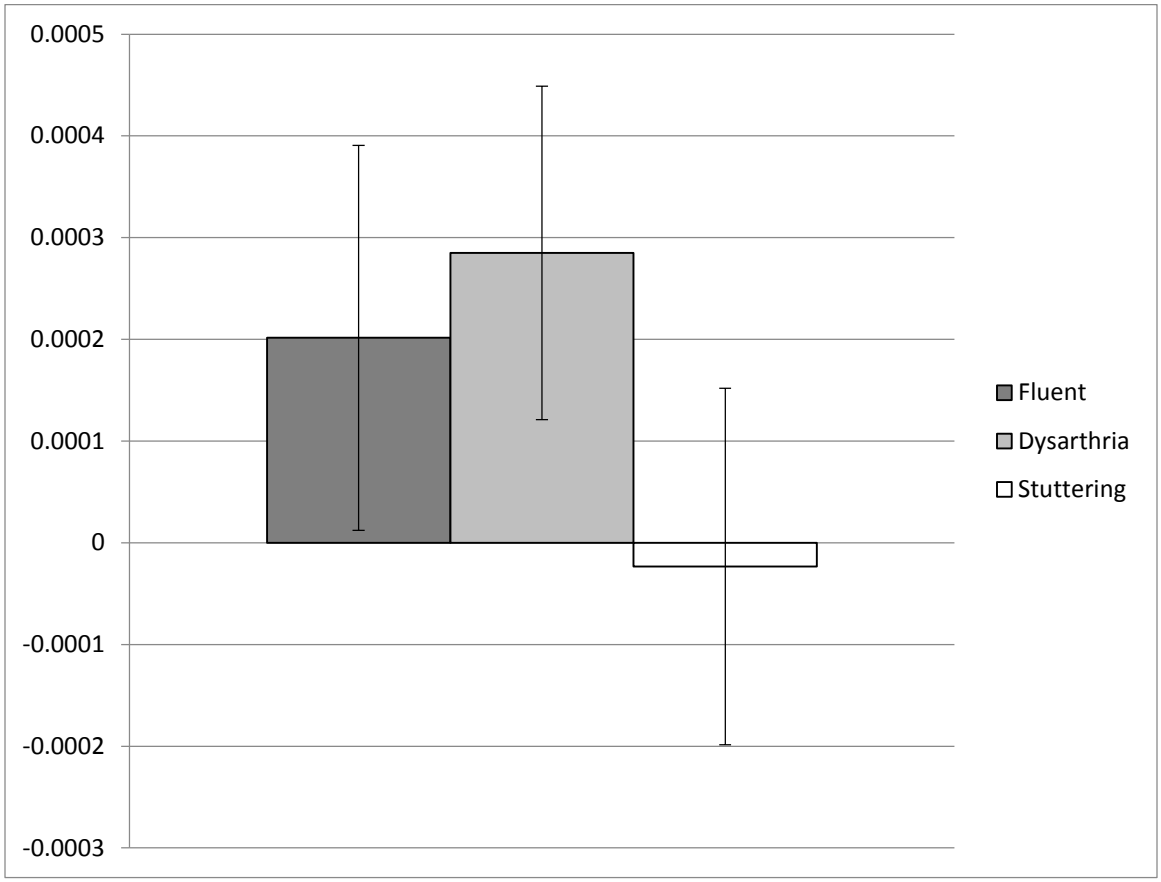


Figure 5: Mean differences and SE for HR

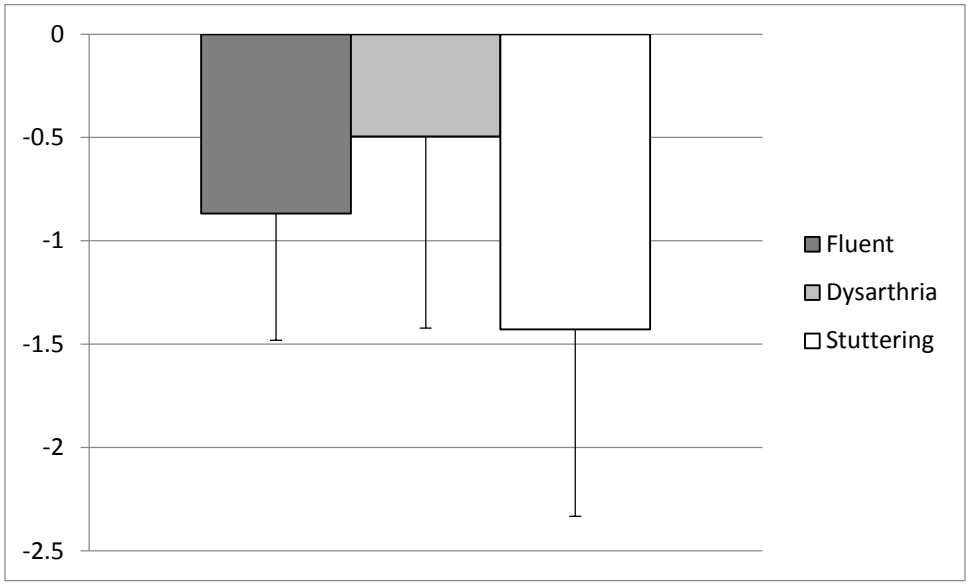


Table 1. Inferential statistical results from stereotype assessments.

Question	*F*	*p*	n^2
1. withdrawn/outgoing	20.248	< .001	.529
2. tense/relaxed	29.473	< .001	.621
3. avoiding/approaching	5.151	.011	.223
4. afraid/confident	12.798	.002	.416
5. introverted/extroverted	14.306	< .001	.443
6. nervous/calm	12.764	< .001	.415
7. self-conscious/self-assured	17.329	< .001	.491
8. quiet/loud	6.621	.004	.269
9. inflexible/flexible	*NS*	*NS*	*NS*
10. fearful/fearless	*NS*	*NS*	*NS*
11. shy/bold	4.927	.013	.215
12. sincere/insincere	*NS*	*NS*	*NS*
13. bragging/self-derogatory	*NS*	*NS*	*NS*
14. emotional/ bland	*NS*	*NS*	*NS*
15. perfectionistic/careless	*NS*	*NS*	*NS*
16. daring/hesitant	*NS*	*NS*	*NS*
17. cooperative/uncooperative	*NS*	*NS*	*NS*
18. intelligent/dull	4.472	.03	.199
19. aggressive/passive	*NS*	*NS*	*NS*
20. pleasant/unpleasant	*NS*	*NS*	*NS*
21. secure/insecure	7.491	.002	.292
22. friendly/unfriendly	*NS*	*NS*	*NS*
23. open/guarded	*NS*	*NS*	*NS*
24. talkative/reticent	10.294	< .001	.364
25. anxious/composed	6.400	.004	.262

Note. $n = 19$, degrees of freedom (df) for all but question 18 were 2, 36. Results revealed a significant difference for sphericity on question 18; therefore corrected *Greenhouse-Geisser* (df 1.497, 26.937) are reported. Non-significant differences indicated by *NS*.

Table 2. Inferential statistics for self-report emotional state response questions.

	Category				Speaker				Category x Speaker				Post-hoc comparisons		
Question	df	*F*	*p*	n^2	df	*F*	*p*	n^2	df	*F*	*p*	n^2	F – D	F – S	D - S
Anxiety	1.252	10.115	.003	.360	1.000	8.214	.010	.313	*NS*	*NS*	*NS*	*NS*	.263 +	.895*	.632*
Comfort	2	3.788	.032	.174	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	-.684*	-.579	.105
Tension	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	.211	.447	.237
Mood	2	3.245	.051+	.153	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	.158	-.211	-.368*
Interaction	1.583	3.610	.050	.167	1.000	7.310	.015	.289	*NS*	*NS*	*NS*	*NS*	.263	.447+	.184
Patience	1.302	3.600	.060	.167	1.000	5.029	.038	.218	*NS*	*NS*	*NS*	*NS*	-.184	-.474	-.289+
Naturalness	2	59.689	.000	.768	1	6.369	.021	.261	2	6.095	.005	.253	-1.000*	-2.921*	-1.921*
Effort	2	201.743	.000	.918	1	10.593	.004	.370	2	18.769	.000	.510	-1.282*	-3.046*	-1.763*

Note. Corrected *Greenhouse-Geisser* values reported for Anxiety, Interaction, and Patience due to significant differences for sphericity. Post-hoc comparisons made with Bonferroni adjustments, * indicates significance at < .05 and + indicates approaching significance.

Table 3: Main effect contrast comparisons inferential statistics for self-report emotional state responses

	F:C			F:D			F:S			D:S		
Question	*F*	*P*	n^2	*F*	*p*	n^2	*F*	*p*	n^2	*F*	*p*	n^2
Anxiety	13.091	.002	.421	6.429	.021	.263	12.283	.003	.406	8.062	.011	.309
Comfort	5.238	.034	.225	5.597	.029	.237	3.742	.069+	.172	*NS*	*NS*	*NS*
Tension	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*
Mood	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	7.840	.012	.303
Interaction	7.620	.013	.297	5.056	.037	.219	5.499	.031	.234	*NS*	*NS*	*NS*
Patience	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	4.208	.055+	.189	6.153	.023	.255
Naturalness	62.873	.000	.777	15.200	.001	.458	95.265	.000	.841	55.769	.000	.756
Effort	261.357	.000	.936	81.647	.000	.819	344.465	.000	.950	138.360	.000	.885

Note. + indicates approaching significance

Appendix A: Vignettes

Vignette A – Imagine a person named Sam. He is a single, 45-year-old white man. Since graduating from college, Sam has been steadily employed and makes a decent living. Usually, Sam gets along well with his family and co-workers. He enjoys reading and going out with his friends. Sam began stuttering when he was three years of age. He repeats sounds and words. Sometimes his speech is stopped by "blocks" where there is just silence and it appears as if he is gasping for air. He also moves his hands or shoulders and makes movements with his mouth when attempting to get through his stuttering.

Vignette B – Imagine a person named Nathan. He is a single, 45-year-old white man. Since graduating from college, Nathan has been steadily employed and makes a decent living. Usually, Nathan gets along well with his family and co-workers. He enjoys reading and going out with his friends. Nathan began speaking when he was three years old. Nathan was recently diagnosed with Parkinson's disease and has a speech disorder called dysarthria because of it. He typically talks slower and his words often run together. His speech sounds robot like. The only difference in Nathan is the way his speech sounds. He doesn't have any physical signs of Parkinson's yet.

Vignette C – Imagine a person named Ryan. He is a single, 45-year-old white man. Ryan began speaking when he was three years of age. Since graduating from college, Ryan has been steadily employed and makes a decent living. Usually, Ryan gets along well with his family and co-workers. He enjoys reading and going out with his friends.

Appendix B: Stereotype scale

Question #	Adjective on left	Closer to adjective on left			Equally between both adjectives	Closer to adjective on right			Adjective on right
1.	Withdrawn	1	2	3	4	5	6	7	Outgoing
2.	Tense	1	2	3	4	5	6	7	Relaxed
3.	Avoiding	1	2	3	4	5	6	7	Approaching
4.	Afraid	1	2	3	4	5	6	7	Confident
5.	Introverted	1	2	3	4	5	6	7	Extroverted
6.	Nervous	1	2	3	4	5	6	7	Calm
7.	Self-conscious	1	2	3	4	5	6	7	Self-assured
8.	Quiet	1	2	3	4	5	6	7	Loud
9.	Inflexible	1	2	3	4	5	6	7	Flexible
10.	Fearful	1	2	3	4	5	6	7	Fearless
11.	Shy	1	2	3	4	5	6	7	Bold
12.	Sincere	1	2	3	4	5	6	7	Insecure
13.	Bragging	1	2	3	4	5	6	7	Self-derogatory
14.	Emotional	1	2	3	4	5	6	7	Bland
15.	Perfectionistic	1	2	3	4	5	6	7	Careless
16.	Daring	1	2	3	4	5	6	7	Hesitant
17.	Cooperative	1	2	3	4	5	6	7	Uncooperative
18.	Intelligent	1	2	3	4	5	6	7	Dull
19.	Aggressive	1	2	3	4	5	6	7	Passive
20.	Pleasant	1	2	3	4	5	6	7	Unpleasant
21.	Secure	1	2	3	4	5	6	7	Insecure
22.	Friendly	1	2	3	4	5	6	7	Unfriendly
23.	Open	1	2	3	4	5	6	7	Guarded
24.	Talkative	1	2	3	4	5	6	7	Reticent
25.	Anxious	1	2	3	4	5	6	7	Composed

Appendix C: Emotional response scale

Please rate your current level of:

1. Anxiety (Very anxious 1- 6 very calm)
2. Comfort (Very comfortable 1 – 6 very uncomfortable)
3. Tension (Very tense 1 – 6 very relaxed)
4. Mood (Very pleasant 1 – 6 very unpleasant)
5. Interaction (Very avoiding 1 – 6 very approaching)
6. Patience (Very pleased 1 – 6 very annoyed)

How would you rate the speaker's:

1. Naturalness (very natural 1 – 6 very unnatural)
2. Effort (very effortless 1 – 6 very effortful)

Appendix D: Descriptive statistics for the stereotypes.

	Fluent		Dysarthria		Stuttering	
Question	Mean (*SE*)	95% CI	Mean (*SE*)	95% CI	Mean (*SE*)	95% CI
1	5.88 (.169)	(5.53, 6.24)	4.22 (.224)	(3.75, 4.69)	4.55 (.256)	(4.01, 5.09)
2	5.47 (.208)	(5.04, 5.91)	3.95 (.281)	(3.36, 4.54)	3.68 (.230)	(3.20, 4.17)
3	5.26 (.323)	(4.59, 5.94)	4.11 (.275)	(3.57, 4.96)	4.26 (.332)	(3.57, 4.96)
4	5.42 (.279)	(4.84, 6.00)	4.42 (.318)	(3.75, 5.09)	4.21 (.302)	(3.58, 4.85)
5	5.53 (.221)	(5.06, 5.99)	4.05 (.223)	(3.59, 4.52)	4.16 (.344)	(3.44, 4.88)
6	5.32 (.242)	(4.81, 5.83)	4.00 (.296)	(3.38, 4.62)	3.79 (.311)	(3.14, 4.44)
7	5.42 (.233)	(4.93, 5.91)	3.90 (.305)	(3.25, 4.54)	3.47 (.300)	(2.84, 4.10)
8	4.42 (.257)	(3.88, 4.15)	3.42 (.257)	(2.88, 3.96)	3.53 (.221)	(3.06, 3.99)
9	4.74 (.214)	(4.29, 5.19)	4.63 (.256)	(4.09, 5.17)	4.74 (.274)	(4.16, 5.31)
10	4.63 (.267)	(4.07, 5.19)	4.00 (.254)	(3.47, 4.53)	4.37 (.308)	(3.72, 5.02)
11	4.74 (.240)	(4.23, 5.24)	3.90 (.305)	(3.25, 4.54)	4.21 (.282)	(3.62, 4.80)
12	3.74 (.227)	(3.26, 4.22)	3.68 (.325)	(3.00, 4.37)	3.32 (.265)	(2.76, 3.87)
13	4.15 (.191)	(3.76, 4.56)	4.26 (.104)	(4.05, 4.48)	4.26 (.150)	(3.95, 4.56)
14	3.84 (.158)	(3.51, 4.17)	3.84 (.115)	(3.60, 4.08)	3.58 (.139)	(3.29, 3.87)
15	3.79 (.181)	(3.41, 4.17)	3.47 (.140)	(3.18, 3.77)	3.58 (.116)	(3.33, 3.82)
16	3.74 (.240)	(3.23, 4.24)	4.11 (.288)	(3.63, 4.58)	3.84 (.299)	(3.21, 4.47)
17	3.32 (.217)	(2.86, 3.77)	3.32 (.306)	(2.67, 3.96)	3.05 (.247)	(2.53, 3.57)
18	3.00 (.342)	(2.28, 3.72)	2.42 (.246)	(1.91, 2.94)	2.42 (.246)	(1.91, 2.94)
19	4.11 (.241)	(3.60, 4.61)	4.53 (.269)	(3.96, 5.09)	4.79 (.211)	(4.35, 5.23)
20	2.95 (.270)	(2.38, 3.52)	2.90 (.264)	(2.34, 3.45)	3.26 (.277)	(2.79, 3.74)
21	2.68 (.265)	(2.13, 3.24)	3.58 (.299)	(2.95, 4.21)	3.90 (.305)	(3.25, 4.54)
22	2.74 (.304)	(2.10, 3.38)	2.90 (.252)	(2.36, 3.43)	3.00 (.254)	(2.47, 3.53)
23	3.00 (.254)	(2.47, 3.53)	3.42 (.299)	(2.79, 4.05)	3.53 (.290)	(2.92, 4.14)
24	3.00 (.276)	(2.42, 3.58)	4.21 (.211)	(3.77, 4.65)	4.26 (.252)	(3.73, 4.79)
25	4.74 (.227)	(4.26, 5.22)	3.68 (.188)	(3.39, 4.08)	4.11 (.285)	(3.51, 4.70)

Appendix E: Descriptive statistics for state emotional questions

	Fluent		Dysarthria		Stuttering	
Question	Mean (*SE*)	95% CI	Mean (*SE*)	95% CI	Mean (*SE*)	95% CI
Anxiety	.579 (.196)	(.167, .991)	.316 (.239)	(-.187, .819)	-.316 (.302)	(-.949, .318)
Comfort	-1.368 (.570)	(-2.565, -.172)	-.684 (.472)	(-1.675, .307)	-.789 (.402)	(-1.633, .054)
Tension	.395 (.317)	(-.271, 1.060)	.184 (.336)	(-.522, .890)	-.053 (.322)	(-.729, .624)
Mood	-.184 (.268)	(-.748, .379)	-.342 (.230)	(-.824, .140)	.026 (.255)	(-.509, .562)
Interaction	.263 (.104)	(.045, .481)	.000 (.132)	(-.278, .278)	-.184 (.214)	(-.633, .265)
Patience	-.211 (.299)	(-.840, .418)	-.026 (.307)	(-.671, .619)	.263 (.351)	(-.475, 1.001)
Naturalness	1.711 (.211)	(1.268, 2.153)	2.711 (.203)	(2.283, 3.138)	4.632 (.209)	(4.193, 5.070)
Effort	1.849 (.126)	(1.584, 2.114)	3.132 (.166)	(2.783, 3.480)	4.895 (.156)	(4.568, 5.222)