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ABSTRACT

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Past research regarding attitudes about people who stutter has generated a wealth of knowledge from explicit methods of data collection like Likert scales, semantic differential scales, and open ended questionnaires. The addition of an implicit measure of attitudes like an Implicit Association Test (IAT) may complement the explicit knowledge the field already possesses toward stuttering. To date, few studies in stuttering have utilized implicit measures to explore attitudes towards people who stutter (PWS). The purposes of this manuscript was to develop stimuli to be inserted into two IATs for Stuttering Speaker versus Fluent Speaker instruments (Picture IAT and Word IAT), to gather implicit attitudes and explicit attitudes from fluent college students, and then compare implicit and explicit attitudes. Results indicated that the Picture IAT yielded significantly fewer strong implicit attitudes than the Word IAT which may indicate that these two instruments are stimulating different attitudes about fluent and stuttered speakers or speech. Results further indicate a gap between implicit and explicit attitudes from fluent college participants where moderate to strong implicit associations toward fluent speakers (inversely moderate to strong negative associations toward stuttering speakers) were present while moderate to strong positive attitudes were reported for explicit attitudes toward both PWS and People Who Do Not Stutter (PWDS). These findings may validate a duel processing model discussed in IAT research. Further research is needed in the field of fluency disorders with a variety of participants to examine strength of associations using these two implicit instruments and the relationships with explicit measures.
This dissertation is dedicated to the following people:

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“Nothing in all the world is more dangerous than sincere ignorance and conscientious stupidity.”

-Dr. Martin Luther King, Jr-

“What a shame you can’t see, we’re not all the same. What a shame” –Shinedown-
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# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CHAPTER 1. INTRODUCTION</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>CHAPTER 2. REVIEW OF LITERATURE</strong></td>
<td>3</td>
</tr>
<tr>
<td>The Importance of Studying Stereotyping and Attitudes toward Stuttering</td>
<td>3</td>
</tr>
<tr>
<td>Measuring Explicit Attitudes about Stuttering</td>
<td>9</td>
</tr>
<tr>
<td>Listing Adjectives to Gather Data about Explicit Attitudes</td>
<td>9</td>
</tr>
<tr>
<td>Semantic Differential Scales</td>
<td>14</td>
</tr>
<tr>
<td>Other Methods of Measuring Perceptions of Stuttering</td>
<td>22</td>
</tr>
<tr>
<td>Unconscious Attitudes</td>
<td>26</td>
</tr>
<tr>
<td>Implicit Association Test</td>
<td>28</td>
</tr>
<tr>
<td>Need for the Present Study</td>
<td>32</td>
</tr>
<tr>
<td>Purpose and Research Questions</td>
<td>38</td>
</tr>
<tr>
<td><strong>CHAPTER 3. PILOT STUDIES TO DEVELOP STIMULI FOR</strong></td>
<td>40</td>
</tr>
<tr>
<td>IATS STUTTERING SPEAKER VERSUS FLUENT SPEAKER</td>
<td>40</td>
</tr>
<tr>
<td>Development of Images Stimuli for Pilot Studies</td>
<td>40</td>
</tr>
<tr>
<td>Pilot Study One</td>
<td>42</td>
</tr>
<tr>
<td>Pilot Study Two</td>
<td>50</td>
</tr>
</tbody>
</table>
Pilot Study Three .................................................................................................................. 58
Conclusion ............................................................................................................................. 61

CHAPTER 4. FIELD STUDY FOR IATS STUTTERING

SPEAKER VERSUS FLUENT SPEAKER (PICTURE IAT AND WORD IAT) ................. 68

Type of Research Design and Purpose ........................................................................ 68
IAT Design ......................................................................................................................... 68
Measures ............................................................................................................................ 70
  IATs Stuttering Speaker versus Fluent Speaker ......................................................... 70
  Explicit self-report measures that typically accompany IATs ............................. 73
Software for the IAT for Stuttering Speakers vs. Fluent Speaker ......................... 74
Recruitment of Participants for the Field Study .......................................................... 74
Procedure ......................................................................................................................... 75
Analysis .............................................................................................................................. 79
  Implicit Measures ....................................................................................................... 79
  Explicit Measures ..................................................................................................... 84
  Implicit and Explicit Relationships ........................................................................ 84
Results ............................................................................................................................... 84
The Picture IAT maybe Measuring Attitudes about “Speakers” ........................................... 108

The Word may be Measuring Attitudes about “Speech” ................................................. 110

Correlations of Implicit and Explicit Attitudes ................................................................. 111

Gender Effects on Implicit and Explicit Attitudes ......................................................... 112

The Effect of Knowing Someone Who Stutters on Implicit and
Explicit Attitudes ............................................................................................................. 113

Fakeability of IATs ........................................................................................................... 114

Neurological Correlates of IATs ................................................................................... 115

Limitations to the Field Study ....................................................................................... 117

Future Research with Implicit Measures ....................................................................... 118

CHAPTER 6. CONCLUSION ............................................................................................ 124

REFERENCES .................................................................................................................. 125

APPENDIX A. TARGET WORD PRODUCTIONS FOR MODELS

TO PRODUCE STUTTERING AND FLUENT IMAGES .................................................. 149

APPENDIX B. IMAGE DEVELOPMENT WITH RESEARCH TEAM .................................. 151

APPENDIX C. PILOT STUDY ONE ............................................................................... 152
APPENDIX Q. PICTURE IAT SCREEN SHOTS............................................................... 215

APPENDIX R. WORD IAT SCREEN SHOTS ............................................................... 230

APPENDIX S. POST SURVEY SCREEN SHOTS....................................................... 245
<table>
<thead>
<tr>
<th>Figure/Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 “Stuttering” Adjectives Generated from Pilot Study 1 (two or more Frequencies listed below)</td>
<td>44</td>
</tr>
<tr>
<td>2 “Fluent” Adjectives Generated from Pilot Study 1 (two or more Frequencies listed below)</td>
<td>45</td>
</tr>
<tr>
<td>3 Correctly Identified “Fluent” Images from Pilot Study 1</td>
<td>46</td>
</tr>
<tr>
<td>4 Correctly Identified “Stutter” Images from Pilot Study 1</td>
<td>48</td>
</tr>
<tr>
<td>5 Pilot Study Two. Correctly Identified “Fluent” Adjectives</td>
<td>54</td>
</tr>
<tr>
<td>6 Pilot Study Two. Correctly Identified “Stuttering” Adjectives</td>
<td>55</td>
</tr>
<tr>
<td>7 Pilot Study Two Correctly Identified “Stuttering” Images</td>
<td>56</td>
</tr>
<tr>
<td>8 Pilot Study Two Correctly Identified “Fluent” Images</td>
<td>57</td>
</tr>
<tr>
<td>9 Responses for Fluent Adjectives</td>
<td>64</td>
</tr>
<tr>
<td>10 Responses for Stuttering Adjectives</td>
<td>65</td>
</tr>
<tr>
<td>11 Responses for Fluent Images</td>
<td>66</td>
</tr>
<tr>
<td>12 Responses for Stuttering Images</td>
<td>67</td>
</tr>
</tbody>
</table>
13 Sequence of Trial Blocks for IAT Stuttering Speaker vs. Fluent Speaker IATs ........................................ 71

14 IAT Effect and Strength of Association ................................................................. 83

15 Demographics from Field Study ................................................................. 93

16 Summary of Mean and Standard Deviations of Raw Latencies for 20 and 40 Trials Compatible and Incompatible Stages ................................. 97

17 Summary of Means and Standard Deviations for Effects of Gender on Implicit Measures .......................................................... 98

18 Summary of Means and Standard Deviations for Effects of Knowing Someone Who Stutters on Implicit Measures ................................................. 99

19 Summary of Means and Standard Deviations for Interactions of Gender and Knowing Someone Who Stutters on Implicit Measures ............... 100

20 Summary of Mean and Standard Deviations for Effects of Knowing Someone Who Stutters on Explicit Measures ....................................... 102

21 Summary of Means and Standard Deviations for Effects of Gender on Explicit Measures ........................................................................ 103

22 Summary of Mean and Standard Deviations for Interactions of Gender and Knowing Someone Who Stutters on Explicit Measures ............... 104
CHAPTER 1

Introduction

An individual’s attitudes are defined by Bem (1968) as one’s “self-description of his affinities for and aversions to some identifiable aspect of his environment” (p. 197). Ajzen and Fishbein (1977) have discussed the relationship between people’s behaviors and attitudes and the possible predictive nature that attitudes can depict one’s external physical actions and their perceptions of objects, people, or their direct environment. In the politically correct society that Americans live in today, it may be difficult to decide whether expressions regarding attitudes and feelings with respect to stereotypes truly are what people think. It is also difficult to know if an individual’s implicit attitudes are different from their explicit attitudes.

One of the “parents of modern theory” of unconsciousness was William Carpenter (Wilson, 2002). Carpenter (1874) discussed the need to study the unconscious mind by saying “the more thoroughly…we examine into what may be termed the Mechanism of Thought, the more clear does it become that not only an automatic, but an unconscious action enters largely into all its processes” (p. 539). He also referred to stereotypes pertaining to the unconscious mind as “the unconscious prejudices which we thus form are often stronger than the conscious; and then are the more dangerous, because we cannot knowingly guard against them” (pp. 542-543). It is these unconscious attitudes and possible stereotypes that the following study aims to explore through the use of Implicit Association Tests (IAT). The IATs developed in this study will examine implicit perceptions people who do not stutter (PWDS) possess about stuttering speakers and fluent speakers.
The first purpose of this study was to develop two IATs (i.e., one Picture IAT and one Word IAT) examining implicit attitudes from participants who do not stutter on a college campus. Three pilot studies were conducted to develop stimuli to use as a part of a field study exploring the utility of these two IATs. Another purpose of this manuscript was to compare the implicit attitudes generated from the IAT with explicit attitudes (i.e., one Likert scale and two thermometer questions) toward Stuttering Speaker and Fluent Speaker target concepts to investigate any relationships implicit and explicit measures may have respect to attitudes.
CHAPTER 2

Review of the Literature

The Importance of studying stereotyping and attitudes towards stuttering

The effects of stereotypes and attitudes People Who Stutter (PWS) and People Who Do not Stutter (PWDS) possess toward stuttering behaviors have been studied extensively for many years. Before proceeding with this discussion, it is important to attach an operational definition of “attitude” as taken from Osgood Suci, and Tannenbaum (1957). These authors suggest that “attitudes are learned and implicit, they are inferred states of the organism that are presumably acquired in much the same manner that other internal learned activity is acquired” (p. 189). It should be noted that Osgood et al. brings the term “implicit”, or indirect, into their definition, which will be a continuous theme throughout this paper. As attitudes relate to stuttering, they can be created by both PWS and PWDS. These attitudes can take on a negative connotation which could be considered stereotypical in nature.

Stereotypes were first defined by Allport (1954) as an “exaggerated belief associated with a category. Stereotypes function to justify (rationalize) our conduct in relation to that category” (p. 187). Williams (1964) later defined stereotypes as “labels or identities we assign to people that show what we believe these persons are like and how we think they will behave” (p. 36). Another definition of stereotyping came from McDavid and Harari (1974) who described stereotypes as exaggerated beliefs that others “excessively generalize…based on very incomplete or ambiguous information” (p. 193). When stereotypes become expressed, their impact can affect all aspects of an individual’s personal, professional and social life.
Some of the earliest research on fluency disorders focused on how stuttering affects PWS socially. The concept of labeling a person who stutters, particularly by parents of children who stutter (CWS) as “stuttering” was thought to possibly produce negative stereotypes and perceptions which would impact that person’s own perceptions of themselves and thus increase stuttering behavior (Johnson, Van Riper, Davis, Scarbrough, Hunsley, & Bakes et al, 1942). Through his discussion of the Diagnosogenic Theory of stuttering, Johnson believed that parents impacted the frequency of stuttering with their children by labeling normal disfluencies “stuttering.” This theory of labeling normal disfluencies as stuttering was tested when one of Johnson’s master’s students, Tudor (1939) studied orphans who were perceived to not stutter. Tudor told these children that “the type of interruptions you have are very undesirable. These interruptions indicate stuttering,” (p. 10). In addition, Tudor suggested that children began to stutter when they were told they were stuttering and needed to work on not stuttering. Johnson and Tudor’s study has since been examined and found to be invalid and unethical (Ambrose & Yairi, 2002), however, the concept of labeling PWS and the effect of this labeling on the general population’s perceptions of PWS continues to be studied today. However these studies did show some of the more emotional and attitude effects that stuttering can have on PWS (Ambrose and Yairi, 2002).

St. Louis and Atkins (1988) along with Dietrich, Jensen, and Williams (2001) investigated labeling of PWS as reported by college students. St. Louis and Atkins studied non-speech-language pathology students and speech-language pathology majors using the Perception of Stuttering Inventory (PSI, Woolf, 1967). St. Louis and Atkins changed the wording on the PSI from “stuttering” to “speaking difficulty” and changed the name of the test to in order to see if students would score a “stuttering” person different from a “difficult
speaking person.” St. Louis and Atkins concluded that due to the students’ knowledge of speech-language pathology, especially with speech-language pathology majors, this experiment yielded no significant findings, however this study may suggest that more education about stuttering may produced less negative labeling of PWS. Deitrich et al. reported similar findings with an undergraduate population when using a seven-point Likert scale to investigate labeling a fellow student as a “stutterer,” “student who stutters” and “student has had a stuttering problem” (p. 58). This study found very little difference in terminology toward labeling stuttering with the exception of gender differences where women’s scores were more positive than the men’s scores. Due to the insignificant finding of the above studies, it might be showing that explicit measures may not have harnessed participant’s true attitudes about labeling stuttering.

For individuals who stutter, perceptions of being stigmatized could be the reality they live with everyday. Goffman (1963) discussed stigma as a deeply discredited attribute. The concept of stigma was studied by Corcoran and Stewart (1998), who performed a qualitative study which involved interviewing eight PWS about their experiences as a person who stutters and how it may affect their perceptions of themselves and emotions they feel. Corcoran and Stewart reported that the stigma of stuttering has a major impact on PWS. Participants attached words like “shame,” “helplessness,” “fear,” “avoidance,” and “suffering” to the stigma of stuttering, which may imply negative attitudes that PWS can develop about their speech. Like Corcoran and Stewart, Klompas and Ross (2004) conducted a qualitative study and found themes describing the impact of stuttering. The themes included “fear of talking” along with negative perceptions and feelings that listeners may have toward their speech participants “laughing, embarrassment, helplessness” (p. 284). Another personal effect of stuttering on
PWS found by Klompas and Ross was decreased confidence, poor self-esteem, and overall negative emotions. Similar to Klompas and Ross, Daniels and Gabel (2004) discussed several internal and external factors which may help to construct the identity of PWS. Emotions such as shame, guilt, and anger (frustration) arise as a part of this identity. These factors, along with stuttering, may develop as a cost of attempting to hide stuttering and the avoidance of speaking situations and words which may further negatively impact PWS’s life experiences. Daniels and Gabel supported their study with citing Crichton-Smith (2002) whom discussed negative memories of growing up, personal loss as an adult, and negative occupational experiences as being an important part of the experience of stuttering.

Negative feelings and attitudes do not only occur with adults who stutter, but also children who stutter (CWS). Vanrychechgem, Hylebos, Brutten, and Peleman (2001) explored the ‘mal-attitudes and negative emotions’ with 143 CWS using the Communication Attitude Scale (Brutton, 1997). This study found that there was a strong correlation between mal-attitude (poor attitudes) and negative emotions which increased with the age of children who stutter. They also found that mal-attitudes and negative emotions increased with severity of disfluencies. As indicated by the above studies, there appears to be strong attitudes for both adult and children who stutter that are negative in nature and may impact these individuals’ lives. Clinically, this research is vital for therapist providing services to PWS. Therapists need to know how a client perceives his or her speech in order to develop attitude related counseling therapy goals.

The effects of stuttering not only impacts PWS’s general attitudes, it also appears to have an influence on their professional lives with the development of negative attitudes and stereotypes by both PWS and PWDS in the work place. Some of the foundations of stereotype
research in the work place began with a study by Hurst and Cooper (1983a) who explored employers’ attitudes towards PWS. Another study examined vocational rehabilitation counselors’ attitudes toward stuttering (Hurst and Cooper, 1983b). The findings from these two studies suggest that employers believe stuttering does not disrupt job performance; however the participants did seem to agree that stuttering may affect promotional possibilities. Findings also indicated that rehabilitation counselors appeared to display many false stereotypes like “stutterers stutter on approximately one-third of words” and “most stutterers have psychological problems” (Hurst & Cooper, 1983b; pp. 22-23). It may be deduced from the Hurst and Cooper studies above that the attitudes rehabilitation counselors and employers had toward PWS may very well have affected how they behave toward people who stutter. These initial studies spurred other research examining occupational experiences toward PWS.

Silverman and Paynter (1990) examined the perceived competence of PWS by PWDS with respect to occupations factory workers or a lawyers and found that college students rated PWS less competent with both jobs, suggesting that negative attitudes may have a great impact on the “appearance of competence” (p. 89). Gabel, Blood, Tellis, and Althouse (2004) examined the attitudes that PWDS report toward PWS with respect to occupational competence by developing an instrument called the Vocational Advice Scale (VAS). This scale was designed to investigate which occupations were perceived to be the most appropriate for PWS. The results of this study indicated that PWDS believe that PWS are less suited for certain career choices, thus leading to PWS to experience role entrapment. Role entrapment is defined by Smart (2001) as occurring “when the group in power…defines those roles minority individuals can and cannot assume” (p. 188). The most common occupations not advised to PWS were “judge, parole officer, and attorney,” (p. 37), thus suggesting the attitude that PWS
cannot perform well in careers requiring more communication ability. This study is important in that if role entrapment does exist toward PWS, then it is possible that stereotyping from employers may in fact decrease promotional opportunities and thus impact PWS professionally and perhaps financially.

In order to assess the impact that PWS perceive about possible professional stereotyping, a few studies have been performed by Rice and Kroll (1994, 1997, and 2006) and Klein and Hood (2004) using questionnaires employing Likert type scales. PWS were asked to rate their perceptions of challenges, experiences, and discrimination in occupational environments. The results indicated that participants felt that employers’ performance evaluations were affected by their stuttering along with promotional options which is similar to what Hurst and Cooper (1983a) suggested. Participants also indicated that they were not asked to perform supervisor duties because they stuttered. Rice and Kroll (1997) specifically revealed that PWS felt that challenges and discrimination in employment environments and promotional opportunities, social isolation, job responsibilities, and performance evaluations were impacted due to their stuttering. Klein and Hood (2004) had similar findings where the PWS participants felt that “stuttering interferes with promotion possibilities,” (p. 261). The final study by Rice and Kroll (2006) attempted to replicate Klein and Hood with an international web survey gathering 412 participants from thirty-two different countries. This study confirmed many concepts from previous studies above where the majority of the PWS participants felt that stuttering limited their promotional opportunities, negatively influenced the quality of occupations they sought, interfered with job performance, limited compensation opportunities, and possibly caused feelings of potential discrimination from employees.
From the research above it appears that stuttering has extensive effects on perceptions that PWS have about themselves along with perceptions that PWDS posses toward stuttering speakers. It could be fair to say then that since stuttering has an impact on attitudes it may help professionals that work with PWS and the people who know PWS to have an accurate means to measure the magnitude of negative attitudes people posses toward their stuttering individuals.

**Measuring explicit attitudes about stuttering**

The attitudes that a variety of groups of listeners reported toward PWS along with possible stereotyping of PWS has been studied for many years, primarily using explicit measures. The use of explicit measures for data collection has been important to studying attitudes because it has provided a wealth of perspectives about stuttering from a variety of populations including PWS and PWDS. The following methodological measures of explicit attitudes have played a role in developing an image of what attitudes may be present about stuttering.

*Listing adjectives to gather data about explicit attitudes.* The methodology of asking participants to list adjectives in order to gain explicit knowledge of attitudes about stuttering can be most credited to Yairi and Williams (1970). Yairi and Williams asked speech pathologist to list adjectives of traits they thought would appropriately describe an elementary school-age boy who stuttered. The 127 participants generated 26 most frequently cited traits describing personality characteristics of a school-age boy who stutters. Of the traits listed, 17 were seen as undesirable and nine as desirable. It should be noted that this study lead to the
development of a semantic differential scale used often in this type of research, which will be discussed later in this manuscript.

This type of data collection, where researchers ask participants to list words explicitly to describe PWS has been most widely used by Norman Lass and Dennis Ruscello. Their research teams have performed several studies examining stuttering stereotypes with participants from a variety of personnel in the education system. The following are populations they canvassed in their research: college students (Ruscello, Lass, & Brown, 1988), speech-language pathologist (Lass, Ruscello, Pannbacker, Schmitt, & Everyly-Meyers, 1989), professors (Ruscello, Lass, Schmitt, Pannbacker, Hoffmann, Smith, & Robinson, 1990), speech-language pathology students (Ruscello, Lass, French, & Channel, 1990) elementary teachers (Lass, Ruscello, Schmitt, Pannbacker, Orlando, Dean, Ruziska, & Bradshaw, 1992), special education teachers (Ruscello, Lass, & Pannbacker, 1994), and school administrators (Lass, Ruscello, Pannbacker, Schmitt, Kiser, & Mussa 1994). In each of the previously stated studies, the participants were asked to list adjectives they felt would describe a hypothetical child and or adult who stutters, which again is very much like the methodology performed by Yairi and Williams (1970).

One of the first research studies to come out of this group was done by Ruscello et al. (1988), who examined 119 college student’s perceptions about an adult and child hypothetical stutterers. The results of this study were that 76.7% of participants reported negative traits for the hypothetical adult person who stuttered and 80.3% reported something negative for the hypothetical child who stuttered with 74% and 77.5% pertaining to personality traits for the adult and child who stuttered respectively. These findings suggested that college students
appear to perceive adults and children who stutter negatively and that more education needs to be provided to combat negative perceptions with increased public awareness.

Lass et al. (1989) attempted to replicate the Yairi and Williams (1970) study by asking 81 speech-language pathologist to list adjectives they would use to describe the following hypothetical stutterers: a male and female adult person who stutters and a male and female 8-year old who stutters. The results indicated that 69.9% of responses were negative with adjectives like nervous, shy, and frustrated used to explain all four groups of hypothetical persons who stutter. They suggested, like Yairi and Williams (1970) that speech-language pathologists appear to possess more negative perceptions about PWS and CWS. The researchers further suggested that this issue could be addressed at the graduate level of education in an attempt to combat the negative perceptions that continued to exist.

With Lass et al. (1989) looking at speech-language pathologists, it seemed logical that Ruscello et al., (1989-1990) would explore speech–language pathology undergraduate and graduate students’ perceptions about an adult and a child who stutters. This study’s results found that 89.1% of the responses from students were negative in nature. This supports the findings from Lass et al., (1989) with speech-language pathologists and college students viewing PWS and CWS with more negative perceptions and personality traits. These researchers suggested that better clinical training for speech-language pathology students is needed in order to dispel the negative attitudes which appear to be dominant with this population.

Ruscello et al. (1991) examined 121 college professors’ perceptions about four “typical” hypothetical stutterers (i.e., a male and female child who stuttered and a male and
female adult who stutters). After asking professors to list as many adjectives they could about the above constructs. The results showed that participants reported negative traits for female and male CWS and the female adult person who stutters more than 72.1% of reported adjectives while 49% of adjectives used to describe the male adult person who stutters were negative. This research suggests that college professors perceive male adults who stutter with less negative attitudes because they have more access to this population than any of the other three hypothetical constructs. Authors suggested that educational opportunities which provide awareness and knowledge about stuttering to college professors needs to be continued. They further suggested that the National Student Speech-Language and Hearing Association (NSSLHA) could get involved, at the college level, to provide awareness workshops or seminars about stuttering.

Another study by Lass et al, (1992) examined how elementary and secondary school teachers perceived a typical eight year old male and female child who stutters along with a typical adult female and male who stutters with the same explicit task methodology of listing adjectives about each hypothetical construct. Results indicated that teachers reported negative traits for the male and the female adults and both children who stutter with more than 67% of adjectives being negative. This study appears to be consistent with past studies stated above. Researchers suggested that these findings are salient due to the importance that a “teacher’s perceptions are… to the educational process” (p. 80) and that a negative perception taken by a teacher may have vast impacts on how CWS are assessed, taught, and with classroom interactions between student and teacher.

The research with educators continued with Ruscello et al. (1992) examining 82 special educators with the same methodological procedure as Ruscello et al. (1991). The results
indicated similar findings as most of the other Lass and Ruscello studies, special educators reported more negative trait adjectives and personality adjectives than positive ones for typical female and males CWS and typical female and male adults who stutter with an average of 67.6% negative terms generated. Researchers indicated that the most adjectives reported was for a male child who stutters which may due to the increased exposure to this construct in schools, and since males stutter more than females. The authors suggested, like the above studies, education to special educators with an emphasis on teaching these participants the “distinction between the stutter and his/her stuttering, i.e., between the speech/nonspeech behavior (s) associated with stuttering and the person who stutters.” (p. 130).

Lass et al. (1994) interviewed forty-two school administrators, all of whom reported similar negative traits (e.g. shy and nervous) about four different hypothetical people who stutter (i.e., female child, male child, female adult, and male adult). They also found that different participants in the education environment viewed children and adults of both genders with negative stereotypes, which may tell the field of speech-language pathology that more positive education maybe needed to decrease negative trait perceptions. Lass et al. (1994) made a very important statement at the end of their article, which could be the central theme for any education that speech-language pathology could give to educators and/or people in the educational environment. They said, “although there may be similarities in the stuttering behavior of different people, their personality traits may be quite diverse and, typically, quite normal” (p. 92).

Lass et al. (1995) suggested that PWS generate a preponderance of negative personality stereotypes. As indicated by Lass et al. (1995), the idea that PWS have negative attitudes toward stuttering might “impact self-perceptions on the progress of persons who stutter and
their success in educational, vocational, and personal endeavors,” (p. 250). Lass concluded that the information above may be vital for a speech-language pathologist to have in order to address these negative attitudes in therapy sessions and change them to more positive attitudes.

The methodological procedure of asking participants to list adjectives to describe PWS has been a valid manner of collecting explicit perceptions from PWDS, as indicated above. The general findings, mainly from the Lass and Ruscello research groups is that individuals in the education system from speech pathologist (i.e., both professionals and students studying to become speech-language pathologists) to school administrators report a majority of negative personality traits for both children and adults who stutter. This type of measure not only has been a valid data collection procedure for explicit attitude about stuttering, it was also the manner in which Woods and Williams generated stimuli for their first semantic differential scale (Woods and Williams, 1976).

Semantic differential scales. The most common instrument used to measure attitudes and possible stereotypical perceptions has been semantic differential scales. The semantic differential scale was developed by Osgood et al. (1957) as a tool to measure “generalized attitudes” (p. 195). The adaption of the semantic differential scale to the field of stuttering can be credited to Yairi and Williams (1970) along with Woods and Williams (1976). The study by Yairi and Williams (1970) appears to be the pivotal work which set the foundation for most semantic differential scales used with stuttering. As mentioned earlier, these researchers generated twenty-six commonly reported adjectives reported from 127 public school speech-language pathologists (SLPs) who were asked to describe an elementary school boy who stutters. Yairi and Williams (1970) suggested that the opinions reported by SLPs towards PWS may be congruent with the opinions of the general public and their experiences with people
who stutter, which may be the biggest impact on the clinicians with stuttering attitudes. Woods and Williams (1976) then developed the first 25-item semantic differential scale about perceptions of stuttering using adjectives developed by Yairi and Williams (1970).

The scale developed by Woods and Williams (1976) was a twenty-five bi-polar word semantic differential scale. The instrument used 25 adjectives from Woods and Williams and “paired with antonyms selected from dictionary listings and graduate students’ choices to form 25 scales with seven equal-appearing intervals between each trait pair” (p. 269). They distributed this scale to seven different groups: adult PWS, parents of children who stutter (CWS), parents of children who don’t stutter but have other speech disorders, parents of normally speaking children, classroom teachers of elementary school children, speech pathologist in public schools, and college students. The purpose of this study was to discover “if the preconceptions people have about stutterers differs from their preconceptions of fluent talkers,” (p. 268) along with reexamining any stereotyping differences between boys and men and whether certain job experiences influence perceptions of stuttering stereotypes. The results from this study suggested that these groups did perceive PWS and PWDS differently with respect to specific undesirable traits and that possible expectations are related to what people who stutter are suppose to be like. They further suggested that PWS learn to develop stereotypes from the reactions of their listeners, which they in turn develop expectations of themselves. As was defined by Osgood et al. (1957), attitudes appeared to be learned.

White and Collins (1984) surveyed undergraduate students using a twenty-five, bipolar word semantic differential rating scale with the instructions to think of a male speaker who suddenly begins to stutter for a short period of time and then becomes fluent again. They asked participants, “What sort of state is this person likely to be in while he is stuttering?” (p. 568).
White and Collins found that personality ratings of a male person who stutters correlate with how a normally fluent person feels when they display disfluent moments. They suggested that “stereotypes may arise from exposure to stutterers,” (p. 567). They concluded that stereotypes toward PWS may arise from normal speakers “inferring” what they feel during normal disfluencies as being the same feelings that a person who stutters feels when stuttering.

The concept of “inferring” (discussed above by White & Collins, 1984) stereotypes by PWDS was further researched by Horsley and FitzGibbon (1987). These authors surveyed 31 speech-language pathologists and 64 students studying communication disorders. The two groups were asked to fill out eight different surveys for hypothetical constructs differing only in the following three ways: a preschooler or eighty-year old, a child who stuttered or not, a boy or a girl. The results suggested that students may project a more negative stereotype toward boys than girls and that the speech-language pathologists (SLPs) do the opposite. Horsley and FitzGibbon further suggested that SLPs may associate internal traits (e.g. anxious and tense) with the external behaviors that PWS, in this case children who stutter, displayed.

This process of inferring internal traits was further investigated with similar finding by Kalinowski, Lerman, & Watt, (1987). In this study, the self perceptions from both PWDS and PWS were explored, both towards themselves and PWS in general. A modified version of Woods and Williams’ (1976) semantic differential scale with the variation being that each bipolar word set was separated with a nine-point scale instead of the original seven point scale. The major finding of this study was that PWS had similar self-perceptions as PWDS. The other finding was that PWDS from this study perceived PWS as significantly more negatively than how PWS perceived PWDS. In fact, Kalinoswki et al. (1987) reported that PWS’s perceptions of other PWS was the opposite of PWDS’s perceptions PWS. This study may suggest that
PWS perceive PWDS “as superior to themselves in almost all of the items presented,” (p. 327). Kalinowski, Armson, Stuart, & Lerman (1993) conducted a follow up study to the 1987 study. This study surveyed 58 speech-language pathologists and members of the general public about their perceptions of themselves and their perceptions of PWS, using the modified Woods and Williams (1976) semantic differential scale. They found that speech-language pathologists perceived PWS significantly more negative than PWS perceived themselves. Further, the authors found that the perceptions of the speech-language pathologists were not significantly different from the general public. This study suggested that SLPs may not be able to separate the behavioral differences that PWS display from the individual person who stutters and thus associate internal stress with negative traits. In addition, the authors suggested that, like the public, SLPs may have had an ‘unfavorable’ first experience with a person who stutters.

Doody, Kalinowski, Armson, and Stuart (1993) surveyed 106 people in small Canadian communities using the semantic differential scale developed by Woods and Williams (1976). The purpose was to investigate whether negative stereotypes exist in smaller towns. They had members of these small communities complete the semantic differential scale with respect to a hypothetical PWDS and a PWS. The results indicated that negative stereotypes do exist in smaller communities, despite the fact that 85% of the respondents reported knowing a person who stuttered. This group of researchers concluded that the stereotype of stuttering may come from the perceived struggling behaviors of stuttering and that struggling characteristics are inferred by PWDS as associated with more undesirable character traits. As pointed out by Horsley and FitzGibbon (1987), the concept of an individual being influenced by a behavior to determine a perception is consistent with the field of psychology. Heider (1958) further discussed the idea that “our cognitions, expectations, and actions are based on a mastery of the
causal network of the environment” (p. 59). It could be suggested that Heider was implying that the environment impacts attitudes greatly.

Weisel and Spektor (1998) attempted to perform further research with the concept that PWDS associate their normal disfluent experiences to perceptions about stuttering. This study surveyed 164 adolescent participants with a modified version of the Woods and Williams (1976) semantic differential scale along with The Ericson Modified S-24 Scale, which is an instrument that measures a person’s perceptual attitudes with respect to their own communication (Ericson, 1969). One of the main purposes was to examine if there is a gender difference with stuttering stereotyping. The results suggested that boys appeared more positive toward PWS than girls. Weisel and Spektor hypothesized that this difference may be due to boys’ attitudes toward PWS to be “influenced by their communication attitudes, while girls conformed more to the stutterer stereotype disregarding their own communication attitudes,” (p. 166). This debate over whether or not there is a gender difference in stereotyping still continues (Burley & Rinaldi, 1986; Patterson & Pring, 1991). In other words, the debate of a gender difference is still in question with respect to the degree of stuttering stereotyping which appears to be unanswered by explicit measurements like semantic differential scales.

Dorsey and Guenther (2000) added to the stereotype and attitudes research by surveying college professors’ and college students’ perceptions of personality traits of an average college student or a college student who stutters. These researchers had participants rate either one of the above hypothetical constructs with twenty personality traits on a scale of 1-7 where the higher the number reported was an indication of the strength that hypothetical person possessed the given trait. This study suggested that both the professors and college students who participated may perceive students who stutter more negatively than their non-
stuttering peers. They also reported that professors seem to possess more negative feelings of personality traits for stutterers than the college students appeared to express. The following passage from Dorsey and Guenther appears to indicate the need for more education about stuttering stereotyping:

> It remains troubling that there is a tendency for professors and college students to hold a negative stereotype of the student who stutters, even should it turn out that the attitudes embedded in that stereotype are discounted when they get to personally know a particular stuttering student.  (p. 81)

Gabel, Tellis, and Althouse, (2004) completed a study exploring college students. In this study researchers asked if participants knew anyone who stuttered and then asked them to rate how well they knew the person with the following options; not very well, well, and very well. The participants then had to fill out a twenty-five bipolar word semantic differential scale, similar to Woods and Williams (1976). The results indicated that the level of familiarity did not significantly affect PWDS’s perceptions of PWS which may suggest that the quality and nature of a relationship with a person who stutters may have a great influence on the perceptions of PWS. Gabel et al further said that it is possible that “the more positive the relationship is with a person who stutters, the more positive the person will perceive others who stutter,” (p. 463). This is vital information to know clinically so education can be provided to parents of children who stutter and adult clients in order to make sure that they know that the closest people in the life of a person who stutters may not typically possess negative perceptions about stuttering.
Gabel (2006) continued his contribution to stereotyping research with fluency disorders and the use of semantic differential scales with college students. Participants were randomly assigned to rate one of the following four hypothetical concepts about male stutterers: a severe male stutterer choosing to attend therapy to improve his stuttering; a mild male stutterer choosing to attend therapy to improve his stuttering; a severe male stutterer choosing not to attend therapy to improve his stuttering; and a mild male stutterer choosing not to attend therapy to improve his stuttering. The results indicated that severity of stuttering and having the knowledge that a person who stutters is receiving therapy influenced attitudes from the participants. More positive ratings were given to mild stuttering conditions as compared to their severe counterparts and that the concept of “attending therapy” produced more positive ratings than “not attending therapy.” Gabel suggested that these findings are important in the clinical capacity in order to provide therapy that targets increased fluency skills and techniques and counseling. It should also be noted that this study did not yield significant interaction main effects with severity and therapy status on participants’ perceptions about stuttering. The idea of providing a proactive, positive education to PWS and the general public appears to be a running theme throughout most of the articles about attitudes toward stuttering in order to combat negative stereotypes.

MacKinnon, Hall, and MacIntyre (2007) attempted to study the development of judging personality traits through “anchoring and adjustment” (Tversky & Kahneman, 1974). Anchoring and adjustment is the process by which individuals attempt to make decisions by changing (i.e., adjusting) some of their preexisting perceptions (i.e., anchors) in order to fill in gaps with their experiences (MacKinnon et al., 2007). This study asked 183 psychology undergraduates to use the semantic differential scale from Woods and Williams (1976) to rate
three different hypothetical constructs: a normal male speaker, a male who experiences temporary disfluencies, and a person who stutters (permanent stuttering). Participants were asked to either rate the person who does not stutter, or both the person with temporary disfluencies and person with permanent stuttering. This study found differences in how the participants responded to the person with temporary disfluencies and person with permanent disfluencies. Researchers concluded that this difference represents an “adjustment” phase. The authors suggested that this study may further support the idea that individuals make inferences with their perceptions in regards to their own feelings and emotions during normal disfluencies as an anchor and then adjust these inferences for perceptions about a permanent stutterer (Doody et al., 1993; Horsley & FitzGibbon, 1987; White & Collins, 1984).

Betz, Blood, and Blood (2008) surveyed college students in an attempt to find out if negative stereotypes may develop with children and at what age they may begin. This study asked college students to use a modified Woods and Williams (1976) semantic differential scale to rate one of eight different vignette descriptions of a 3-, 4-, 5-, and 6- year-old child who stutters and child who does not stutter. This study found that negative stereotypes may begin as early as 3-years-old. Betz et al. goes on to report that there is a level of concern that students would create negative attitudes toward children without any kind of auditory and/or visual stimulus. Again, this study may imply that early education about stuttering is not only vital for children who stutter (CWS) but also for children who don’t stutter (CWDS) along with the rest of the public, in order to improve perceptions of PWS.

The use of the semantic differential scale has proven to be a useful tool when studying explicit attitudes that PWDS and PWS have regarding stuttering. The ability to modify this instrument to fit different populations appears to have been an asset to getting at individuals’
perceptions about stuttering in a fairly clear explicit manner and a rather participant friendly methodology.

*Other methods of measuring perceptions of stuttering.* A variety of other instruments and approaches to studying attitudes and perceptions of stuttering have been used. As pointed out by some of the research above, educators and peers of PWS may serve a vital role in the lives of PWS. Crowe and Walton (1981) surveyed elementary school teachers and licensed speech-language pathologists using the Teachers Attitudes toward Stuttering Inventory (TATS) (Crowe and Walton, 1978) and the Alabama Stuttering Knowledge Test (ASK) (Crowe and Cooper, 1977). The researchers found that teachers who have more knowledge regarding stuttering appeared to have more positive attitudes toward stuttering. This may show that more education about negative stereotypes, regarding PWS, may decrease the negative attitudes they may have regarding stuttering.

Burley and Rinaldi (1986) examined explicit attitudes with a fourteen bi-polar word semantic differential scale modified from past studies having to do with trustworthiness, strength of character, and employability (Crowe & Walton, 1981; Duffy, Hunt, & Giolas, 1975; Hurst & Cooper, 1983). This study was unique, as compared to the other research in the fact that participants were asked to listen to one of four recordings of a female or male person who stutters. The groups were divided by gender. They found a significant effect that male participants rated PWS lower than the female participants. The researchers suggested that these differences may be due to males having tendencies for higher aggression and less empathy to PWS than females (Maccoby & Jacklin, 1974; Hoffman, 1977). The use of the recordings combined with a modified semantic differential scale was a departure from the standard
methodological hypothetic person who stutters which has been the dominant manner of presentation of a person who stutters.

Wenker, Wegener, and Hart (1996) studied stereotypes using stimuli in a variety of ways. This study asked 158 undergraduate students to rate one of four conditions: a live disfluent speaker who presented a fifteen minute lecture; a live fluent speaker who presented the same fifteen minute lecture; an audiotape of a stuttering speaker presenting a fifteen minute lecture; or an audiotape of a fluent speaker presenting a fifteen minute lecture (all presentations were performed by the same speaker who was an actor). The results of this study found that participants rated the disfluent live speaker as more favorable with respect to personality type traits but less favorable with speech related characteristics. Wenker et al. suggested that the results may have been influenced by the actor changing his personality during the disfluent presentation. Participants may have felt sympathy for the disfluent speaker as well. Another finding with this study was that there were no significant gender differences noted with the participants’ ratings. This is consistent with Patterson and Pring (1991) discussed above.

Franck, Jackson, Pimentel, and Greenwood (2003) performed a study where fourth and fifth-grade students reported their perceptions of a video of an adult male who stutters while reading a poem or an adult male reading a poem fluently. This study utilized a semantic differential rating scale modified from Freeby and Madison (1989). It should be noted here that Freeby and Madison used their scale to study perceptions of children toward their same age peers who have articulation disorders. Franck et al. indicated that school age children may possess the same or similar negative views of PWS as adults. They also suggested that “the results of this study support the need for education in the school environment about stuttering and the negative perceptions that many children hold,” (p. 11).
Klassen (2001) conducted a study that focused on the perceptions of PWS and people who know them well (family and friends) and colleagues. This study asked three males and three females to provide names and addresses of family members, friends and/or colleagues, which the researcher then sent a packet of questionnaires to everyone named, including the six PWS. The questionnaires consisted of a modified Woods and Williams (1976) semantic differential scale and borrowed questions from other instruments which look at attitudes of parents and clinicians toward stuttering (Cooper & Cooper, 1985, 1996; Crowe & Cooper, 1977). The results from Klassen indicated more positive attitudes from people who know and interact with at least one person who stutters as compared to past studies looking at the general public’s perceptions toward stuttering. These findings suggested that negative stereotypical perceptions may decrease with increased exposure to people who stutter. Further results from this study showed that family, friends, and colleagues of people who stutter rated the stutterers’ speech less abnormal than the stutters’ rated their own speech. Klassen suggested that PWS may have higher expectations for their speech than their listeners.

Panico, Healey, Brouwer, and Susca (2005) examined stereotypes with quantitative and qualitative judgments of sixty-four undergraduates and community participants who were presented with audiovisual or audio-only samples. There were a total of eight conditions which consisted of four audiovisual conditions which showed a person reading a passage with 0, 5, 10, and 15% disfluencies and four audio-only conditions with the same person reading the same passage with the same frequency of disfluencies as the audiovisual samples. Participants were asked to rate the conditions using a seven-point Likert type scale with six statements and then answer four open-ended questions looking at overall impressions of the sample’s speech, adjectives to describe the person’s speech, anything that stands out in the person’s speech, and
whether or not the person’s speech interfered with the content of the message. The first major finding presented by Panico et al. was that the participants found little significant difference between the two kinds of presentation styles of the speech samples (i.e. audiovisual and audio-only). Similar to the first finding, there was little difference between the qualitative answers with the exception of how clear the message was between audiovisual and audio-only presentations. The last major finding reported was that participants rated mild and moderate disfluent samples significantly different and that the percentages of negative comments increased with an increase in severity. The authors of this article suggested that there is very little difference with presentation styles of audio-only or audiovisual presentation, however, O’Brian Packman, Onslow, Cream, O’Brian, and Bastock, (2003) presented contrary findings by stating that the “audiovisual sample appears to be more socially valid,” (Panico et al.; p.81).

Conducting research with audio and visual presentations of PWS appears to make logical sense and still this type of methodology may generate the following questions: To what degree do audio and visual aspects of stuttering impact the perceptions of attitudes about stuttering from PWDS? How can the magnitude of effects of visual and/or visual characteristics of stuttering be measured with PWDS? Perhaps one answer would be to perform a meta-analysis on all of the explicit research generated with perceptions toward PWS. However, with all the different methodological procedures used to gather explicit attitude information (e.g., a variety of modified semantic differential scales, listing adjectives, open-ended questions, Likert scales) and presentation of stimuli (e.g., hypothetical constructs, audio, visual, actors), it may be difficult to compare studies accurately. The development of one instrument that is an indirect measure of attitudes may be an alternative to having several different direct, explicit, measurements of attitudes.
Unconscious attitudes

The concept of unconscious thinking has been argued and discussed for more than a hundred years. Carpenter (1874) first explained unconsciousness as “in physiological language as the reflex action of the cerebrum” (p. 515). Carpenter later reflected on Sir William Hamilton’s perspective of unconsciousness as the notion that “the mind may undergo modifications, sometimes of very considerable importance, without being itself conscious of the process, until its results present themselves to the consciousness, in the new ideas, or new combinations of ideas, which the process has evolved” (p. 515). Other theories of the unconscious mind came from Sigmund Freud who separated the unconscious into the two parts, one being the Superego which is the personality structure and the other being the Id which represents a person’s instincts (Anderson & Black, 2006). Other terms like “adaptive unconscious” have been used to relate how the unconscious mind evolves and adapts with experiences along with the idea that the “unconscious is not governed by accuracy and accessibility alone. People’s judgments and interpretations are often guided by… the desire to view the world in the way that give them the most pleasure” (Wilson, 2002; p. 38).

Similarly, Banaji, Lemm, and Carpenter (2001) defined unconsciousness as “the family of processes that occur outside conscious awareness without conscious control, or without intention to perform” (p. 135). This concept of possessing a lack of awareness was developed into a perspective called an automatic thought, another term used when discussing unconscious processing with some of the earliest of researchers defining it as a “process capable of running to completion without conscious monitoring” (Anderson, Moskowitz, Blair, & Nosek, 2007; p. 138). An automatic thought ties closely to the development of an attitude, which Fazio, Sanbonmatsu, Powell, and Kardes (1986) reported to be as perceived associations an individual
applies to an object and the evaluation of that object that comes without awareness. This perspective of thinking about unconscious processing has four components with respect to social knowledge being availability, accessibility, applicability, and self-regulation. The ability for people to categorize thoughts and perceptions about others can be credited to Allport (1954) who suggested that “categories have a close and immediate tie with what we see, how we judge, and what we do…their purpose seems to be to facilitate perceptions and conduct” (p. 21).

With respect to stereotypes, the process of social knowledge is vital to creating negative attitudes which can be seen as “attributes associated with a social category” (Anderson, Moskowitz, Blair, & Nosek, 2007; p. 141). In order to develop a stereotypical attitude there needs to be a memory or knowledge available about a social group, then this knowledge must be easily or automatically accessible which then leads to the applicability of the social knowledge to a given situation before finally our self-regulation processes that can inhibit, adjust, enhance, or suppress the social knowledge can finalize the creation of an attitude (Anderson et al., 2007).

Further support for the unawareness of automatic thoughts and support for Allport’s philosophies on categorization was discussed by Banaji and Bhaskar (2000) when they reported that “The best of intentions do not and cannot override the unfolding of unconscious processes, for the triggers of automatic thought, feeling, and behavior live and breathe outside conscious awareness and control” (pp. 142-143). Banaji and Bhaskar further talked about the difficulty attempting to measure stereotypes and the idea that the perceivers and the social group being stereotyped are typically unaware of judgments being made and stereotypes. These
judgments are typically made by passing a judgment about a group of people not the actions of an individual or target being judged.

Implicit Association Test

One way to measure automatic thoughts is to use an Implicit Association Test (IAT). IATs are essentially used to measure the magnitude that individuals associate images and words to specific categories (Olson & Fazio, 2003) and that this process of categorization is measuring unconscious attitudes; however this should not imply that individuals are not aware of their unconscious attitudes. IATs are an indirect measure attempting to get at more implicit conceptual behaviors, like stereotyping, by examining time latency differences when a person categorizes attribute concepts into two target groups. These differences in the amount of time to group attribute stimuli in the form of images and/or words, produces an IAT Effect. This IAT Effect, as defined by Greenwald, McGhee and Schwartz (1998), is the “difference in mean latency between …two conditions non compatible and compatible” (p. 1468). This Effect is essentially a measure of magnitude of association an individual may possess toward a specific construct (target concept). The IAT Effect implies that this measure can be extracted from participants without directly asking them about attitudes, which is done with explicit attitude measurements used in past stuttering literature. Individuals may not be fully aware of the depth of their attitudes at a more consciousness level, so these type of tasks can explore those attitudes through a more indirect manner. IATs can be seen as a cousin of semantic priming tasks (Fazio, 1986) however, there seems to be less than robust correlations between IATs and semantic priming (Lane, Banaji, Nosek, & Greenwald, 2007; Olson & Fazio, 2003) so they can be viewed as independent measures. As stated above, IATs are an indirect means to probe explicit concepts. IATs have been reported to have low correlations with explicit measures,
however, implicit and explicit associations are also perceived to be a separate process. According to Greenwald and Banaji (1995), correlations between implicit and explicit attitudes could be dependent upon how aware individuals are of their own attitudes toward the stimuli. This reasoning was supported by Wilson, Lindsey, and Schooler (2000) along with Banaji (2000), who proposed a dual model of implicit and explicit attitudes. This dual model suggested that increased personal awareness or introspection can increase correlation levels with implicit and explicit measures of attitudes.

The dual model proposed was confirmed by Hofmann, Gawronski, Gschwender, Le, and Schmitt (2005) who investigated the relationship between implicit and explicit measures using IATs with a meta-analysis methodology. The results indicated a “dual systems model” which separates implicit attitudes as an associative process and explicit attitudes as a propositional process. The associative process can be defined as the impulsive neural process which “has low flexibility” and is “fast and needs no attentional resources” in order to represent patterns of associations. The propositional process can be seen as the reflective neural system which representations, in this case attitudes, can be formulated by interpreting more than one thought which is processed and “a truth value is attached” to that thought (Strack & Deutsch, 2004; p. 223). The major differences between the associative process and the propositional process is the propositional process requires large amounts of cognitive capacity and processing time and can be distracted easier than the associative process which is fast and requires less cognitive capacity. The conclusions from Hofmann et al. were that associative (implicit) processes and propositional processes are “systematically related” however the magnitude of correlation can be determined “by the degree of spontaneity of explicit self reports” that individuals report as compared to an IAT” (p. 1382).
Further support for the idea that implicit and explicit mental processing are related and yet distinct processes has been reported several times in the area of research focused on IATs (e.g., Lane et al., 2007; Nosek, 2007; Schnabel, Asendorpf, & Greenwald, 2008a). The correlations between implicit and explicit measures tend to be low, however, this concept is supported by the theory that unconscious attitudes and conscious attitudes are separate processes (Banaji, 2001; Hofmann, Gschwendner, Nosek, & Schmitt, 2005; Lane et al., 2007; Nosek, 2007; Nosek, Banaji, & Greenwald, 2005; Schnabel, Asendorpf, & Greenwald, 2008b).

Questions regarding reliability and validity of the IAT have been asked and researched since the conception of this instrument. One such study investigated “inter-item consistency (the extent that items within a single measure at a single measurement correlate with each other), stability (the extent to which a measure at one measurement occasion correlates with the same measure at other times), and convergent validity (the extent to which different measures that are designed to tap the same construct correlate with each other)” (Cunningham, Preacher, & Banaji, 2001; p. 164). The inter-item consistency, using Cronbach’s alpha (Cronbach, 1951), was found to be liberally acceptable for the IAT. Despite the inter-item consistency being lower than explicit measures of attitudes, the stability across time was reported to be acceptable and that the convergent validity was significantly correlated with other implicit measures (i.e., Response-window evaluative priming and response window IAT). The research performed by Cunningham et al. added to the theory that implicit and explicit attitudes may correlate and still be distinct processes, as discussed above with the dual model. It should be noted that Nosek, Greenwald, & Banaji (2005) recommended that an IAT could be created with as few as two items of stimulus to represent each target concept without impairing the reliability of an IAT.
IATs have been reported to possess strong predictive validity when correlated with other direct measures of stereotyping and prejudice (Nosek, Smyth, Hansen, Devos, Lindner, & Ranganath, 2007; Nosek & Hansen 2008b; Poehlman, Uhlmann, Greenwald, & Banaji, 2007). Research has also attempted to use IATs to predict behavior. This research has explored the process of “different processing modes or linking attitudes to behavior” (Fazio, 1990; p. 92). A common model referred to when discussing indirect and direct measurements of attitudes, like the IAT, is the MODE model (Fazio, 1990). The MODE model stands for “motivation and opportunity as determinants of which processing mode is likely to operate in any given situation” (Fazio, 1990; p. 92). This model basically indicates that the cognitive process of thinking about a decision before performing a specific behavior, or the deliberation process, may impact correlations between indirect measure processing and directed processing. Applying the MODE model to attitudinal measurements means that if the “motivation or opportunity is relatively low at the time that the explicit response…then the explicit response will correlate with the implicit” response (Fazio & Olson, 2003; p.304). However, if the opposite is present, high motivation and opportunity for deliberation processing, then the correlations maybe lower. In other words, the less cognitive thought put into explicit response the higher the relations that these explicit responses will be tied with implicit responses or measurements.

Due to its growing popularity of IATs in the psychological community since Greenwald et al. (1998) developed this instrument, the IAT has been used in a variety of disciplines investigating social attitudes related to: race, prejudice, and attitudes (e.g., Dasgupta, McGhee, Greenwald, & Banaji, 2000; Moule, 2009; Rudman, Greenwald, & Mellot, 1999), gerontology (e.g., Hummert, Garstka, O’Brien, Greenwald, & Mellott, 2002; Levy & Banaji, 2002), self–
esteem (e.g., Oakes, Brown, Cai, 2008; Pinter & Greenwald, 2005), body weight perceptions (e.g., Swartz, Chambliss, Brownell, Blair, & Billington, 2003; Schwartz, Vartanian, Nosek, & Brownell, 2006), perceptions of mental illnesses (e.g., Peris, Teachman, & Nosek, 2008), consumer psychology (e.g., Brunnel, Tietie, & Greenwald, 2004; Maison, Greenwald, & Bruin, 2001), psychology of empathy (e.g., Kampfe, Penzhom, Schikora, Dunzl, & Schneidenbach, 2009), sports psychology (e.g., Banting Dimmock, & Lay 2009), anxiety disorders (e.g., Gschwendner, Hofmann, & Schmitt, 2008), psychology of religion and paranormal (Weeks, Weeks, & Daniel, 2008), psychology of addiction (Ostafin, Marlatt, & Greenwald, 2008, Wiers, van Woerden, Smulder, & de Jong, 2002), neuropsychology (Luo, Nakic, Wheatley, Richell, Martin, & Blair, 2006), psychology of gender (Aidman & Carroll, 2003; Jellison, McConnell, & Gabriel, 2004), and psychology of romance (Rojahn, Komelasky, & Man, 2008). IATs have not been used to explore attitudes or stereotypes of PWS.

Need for the present study

Explicit research studies which have involved such methodology as semantic differential scales and listing adjectives to describe stuttering have been the dominant tools for collecting data with regards to stereotypes toward PWS. Attitude and stereotyping research in communication disorders has primarily used a variety of scales to explore attitudes towards hypothetical PWS, audio only clips of people stuttering and not stuttering, and audiovisual stimuli of fluent and stuttering individuals. The use of the previously mentioned data collection methodologies in the field of speech-language pathology has been able to identify that PWS and PWDS report negative attitudes toward stuttering, with respect to presumed personality traits. However, there are limitations to only focusing on explicit measures of attitudes people
possess. More recent research by Irani and Gabel (2008) may be an example that the use of explicit measures (e.g., semantic differential scales) could be limiting in painting a clear picture of participants’ perceptions regarding stuttering. Interestingly, Irani and Gabel used a semantic differential scale with school teachers and found that they perceived both fluent and stuttering speakers positively and that experience teaching and with people who stutter did not appear to have an impact on attitudes toward PWS. This finding is not congruent with past research. This is just one study that may show that the use of explicit measures may require the compliment of implicit measures to get the full picture of what attitudes look like from participants’ perspectives.

Another weakness to past explicit stereotype research studies relates to whether or not the various ways of presenting stimuli (hypothetical situations or concepts, audio-only, audiovisual recordings, or the use of in person presentations with actors or real PWS) can or cannot be compared to each other. The previously stated types of stimuli presentations may involve diverse arrangements of cognitive processes on the attention system of the brain thus introducing large demands on this system which may produce potential competition and interference with the stimulus signals (Anderson & Black, 2006). Thus, with the attention system taxed with multiple stimuli, comparing these varieties of stimuli presenting stuttering could bring in questions of validity of explicit measures of attitudes about stuttering.

An additional limitation related to presentation of stimuli is that many explicit surveys used in stuttering research instruct the participant to imagine a hypothetical situation or concept in order to hopefully get them to think of PWS and PWDS when making a judgment. A common theory of stereotype development is that people infer attitudes about PWS by their own experiences with their own normal disfluencies and may be able to adjust those inferred
attitudes based on experiences with PWS (Doody et al, 1993; Weisel & Spektor, 1998; White & Collins, 1984). Bearing the previous statement in mind, Williams (2006) said “stuttering affects no two people the same way” (p. 9). Since all people are unique, a question of stimuli presentation “control” may arise if researchers are asking participants to essentially imagine a person who stutters. Each participant could have a different perspective of a hypothetical person who stutters and thus generate larger variability within results. The idea that researchers may be losing control based on the type of stimuli with respect to audio or visual processing with participants and hypothetical presentations of stuttering may offer the possibilities of reducing reliability of results.

Another limitation to the past research on stereotyping and stuttering is that most studies cannot predict or determine if stereotypes or attitudes predict behaviors. Woods and Williams (1976) suggested that behaviors that individuals possess may be “unfavorably to stutterers, at least in covert and subtle ways,” (p. 277). For clinicians, it is vital to come to terms with their own stereotype beliefs about stuttering in order to avoid perceiving clients with stereotypes they may possess which could thus impact their behaviors toward their stuttering clients (White & Collins, 1984). In addition, Woods and Williams suggested that PWS could be swayed by listeners’ reactions to their stuttering behaviors. If the previous statement is true, then when clinicians hold stereotypes or attitudes toward stuttering and their clients begin to behave in a manner that confirms or supports those attitudes, then the stereotype is further reinforced to the clinician. Our field needs to develop an instrument which can measure these possible implicit reactions in order to make clinicians aware of their associations to stuttering whether they are positive or negative. Further, if people do react
“unfavorably” in “covert and subtle ways,” perhaps explicit measures like semantic differential scales may not be good instruments to measure these reactions.

The primary limitation with the past research involved in stereotyping of PWS is that the means of measuring attitudes does not consider the “unconscious needs and drives of an individual,” (Leahy, 1994; p. 40). An instrument to measure these unconscious drives and attitudes of all people who interact or do not interact with PWS needs to be developed in order to get an idea of the general public’s core associations to stuttering. The Implicit Association Test (IAT) (Greenwald et al., 1998) is the following:

A response latency measure that rests on the assumption it shares with other measures of associative strength that the more strongly two concepts have come to be associated with one another, the faster and more accurately they can be paired together. (Baron & Banaji, 2006, p. 54).

This test is an indirect measure of social cognition to look at cognitive personality and social behavior (Greenwald & Banaji, 1995) which has been shown to have predictive validity with respect to stereotyping and prejudice (Nosek et al., 2007; Poehlman et al., 2007). It may be an appropriate instrument to measure unconscious attitudes toward PWS because “people might be unwilling to report some of their attitudes or stereotypes because they do not like having them” or they may not have the cognitive ability or conscious ability to explain their stereotypical thoughts (Nosek et al., 2007). Along these same lines, Dovidio and Fazio (1992) mentioned that people may be more inclined to express more socially appropriate answers than their “true private opinions” (p. 209). IAT have also been shown to predict behaviors and judgments (Lane...
et al., 2007, Nosek et al., 2007) along with social judgments, physiological responses, and social actions (Poehlman et al., 2007).

If an IAT was created to measure implicit attitudes toward stuttering speakers and fluent speakers it could be used in an attempt to examine the idea suggested by Betz et al. (2008) that the more familiar a person is with stuttering or people who stutter they will have less negative attitudes toward stuttering. It may also help the field to connect physiological reactions to stuttering studies similar to a recent study by Guntupalli, Kalinowski, Nanjundeswaran, Saltuklaroglu, and Everhart (2006), which indicated that skin conductance increased and heart rate slowed down in reaction to a visual stimulus of a person stuttering, possibly indicating unpleasant physiological reactions to a one-minute video tape of a person stuttering. Guntupalli et al. (2006) also discuss neurological mechanisms associated with emotions. IAT measures have been shown to have high correlations with differences in the amygdala activation when using functional magnetic resonance imaging (fMRI) (Beer, Stallen, Lombardo, Gonsalkorale, Cunningham, & Sherman, 2008; Cunningham et al, 2004; Cunningham, Van Bavel, & Johnsen 2008; Knutson, Mah, Manly, & Grafman 2007; Luo, Nakic, Wheatley, Richell, Martin, & Blair 2006). With the amygdala being an emotional center in the brain, the idea that automatic processing is performed with respect to attitudes may not be surprising. Other areas of the brain, like the orbital frontal cortex, have been observed when an IAT is performed while using fMRI technology, which may indicate this area facilitates automatic processes, which also may be due to the lack of activity for explicit measures (Van Bavel et al., 2008). Another neurological system recently discovered is called the mirror neurons system. Research with mirror neurons have helped with understanding how of humans mimic other people’s emotions which ties into the idea of cognitive empathy (Kaag, 2009;
Keysers & Fadiga, 2008; Nummenmaa, Hirvonen, Parkkola, & Hietanen, 2008). These mirror neurons have been found to help with understanding how individuals can process facial expressions and movements in the attempt to feel what another person feels (Keyser & Fadiga, 2008). This system could support the suggestion that PWDS infer experience they have during non fluent moments with people who stutter (Horsley & FitzGibbons, 1987; White & Collins, 1984). The development of an implicit method of testing possible stereotypes of stuttering may help support the neuroscience research with mirror neurons and other areas of the brain with respect to empathy and the explicit measures taken by White and Collins and Horsley and FitzGibbons.

IATs may yield different results about labeling since it is an indirect measure of unconscious attitudes. Individuals may provide more positive responses on explicit labeling tasks, like a semantic differential scale, in order to not appear insensitive to the researchers gathering the data, uncompassionate to disorders, and inconsiderate of people with disabilities (like stuttering). However, with an implicit measure, it may be more challenging to hide what a person truly perceives about a given target concept. Previous research has found that IATs tend to be less vulnerable to “faking answers” than explicit measures (Lane et al., 2007; Steffens, 2004).

An indirect measure like an IAT may help uncover attitudes that people may not be willing to report (Nosek et al., 2007), thus overcoming the problems related to socially desirable responses. This is because participants may not be aware that these unconscious attitudes and stereotypes exist (Greenwald & Banaji, 1995). This need for research to explore unconscious attitudes and stereotypes is vital to any disorder or difference and “speaks to a problem of great social significance” (Banaji, Lemm, & Carpenter, 2001; p.149).
Purpose and research questions

The purpose of this study is to develop and perform a field test with two IAT, one Picture IAT (where visual images of people stuttering and being fluent are presented along with words representing good and bad attribute concepts) and one Word IAT (where words describing fluent speakers and stuttering speakers are presented along with words representing good and bad attribute concepts), to examine implicit attitudes from PWDS in order to compare those attitudes to explicit attitude measures with respect to stuttering and fluent speakers. It should be noted that the reason for choosing the target concepts of Fluent Speaker and Stuttering Speaker and not Fluent and Stuttering is to be consistent with past attitude research which investigated “people” and not “speech” aspects associated with the words “fluent” or “stuttering”.

Following three pilot studies that were conducted to develop stimuli, a field study was conducted to explore whether there were differences with attitudes PWDS reported while completing the two Stuttering Speaker and Fluent Speaker IATs and the explicit scales. It is also hoped that by answering the research questions below, normalization of these two IATs with PWDS can be attained, which would be the next step in the development of these instruments along with the purposes stated above.

1. Is there a difference in the implicit attitudes PWDS possess toward stuttering speakers and fluent speakers?
2. Are the two IATs (Picture IAT and Word IAT) yielding similar or different results and thus testing or not testing the same construct?
3. What are the explicit (self-reported or conscious) attitudes that PWDS have about stuttering and fluent speakers?

4. What relationships do the implicit and explicit attitudes have when those attitudes are directed towards stuttering and fluent speakers?
CHAPTER 3

Pilot Studies to Develop Stimuli for IATs Stuttering Speakers and Fluent Speaker

The three pilot studies below were designed in order to generate stimuli to construct a seven-stage Implicit Association Tests (IAT) with the target concepts of “Stuttering Speaker” and “Fluent Speaker.” It should be noted here that along with the target concepts of “Stuttering Speaker” and “Fluent Speaker,” there will be attribute concepts of “Bad” and “Good.” The attribute concepts of “Bad” and “Good” were attained from the robust research on IATs and the many versions of IAT instruments created since 1998 (Greenwald et al., 1998). Participants for all three pilot studies were college students from Bowling Green State University (BGSU).

Development of image stimuli for pilot studies.

To develop the IAT, images of people stuttering and speaking fluently were required. The images were gathered by taking photographs of two models by a photographer using a Canon EOS Digital Rebel with a 480 EX Speedlite lens and 18-25 EF-S Canon Kit Lens. The models for the images were two PWS who were given two lists of 12 words (the same words on each list in the same order) which included: three plosives (i.e. /p, t, k/), two fricatives (i.e. /f, sh/), and one interdental (/th/) words in the initial position (words were taken from Kelman & Edward, 1994; See Appendix A). These PWS were both certified Speech-Language Pathologists with a documented history of stuttering, along with extensive experience with stuttering therapy and advanced education in fluency disorders. The two models were instructed to stutter on the twelve words as indicated by one of the following prompts given; “Part Word (also referred to as sound syllable repetition),” “Block (also called inaudible sound prolongation)” and “Sound Prolongation (also called an audible sound prolongation)” (see
Appendix A). Thus, there were six part word repetition productions, three blocks, and three sound prolongations prompts. The participants were asked to read the single words and produce the disfluency prompted. Then they were asked to produce the same words fluently. Researchers chose to have models perform disfluent productions first in the attempt to generate some real disfluencies with novel words and then the fluent productions second to utilize the adaptation effect of stuttering (Bloodstein, 1995).

The photographer was instructed to take two to three pictures of each word produced from the “stuttering productions list” and “fluent” productions. Thus, 86 photos for participant one and 95 photos for participant two were gathered, for a total of 181 images. One image was selected for each stuttered and each fluent production for each model from the word list for a total of 48 images between the two models (i.e., 12 fluent words +12 stuttered words x 2 models =24 images). Stuttered images were chosen if they depicted the model stuttering on the initial consonant while fluent images were chosen when models were perceptually producing vowel sounds following the initial consonant. The images were then put in order using three criteria: alphabetical, fluent word productions before stuttered productions and model one before model two (e.g., police-fluent-model 1, police-fluent-model 2, police-stuttered-model 1, police-stuttered-model 2) before randomly ordering all 48 images by using a random number generator.

After images were randomly ordered, they were then inserted into a questionnaire which was sent to seven research team members to judge whether the images looked like the participants were producing stuttered or fluent speech (see Appendix B). The research team consisted of seven individuals with extensive experience in the field of speech-language pathology, primarily fluency disorders. The members of the research team were asked to
perform a forced choice survey with “stutter” or “not stuttering” judgments of each image (note the directions on Appendix B asking the research team members to indicate an “s” for “stuttering” or an “n” for “not stuttering” in a box below each image provided). Thirty-six of the 48 images were correctly identified as “stuttering” or “not stuttering” with 85% or better agreement with the entire research team (i.e., 20 “Fluent” and 16 “Stuttering” images). These 36 images were then used as stimuli for the Pilot Study One survey instrument.

Pilot Study One

Following the development of the images, Pilot Study One was conducted. The purpose of Pilot Study One was to develop a list of possible adjectives that college students associate with “stuttering” and “fluent” along with an initial attempt to see what images college students correctly identify as “stuttering” or “fluent.”

This study used a questionnaire consisting of an informed consent page, a demographics page, two qualitative questions and the 36 images of stuttered and fluent images of models correctly agreed upon by the research team above (see Appendix C). The two open-ended questions appeared first on the questionnaire and asked participants: 1) When you hear the word “stutter” what words come to mind? (try and think of single words please); 2) When you hear the word “fluent” what words come to mind? (try and think of single words please). After the two open-ended questions, participants were shown the 36 images of stuttering and fluent word productions and asked to circle which answer they thought best represents “stuttering” and “fluent.” Images were presented in random order and under each picture were three choices which participants were asked to choose the word or phrase that appropriately represented to them how they perceived that picture: “Stuttering”, “I Can’t Tell”, and
“Fluent”. Participants were given the option of “I Can’t Tell” in hopes of more accurate data for associations to “stuttering” and “fluent” images.

The participants for this study were 43 undergraduate students at BGSU who were from a variety of majors (e.g. Applied Health, Aviation, Business, Communication Disorders, Education, Fine Arts, Psychology, and Sports Management). Participants’ ranged in age from 18-34 years old, 60% were female, and 44% knew someone who stuttered (mean and standard deviation). Fluent speaking agents were selected to deliver surveys to the participants in order to prevent a possible influence by a stuttering presenter (see Appendix D).

The most frequently generated words (two or more times) reported by participants to represent “stuttering” are the following: slow, speech, difficulty, annoying, repetition, choppy, confusing, difficult, hard, hesitation, impairment, nervous, patience, unclear, and stumble (see Table 1. "Stuttering" Adjectives Generated from Pilot Study 1 (two or more frequencies listed below).

The “fluent” words most often reported were: smooth, easy, clear, normal, understandable, flow, quick, flowing, knowledgeable, language, smart, ease, fast, fluid. See Table 2 for the list of “fluent” words generated.

Twenty-five images out of the 36 were correctly identified by the majority of the participants (i.e., 50% or more). Of the 25 correctly indentified pictures, 13 were of fluent productions (see Table 3) and 12 were of stuttered productions (see Table 4).
Table 1

"Stutter" Adjectives Generated from Pilot Study 1 (two or more frequencies listed below)

<table>
<thead>
<tr>
<th>&quot;Stutter&quot; Adjectives Generated</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>slow</td>
<td>7</td>
</tr>
<tr>
<td>speech</td>
<td>5</td>
</tr>
<tr>
<td>difficulty</td>
<td>4</td>
</tr>
<tr>
<td>annoying</td>
<td>3</td>
</tr>
<tr>
<td>repetition</td>
<td>3</td>
</tr>
<tr>
<td>confusing</td>
<td>3</td>
</tr>
<tr>
<td>difficult</td>
<td>2</td>
</tr>
<tr>
<td>patience</td>
<td>3</td>
</tr>
<tr>
<td>choppy</td>
<td>2</td>
</tr>
<tr>
<td>hard</td>
<td>2</td>
</tr>
<tr>
<td>hesitation</td>
<td>2</td>
</tr>
<tr>
<td>impairment</td>
<td>2</td>
</tr>
<tr>
<td>nervous</td>
<td>2</td>
</tr>
<tr>
<td>unclear</td>
<td>2</td>
</tr>
<tr>
<td>stumble</td>
<td>2</td>
</tr>
</tbody>
</table>
Table 2

"Fluent" Adjectives Generated from Pilot Study 1 (two or more frequencies listed below)

<table>
<thead>
<tr>
<th>&quot;Fluent&quot; Adjectives Generated</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>smooth</td>
<td>11</td>
</tr>
<tr>
<td>easy</td>
<td>7</td>
</tr>
<tr>
<td>clear</td>
<td>5</td>
</tr>
<tr>
<td>normal</td>
<td>5</td>
</tr>
<tr>
<td>understandable</td>
<td>5</td>
</tr>
<tr>
<td>flow</td>
<td>5</td>
</tr>
<tr>
<td>quick</td>
<td>4</td>
</tr>
<tr>
<td>flowing</td>
<td>4</td>
</tr>
<tr>
<td>language</td>
<td>3</td>
</tr>
<tr>
<td>knowledgeable</td>
<td>2</td>
</tr>
<tr>
<td>smart</td>
<td>3</td>
</tr>
<tr>
<td>ease</td>
<td>2</td>
</tr>
<tr>
<td>fast</td>
<td>2</td>
</tr>
<tr>
<td>fluid</td>
<td>2</td>
</tr>
</tbody>
</table>
Table 3

*Correctly Identified “Fluent” Images from Pilot Study #1*

<table>
<thead>
<tr>
<th>&quot;Fluent&quot; Word</th>
<th>Participant (model)</th>
<th>Frequency of Correctly Identity Images</th>
</tr>
</thead>
<tbody>
<tr>
<td>toolbox</td>
<td>2</td>
<td>81.4</td>
</tr>
<tr>
<td>can</td>
<td>2</td>
<td>79.1</td>
</tr>
<tr>
<td>kissing</td>
<td>2</td>
<td>74.4</td>
</tr>
<tr>
<td>thorn</td>
<td>2</td>
<td>72.1</td>
</tr>
<tr>
<td>police</td>
<td>2</td>
<td>72.1</td>
</tr>
<tr>
<td>thanksgiving</td>
<td>2</td>
<td>67.4</td>
</tr>
<tr>
<td>tea</td>
<td>1</td>
<td>65.1</td>
</tr>
<tr>
<td>foot</td>
<td>2</td>
<td>60.5</td>
</tr>
<tr>
<td>tea</td>
<td>2</td>
<td>55.8</td>
</tr>
<tr>
<td>thanksgiving</td>
<td>1</td>
<td>55.8</td>
</tr>
<tr>
<td>police</td>
<td>1</td>
<td>55.8</td>
</tr>
<tr>
<td>shadow</td>
<td>2</td>
<td>53.5</td>
</tr>
<tr>
<td>shovel</td>
<td>1</td>
<td>51.2</td>
</tr>
<tr>
<td>kissing</td>
<td>1</td>
<td>46.5</td>
</tr>
<tr>
<td>fish</td>
<td>1</td>
<td>39.5</td>
</tr>
<tr>
<td>toolbox</td>
<td>1</td>
<td>39.5</td>
</tr>
<tr>
<td>foot</td>
<td>1</td>
<td>34.9</td>
</tr>
<tr>
<td>peach</td>
<td>1</td>
<td>20.9</td>
</tr>
</tbody>
</table>
Table 3 (continued)

<table>
<thead>
<tr>
<th>&quot;Fluent&quot; Word</th>
<th>Participant</th>
<th>Frequency of Correctly Identity Images</th>
</tr>
</thead>
<tbody>
<tr>
<td>fish</td>
<td>2</td>
<td>9.3</td>
</tr>
<tr>
<td>shovel</td>
<td>2</td>
<td>missing data</td>
</tr>
</tbody>
</table>
Table 4

Correctly Identified “Stutter” Images from Pilot Study 1

<table>
<thead>
<tr>
<th>&quot;Stutter&quot; Word</th>
<th>Produced</th>
<th>Disfluency Type</th>
<th>Participant (model)</th>
<th>Frequency of Correctly Identified Images</th>
</tr>
</thead>
<tbody>
<tr>
<td>fish</td>
<td></td>
<td>Partword Rep (SSR)</td>
<td>1</td>
<td>100</td>
</tr>
<tr>
<td>can</td>
<td></td>
<td>Block (ISP)</td>
<td>1</td>
<td>95.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sound Prolongation</td>
</tr>
<tr>
<td>foot</td>
<td></td>
<td>(ASP)</td>
<td>1</td>
<td>90.7</td>
</tr>
<tr>
<td>police</td>
<td></td>
<td>Partword Rep (SSR)</td>
<td>1</td>
<td>88.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sound Prolongation</td>
</tr>
<tr>
<td>thanksgiving</td>
<td></td>
<td>(ASP)</td>
<td>1</td>
<td>88.4</td>
</tr>
<tr>
<td>peach</td>
<td></td>
<td>Block (ISP)</td>
<td>2</td>
<td>86</td>
</tr>
<tr>
<td>peach</td>
<td></td>
<td>Block (ISP)</td>
<td>1</td>
<td>86</td>
</tr>
<tr>
<td>shovel</td>
<td></td>
<td>Partword Rep (SSR)</td>
<td>1</td>
<td>83.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sound Prolongation</td>
</tr>
<tr>
<td>shadow</td>
<td></td>
<td>(ASP)</td>
<td>1</td>
<td>76.7</td>
</tr>
<tr>
<td>can</td>
<td></td>
<td>Block (ISP)</td>
<td>2</td>
<td>67.4</td>
</tr>
<tr>
<td>shovel</td>
<td></td>
<td>Partword Rep (SSR)</td>
<td>2</td>
<td>53.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sound Prolongation</td>
</tr>
<tr>
<td>thanksgiving</td>
<td></td>
<td>(ASP)</td>
<td>2</td>
<td>51.2</td>
</tr>
<tr>
<td>tea</td>
<td></td>
<td>Block (ISP)</td>
<td>2</td>
<td>46.5</td>
</tr>
</tbody>
</table>
Table 4 (continued)

<table>
<thead>
<tr>
<th>&quot;Stutter&quot; Word Produced</th>
<th>Disfluency Type</th>
<th>Participant (model)</th>
<th>Frequency of Correctly Identified Images</th>
</tr>
</thead>
<tbody>
<tr>
<td>foot</td>
<td>Sound Prolongation (ASP)</td>
<td>2</td>
<td>44.2</td>
</tr>
<tr>
<td>fish</td>
<td>Partword Rep (SSR)</td>
<td>2</td>
<td>41.9</td>
</tr>
<tr>
<td>kissing</td>
<td>Partword Rep (SSR)</td>
<td>1</td>
<td>32.6</td>
</tr>
</tbody>
</table>
Additionally, inter-rater reliability was performed with one research team member with respect to all the image data from all 43 participants after data was collected. One hundred percent agreement was reported between the two researchers.

**Pilot Study Two.**

The purpose of the second pilot study was to narrow down the number of stimuli to between four and eight adjectives and images stimuli for fluent and stuttering representations in order to be inserted into two IATs instruments (i.e., Picture IAT and Word IAT) for Stuttering Speaker and Fluent Speaker target concepts. To do this the survey used 23 words generated from Pilot Study One along with words that were most frequently cited for “stuttering” and “fluent” from the following online sites:


The above online sites generated five words for “stutter” (i.e. stammer, falter, sputter, stumble, and impediment) and six words for “fluent” (i.e. eloquent, smooth, glib, graceful, silver-tongued, and flowing). This list allowed for a total of 34 words for the questionnaire. Also, the 25 pictures that were correctly identified from the first pilot study were used and presented in a similar manner as Pilot Study One.

Pilot Study Two used four different versions of the survey questionnaire in an attempt to eliminate any order effects with respect to stimulus order that may arise if there were only one version. The words and images were randomly organized separately for each questionnaire (i.e. four different randomized orders for the words and four different randomized orders for
the images with the words section always coming first). Participants were asked to circle one answer (i.e. “stuttering”, “fluent”, “I can’t tell”) they felt best represented each of the 34 words and each of the 25 images (See Appendix E). The Informed Consent Form and Demographics sheet were the same for Pilot Study Two as they were for Pilot Study One.

This second pilot study was completed with 187 college student participants from BGSU. Sixty percent of participants were female, the average age of participants was 19.6 and the participants were from a variety of majors (e.g. Business, Education, Communication Disorders, and Communication Studies). It should be noted that the majority of participants reported knowing someone who stuttered (57%) with a majority stating that they had a “friend” who stutters (67% of reported responses).

The first series of analyses performed were to investigate any order effects across the four versions of the instrument and responses that people chose for each stimuli. The first analysis performed was a one-way ANOVA to investigate differences in mean responses, over the entire survey, between all four versions. The findings for this comparison were not significant ($F (3, 236) = .182$, $p=.908$). The next two analyses were one-way ANOVAs looking at differences in mean scores for all “stuttering” and “fluent” stimuli respectfully (each ANOVA included both adjectives and picture images together). The researchers controlled for each stimuli group (“stuttering” and “fluent”) prior to running the ANOVA looking at differences of means across the four randomized versions of the survey. No significant differences were found for either the “stuttering” ($F (3, 118) = .509$, $p=.676$) or the “fluent” ($F (3, 118) = 1.737$, $p=.163$) stimuli across versions when examining all stimuli identified as “stuttering” or “fluent” (i.e. both images and words). The next set of ANOVAs investigated any differences within the adjectives and the images sections of the survey separately. No
significant effects were found within either the adjectives section \( (F(3, 136) = .111, p=.953) \) nor the images section \( (F(3, 100) = .396, p=.756) \). Further counter balancing ANOVAs investigated any significant differences within the each section (adjectives and images) of Pilot Study Two while controlling for “stutter” stimuli or “fluent” stimuli. No significant effects were found for the “stutter” and “fluent” stimuli within the adjective section \( (F(3, 68)= .353, p=.786 \) and \( F(3, 68)= .721, p=.676 \) respectively) and the “stutter” stimuli for the images \( (F(3, 47)=1.379, p=.261) \). However, significant differences were found with the “fluent” images stimuli across versions \( (F(3, 53) = 4.391, p=.008) \). The above analysis for the most part indicates that there was not a strong order effect across versions with the images and words that participants identified as “stuttering” and “fluent”, with the exception of “fluent” image stimuli. This last significant finding with fluent images being significantly different could be due the participants associating certain features of the models faces (e.g., eye’s opened or closed, facial tension) with stuttering and fluent speakers and thus had an easier time (picking with more accuracy) stuttering images. However since this was the only significant difference out of all the order effect analysis conducted, we do not see this as much of a threat to Pilot Study Two’s overall results.

The next set of analysis conducted were descriptive frequency analysis to determine the number of participants who correctly identified “stuttering” and “fluent” adjectives. The results from the adjectives portion of Pilot Study Two showed that 24 words for “fluent” or “stuttering” adjectives were correctly identified by the majority (50%) or more of participants (15 “fluent” words and nine “stuttering” words). Fifty percent or more of the participants correctly identified “fluent” words, of those 15 nine words were correctly identified by more than 80% of the participants (i.e. clear, ease, easy, flow, flowing, fluid, graceful, normal, and
smooth). It should be noted that the following three “fluent” words were correctly identified by at least 90% of the participants: clear, flowing, and smooth. For a summary of this data, see Table 5.

Fifty percent or more of participants correctly identified nine stuttered words (i.e., hesitation, difficulty, repetition, impairment, impediment, choppy, sputter, stammer, and stumble). Three of the nine words were correctly identified by more than 70% of the participants (i.e., sputter, stammer, and stumble). Table 6 summarizes this data.

The last set of analysis included a descriptive frequency analysis. This analysis was completed to determine the number of participants to correctly identify “stuttering” and “fluent” looking images. The results indicated that 22 of the 25 pictures were correctly identified by at least 50 percent of participants (i.e., eleven “stuttering” and eleven fluent images). There were four “stuttering” images that eighty percent of participants correctly indentified (i.e., thanksgiving, foot, fish, and can) (See Appendix F). From the four previously mentioned “stuttering” pictures, “can” and “fish” produced by model number one were correctly identified with more than ninety percent of the college participants in this second Pilot Study (See Table 7).

Of the 13 total fluent images that participants were asked to identify as “stuttering”, “fluent”, or “I can’t tell”, 11 were correctly identified by more than 50% of participants and four were correctly identified by more than 70% of college students participating (see Table 8. and See Appendix G).
Table 5

*Pilot Study Two. Correctly Identified “Fluent” Adjectives*

<table>
<thead>
<tr>
<th>Adjectives</th>
<th>Frequency of Participants Correctly Identified</th>
</tr>
</thead>
<tbody>
<tr>
<td>flowing</td>
<td>92.6</td>
</tr>
<tr>
<td>clear</td>
<td>92.4</td>
</tr>
<tr>
<td>smooth</td>
<td>92.4</td>
</tr>
<tr>
<td>flow</td>
<td>87.3</td>
</tr>
<tr>
<td>graceful</td>
<td>86.7</td>
</tr>
<tr>
<td>fluid</td>
<td>81.2</td>
</tr>
<tr>
<td>normal</td>
<td>81.2</td>
</tr>
<tr>
<td>ease</td>
<td>81.1</td>
</tr>
<tr>
<td>easy</td>
<td>80.1</td>
</tr>
<tr>
<td>understandable</td>
<td>73.2</td>
</tr>
<tr>
<td>eloquent</td>
<td>70.4</td>
</tr>
<tr>
<td>smart</td>
<td>65.7</td>
</tr>
<tr>
<td>quick</td>
<td>54.9</td>
</tr>
<tr>
<td>fast</td>
<td>52.7</td>
</tr>
<tr>
<td>speech</td>
<td>50.1</td>
</tr>
<tr>
<td>knowledgeable</td>
<td>47.6</td>
</tr>
<tr>
<td>language</td>
<td>44.125</td>
</tr>
<tr>
<td>slow</td>
<td>24.8</td>
</tr>
</tbody>
</table>
Table 6

_Pilot Study Two. Correctly Identified “Stuttering” Adjectives_

<table>
<thead>
<tr>
<th>Adjectives</th>
<th>Identified</th>
</tr>
</thead>
<tbody>
<tr>
<td>stammer</td>
<td>73.1</td>
</tr>
<tr>
<td>sputter</td>
<td>71.9</td>
</tr>
<tr>
<td>stumble</td>
<td>71.5</td>
</tr>
<tr>
<td>choppy</td>
<td>64.4</td>
</tr>
<tr>
<td>impediment</td>
<td>62</td>
</tr>
<tr>
<td>impairment</td>
<td>61.3</td>
</tr>
<tr>
<td>repetition</td>
<td>56</td>
</tr>
<tr>
<td>difficulty</td>
<td>53.7</td>
</tr>
<tr>
<td>hesitation</td>
<td>52.5</td>
</tr>
<tr>
<td>falter</td>
<td>45.5</td>
</tr>
<tr>
<td>nervous</td>
<td>44.375</td>
</tr>
<tr>
<td>unclear</td>
<td>40.075</td>
</tr>
<tr>
<td>confusing</td>
<td>30.275</td>
</tr>
<tr>
<td>hard</td>
<td>29.975</td>
</tr>
<tr>
<td>annoying</td>
<td>20.275</td>
</tr>
<tr>
<td>patience</td>
<td>17.8</td>
</tr>
</tbody>
</table>
Table 7

*Pilot Study Two Correctly Identified “Stuttering” Images*

<table>
<thead>
<tr>
<th>&quot;Stutter&quot; Word</th>
<th>Produced</th>
<th>Disfluency Type</th>
<th>Participant (model)</th>
<th>Frequency of Correctly Identity Images</th>
</tr>
</thead>
<tbody>
<tr>
<td>can</td>
<td>Block (ISP)</td>
<td>1</td>
<td>91</td>
<td></td>
</tr>
<tr>
<td>fish</td>
<td>Partword Rep (SSR)</td>
<td>1</td>
<td>90.3</td>
<td></td>
</tr>
<tr>
<td>thanksgiving</td>
<td>(ASP)</td>
<td>1</td>
<td>85.4</td>
<td></td>
</tr>
<tr>
<td>foot</td>
<td>(ASP)</td>
<td>1</td>
<td>81.4</td>
<td></td>
</tr>
<tr>
<td>peach</td>
<td>Block (ISP)</td>
<td>2</td>
<td>74.4</td>
<td></td>
</tr>
<tr>
<td>peach</td>
<td>Block (ISP)</td>
<td>1</td>
<td>72.5</td>
<td></td>
</tr>
<tr>
<td>police</td>
<td>Partword Rep (SSR)</td>
<td>1</td>
<td>72</td>
<td></td>
</tr>
<tr>
<td>thanksgiving</td>
<td>(ASP)</td>
<td>2</td>
<td>68.7</td>
<td></td>
</tr>
<tr>
<td>shovel</td>
<td>Partword Rep (SSR)</td>
<td>2</td>
<td>64.8</td>
<td></td>
</tr>
<tr>
<td>shadow</td>
<td>(ASP)</td>
<td>1</td>
<td>55.8</td>
<td></td>
</tr>
<tr>
<td>shovel</td>
<td>Partword Rep (SSR)</td>
<td>1</td>
<td>51.2</td>
<td></td>
</tr>
<tr>
<td>can</td>
<td>Block (ISP)</td>
<td>2</td>
<td>37.8</td>
<td></td>
</tr>
</tbody>
</table>
Table 8

*Pilot Study Two- Correctly Identified “Fluent” Images*

<table>
<thead>
<tr>
<th>&quot;Fluent&quot; Word Producing</th>
<th>Participant (model)</th>
<th>Frequency of Correctly Identify Images</th>
</tr>
</thead>
<tbody>
<tr>
<td>can</td>
<td>2</td>
<td>79.4</td>
</tr>
<tr>
<td>kissing</td>
<td>2</td>
<td>73.7</td>
</tr>
<tr>
<td>police</td>
<td>2</td>
<td>72.9</td>
</tr>
<tr>
<td>tea</td>
<td>2</td>
<td>71.3</td>
</tr>
<tr>
<td>toolbox</td>
<td>2</td>
<td>68.1</td>
</tr>
<tr>
<td>thorn</td>
<td>2</td>
<td>64.7</td>
</tr>
<tr>
<td>thanksgiving</td>
<td>2</td>
<td>62.6</td>
</tr>
<tr>
<td>foot</td>
<td>2</td>
<td>60.1</td>
</tr>
<tr>
<td>shadow</td>
<td>2</td>
<td>59.2</td>
</tr>
<tr>
<td>tea</td>
<td>1</td>
<td>54.2</td>
</tr>
<tr>
<td>shovel</td>
<td>1</td>
<td>50.1</td>
</tr>
<tr>
<td>police</td>
<td>1</td>
<td>49.4</td>
</tr>
<tr>
<td>thanksgiving</td>
<td>1</td>
<td>48</td>
</tr>
</tbody>
</table>
Pilot Study Three.

Pilot Study number three was conducted to investigate possible reasons why college student participants chose images and words that they perceived as associated with “stuttering” and “fluent” words. Sixty college student participants were given the original questionnaire from Pilot Study Two with the following additional open ended questions: What are some reasons why you chose “Stuttering” for adjectives above?; What are some reasons why you choose “Stuttering” for the pictures above? What are some reasons why you chose “Fluent” for adjectives above?; What are some reasons why you choose “Fluent” for the pictures above? The questionnaire was distributed using the same methodology and target population (college students at Bowling Green State University) as Pilot Study one and two.

Qualitative analysis was conducted. The participants’ answers were coded for themes and then manifest effect sizes were developed. Manifest effects, which are defined as effect sizes that represent “specific counts of significant statements or observations analyzed that underlie emergent themes” (Onwuegbuzie, 2003; p. 397) and included frequency and intensity effects. For this analysis intensity effect sizes were used, which is defined as “the frequency of each significant statement within each theme” (Onwuegbuzie, 2003, p. 397). This concept of binarizing themes for qualitative research is to enhance the descriptions with numbers. Participant’s statements were put into common themes and then converted to frequencies in percentage units in order to show prevalence of thoughts participants possess (see Tables 9-11 below). These are acceptable means of measuring effect sizes in qualitative research.

The results from pilot study three suggested that adult college students who do not stutter have a variety of reasons why they would associate words and images to “stuttering”
and “fluent”. Several themes were developed from the answers provided by the 60 participants when asked “why” participants chose “fluent”, “I can’t tell”, or “Stutter” answers. The following themes were developed from the responses for the “fluent” adjectives stimuli presented: 42% of the responses pertained to defining fluent speech (e.g., “they described traits a fluent speaker would possess”, “those words sounded like someone who has fluent communication and did not stutter”); 30% of the responses, referred to speech production (e.g. “the words are very short and I think very easy to say”); 14% of responses took on a neutral type theme (e.g. “fluently”, “guessed”); 7% of participant responses pertained to positive aspects of fluent speech (e.g. “made me think of successful speech”); 5% of responses appeared to be based on the participants experiences (e.g. “usually if you can understand the person and they speak clearly, they aren't stuttering”); 2% of responses appeared to be about a feelings people who stutter might have (e.g. “these words appeared as more to do with flow and confidence”). See Table 9.

The following are the themes generated for the possible reasons participants chose “stuttering” for adjectives stimuli: 43% of the responses had a define stuttering theme (e.g., “some of them just seemed like they would go good with somebody who stutters or my idea of stuttering”); 26% of responses appeared to deal with the participant’s perceptions of how speech is produced (e.g., “behavior needed to cope with stuttering”); 11% of the responses appeared to be generated from the participants personal experiences (e.g., “words seemed to illustrate what I've experienced when speaking with a person who stutters”); 9% of responses appeared to be regarding feelings a person who stutters may experience (e.g., “person gets nervous they may stutter”); 5% appeared to have neutral theme nature to the response (e.g. “guessed”); 3% of responses had a negative or difficulties theme (e.g., “difficulties they face”);
and 3% of the responses had a visual component (e.g., “it comes to mind when you picture someone talking who is stuttering”). For a summary, see Table 10 below.

Themes were also generated for the image stimuli from the qualitative answers from Pilot Study Three. The following themes for “fluent” image stimuli were chosen for the following reasons: 23% of the responses appeared to pertain to a lack of struggling/confused impression of the image (e.g., “the person didn't look as though they were having issues speaking and they didn't look confused”): 21% of the responses presented with a theme of relaxation (e.g., “I choose fluent for those people with relaxed faces who look as though they have no problem speaking and can easily be done”); 18% of the responses appeared to pertain to possible feelings that the participants perceive that PWS may possess (e.g., “they look confident about what they were saying”); 15% of responses mentioned the eyes and/or mouth of the imaged person (e.g., “eyes were fully open staring straight ahead with their lips gently opened a little”); 12% of the responses had a neutral nature to them (e.g., “because the facial pictures look fluent”); and 11% of the responses mentioned the word normal (e.g., “when the guy made a normal face”). See Table 11.

Finally, themes were generated for images chosen as “stuttering” by participants. The following themes were reported: 39% of the participant’s responses referred to a perceived sense of struggling by the person (e.g., “the person appeared to look as though they were struggling with words”); 18% of responded referred to the eyes being closed in the picture with 18% of the responses (e.g., “his eyes were closed or had a strained look”); 13% of the responses referred to the lips and mouth of the imaged person who stutters (e.g., “they look like their lips are tight and trying to get out a word’); 10% of participants referred to the imaged person stuttering possibly being confused (e.g., “the person's face looked confused as if
they were stuttering’’); 8% of the responses possesses a neutral theme (e.g., “because it looks like they are’’); 6% of the responses appeared to refer to feelings’’ the imaged person maybe feeling (e.g., “the stuttering pictures showed anxiety, nervous, or aggravated facial expressions’’); and 6% of responses appeared talk about the participant’s personal experiences with PWS (e.g., “certain faces seem to be stuck the way people I know who stutter get stuck’’). For a summary, see Table 12.

The above findings from Pilot Study Three may indicate that stuttering and fluency could be associated with specific images and adjectives. It appears that participants attempted to develop a definition about stuttering when adjectives associated with perceived stuttering were presented. Participants also seemed to associate tension and eye closure with stuttering about the visual stimuli.

Conclusion

The three pilot studies above were performed in the attempt to generate stimuli to be inserted into a field study testing the Implicit Association Tests for Stuttered Speakers and Fluent Speakers and also to explore reasons why non stuttering participants may categorize adjectives and images associated with stuttering and fluent speakers. The results of the these pilot studies may suggest that college students possess several common ways of categorizing fluent and stuttered speakers with words and images.

Anderson, Moskowitz, Blair, and Nosek (2007) discussed the following four needs for an individual to socially categorize or make judgments of others: availability, accessibility, application, and self regulation. They reported that social knowledge of a group needs to be available, before this knowledge is easily accessible, then the knowledge can be applied in
some way before a person can self-regulate (e.g., inhibit, adjust, enhance, or suppress) before a judgment (attitude) is created. Similar to Anderson et al., participants in Pilot Study three appeared to generated a definition to tap into available knowledge in order to apply that definition to stuttering and fluent speakers. They also appeared to look at production of speech and how difficult words would be for fluent and stuttering speakers. These definitions and perceptions of production may have been generated by feelings and experiences that participants had about fluent people and people who stutter, as indicted by common themes above in pilot study three.

The visual stimuli seemed to develop similar results of why participants thought images represented stuttering or fluent speakers. The associations of tension, eye closure, and mentioning a model’s mouth and lips were common themes when participants attempted to categorize both fluent with stuttering speakers. This ability to associate a visual image with stuttering and fluent speakers may suggest that listeners may create external associations of visual struggle and tension with negative stereotypes regarding internal personality traits when judging an individual who stutters. The previous statement would be congruent with what Horsley and FitzGibbon (1987) suggested about speech-language pathologist projecting internal traits of anxiety and feelings of tension they possess during moments of normal disfluencies with possible external behaviors for PWS. This type of visual discrimination between fluent and stuttered speakers may provide researchers with a new direction to study attitudes that both PWS and PWDS possess toward the behavior of stuttering and stuttering speakers. However, for this manuscript the most often reported images and adjectives generated from the pilot studies will be inserted into the two IATs (i.e., Picture IAT and Word
IAT) examining implicit associations and explicit attitudes toward Stuttering Speakers and Fluent Speakers in Chapter 4.
Table 9

*Responses for Fluent Adjectives*

<table>
<thead>
<tr>
<th>Percentage of Responses</th>
<th>Theme</th>
<th>Example (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>42%</td>
<td>Defining Fluent Speech</td>
<td>“they described traits a fluent speaker would possess”</td>
</tr>
<tr>
<td>30%</td>
<td>Production</td>
<td>“the words are very short and I think very easy to say”</td>
</tr>
<tr>
<td>14%</td>
<td>Neutral</td>
<td>“fluently”, “guessed”</td>
</tr>
<tr>
<td>7%</td>
<td>Positive</td>
<td>“made me think of a successful speech”</td>
</tr>
<tr>
<td>5%</td>
<td>Experience</td>
<td>“usually if you can understand the person and they speak clearly, they aren’t stuttering”</td>
</tr>
<tr>
<td>2%</td>
<td>Feelings</td>
<td>“these words appeared as more to do with flow and confidence”</td>
</tr>
<tr>
<td>Percentage of Responses</td>
<td>Theme</td>
<td>Example (s)</td>
</tr>
<tr>
<td>-------------------------</td>
<td>------------------------</td>
<td>----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>43%</td>
<td>Define stuttering</td>
<td>“some of them just seemed like they would go good with somebody who stutters or my idea of stuttering”</td>
</tr>
<tr>
<td>26%</td>
<td>Production</td>
<td>“behavior needed to cope with stuttering”</td>
</tr>
<tr>
<td>11%</td>
<td>Experiences</td>
<td>“words seemed to illustrate what I've experienced when speaking with a person who stutters”</td>
</tr>
<tr>
<td>9%</td>
<td>Feelings</td>
<td>“person gets nervous they may stutter”</td>
</tr>
<tr>
<td>5%</td>
<td>Neutral</td>
<td>“guessed”</td>
</tr>
<tr>
<td>3%</td>
<td>Negative or Difficulties</td>
<td>“difficulties they face”</td>
</tr>
<tr>
<td>3%</td>
<td>Visual</td>
<td>“it comes to mind when you picture someone talking who is stuttering”</td>
</tr>
</tbody>
</table>
### Table 11

*Responses for Fluent Images*

<table>
<thead>
<tr>
<th>Percentage of Responses</th>
<th>Theme</th>
<th>Example(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>23%</td>
<td>Struggling/confused</td>
<td>“the person didn't look as though they were having issues speaking and they didn't look confused”</td>
</tr>
<tr>
<td>21%</td>
<td>Relaxation</td>
<td>“I choose fluent for those people with relaxed faces who look as though they have no problem speaking and can easily be done”</td>
</tr>
<tr>
<td>18%</td>
<td>Feelings</td>
<td>“they look confident about what they were saying”</td>
</tr>
<tr>
<td>15%</td>
<td>Eyes and/or mouth</td>
<td>“eyes were fully open staring straight ahead with their lips gently opened a little”</td>
</tr>
<tr>
<td>12%</td>
<td>Neutral</td>
<td>“because the facial pictures look fluent”</td>
</tr>
<tr>
<td>11%</td>
<td>Normal</td>
<td>“when the guy made a normal face”</td>
</tr>
</tbody>
</table>
### Table 12

**Responses for Stuttering Images**

<table>
<thead>
<tr>
<th>Percentage of Responses</th>
<th>Theme</th>
<th>Example (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>39%</td>
<td>Struggling</td>
<td>“the person appeared to look as though they were struggling with word”</td>
</tr>
<tr>
<td>18%</td>
<td>Eyes closed</td>
<td>“his eyes were closed or had a strained look”</td>
</tr>
<tr>
<td>13%</td>
<td>Lips and Mouth</td>
<td>“they look like their lips are tight and trying to get out a word”</td>
</tr>
<tr>
<td>10%</td>
<td>Confused</td>
<td>“the person's face looked confused as if they were stuttering”</td>
</tr>
<tr>
<td>6%</td>
<td>Feelings</td>
<td>“the stuttering pictures showed anxiety, nervous, or aggravated facial expressions”</td>
</tr>
<tr>
<td>6%</td>
<td>Personal Experiences</td>
<td>“certain faces seem to be stuck the way people I know who stutter get stuck”</td>
</tr>
</tbody>
</table>
CHAPTER 4

Field study for IATs Stuttering Speaker versus Fluent Speaker

(Picture IAT and Word IAT)

Type of research design and purpose

The primary theoretical drive (Morse, 1991) for this field study is mainly quantitative. The purpose of this field study is to take the words and pictures stimuli generated from the three pilot studies and insert them into two IATS (i.e., one Picture IAT and one Word IAT) to evaluate implicit attitudes toward the target concepts of Stuttering Speaker and Fluent Speaker. The target concepts (i.e., Stuttering Speaker and Fluent Speaker) were chosen in an attempt to decrease vague terms like “Stuttering” or “Fluent” which may indicated participant’s associations toward “speakers” or “speech.” Another purpose of this field study was to collect explicit attitudes taken from three measures pertaining to preference to fluent and stuttering speakers, warmth toward fluent speakers, and warmth toward stuttering speakers and examine relationship of the explicit attitudes with implicit attitudes. The research design will be a simultaneous multi-method quantitative study (Morse, 2003). Specific descriptions of protocol with recruiting, procedures, and analysis of this field study are below.

IAT Design

The Implicit Association Test (IAT) was developed by Greenwald et al. (1998). IATs were developed in an attempt to measure variability in unconscious attitudes (conditioned associations) based in the field of social cognition (Greenwald & Banaji, 1995; Lane et al., 2007; Ranganath & Nosek, 2008). This test assumes that it is easier to perform behavioral
responses with respect to strongly associated concepts than it is for weaker associated concepts, in other words this instrument measures relative strength of associations to target attributes (Greenwald et al., 1998; Nosek et al., 2005; Schnabel et al., 2008). Baron and Banaji (2006) defined an IAT as the following:

The IAT is a response latency measure that rests on the assumption it shares with other measures of associative strength, that the more strongly two concepts have come to be associated with one another, the faster and more accurately they can be paired together. (p. 54).

An IAT uses responses (i.e. pressing keys on a keyboard) to produce time latency differences between two target concepts (i.e., Stuttering Speaker and Fluent Speaker) and two attribute concepts (i.e. Good & Bad) words. The previously mentioned target and attribute concepts appeared on a computer screen in the upper left and/or right hand corners while associated images or words appeared in the center of the screen. Participants used the computer keyboard (i.e. E key, and I key) to assign associated words and images to target and attribute concepts along with the space bar key to navigate between stages of the test. The E key was used to designate an association of the word or image (which appears in the center of the screen) to a target and/or attribute concept word in the upper left corner. The I key was used to designate the associated word or image to a target and/or attribute concept word in the upper right corner of the computer screen. Since IATs are based on time latency differences of responses, these differences compare how fast participants categorize associated words and images to target and associated concepts. Participants were instructed to perform this task as fast as they could with the least amount of errors. The latency differences were calculated using Cohen’s D (Cohen, 1988), which will be discussed further in the analysis section of this paper. 
Measures

IAT Stuttering Speaker versus Fluent Speaker. Implicit Association Tests have seven stages (Nosek et al., 2005, Nosek et al., 2007) that assess unconscious attitudes with two target concepts (i.e., Stuttering Speaker and Fluent Speaker) and two attribute concepts (i.e. Good and Bad). All stimuli were presented in random order for each of the seven stages. See Table 13 which displays the seven stages.

As indicated in Table 13, the first of the seven stages consisted of 10 trials for each of the target concepts (i.e. Stuttering Speaker and Fluent Speaker), totaling 20 trials. The target concepts of Stuttering Speaker and Fluent Speaker appeared in the upper left or right corners of a computer screen, while images or words stimuli associated with each of the target concepts appeared in the center of the screen. The second stage is the same visual set up and number of trials as stage one with the exception that the two target concepts were replaced with the attribute concepts of Good and Bad (i.e., Good adjectives: beautiful, superb, joyful, glorious, pleasure, marvelous, wonderful, lovely; Bad adjectives: agony, horrible, awful, humiliate, nasty, terrible, tragic, painful). Just like the first stage, the second stage was a practice stage for the attribute concepts. The first two stages could be seen as priming stages, preparing the participants for stages three and four.
Table 13.

Sequence of Trial Blocks for IAT Stutter Speaker vs. Fluent Speaker IATs

<table>
<thead>
<tr>
<th>Stage</th>
<th>No. of Trials</th>
<th>Function</th>
<th>Items Assigned to &quot;E&quot; Key</th>
<th>Items Assigned to &quot;I&quot; Key</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20</td>
<td>practice</td>
<td>Stuttering Pictures and/or words</td>
<td>Fluent Pictures and/or words</td>
</tr>
<tr>
<td>2</td>
<td>20</td>
<td>practice</td>
<td>Words Associated with &quot;Good&quot;</td>
<td>Words Associated with &quot;Bad&quot;</td>
</tr>
<tr>
<td>3</td>
<td>20</td>
<td>test</td>
<td>Stuttering Pictures and/or words + Words Associated with &quot;Good&quot;</td>
<td>Fluent Pictures and/or words + Words Associated with &quot;Bad&quot;</td>
</tr>
<tr>
<td>4</td>
<td>40</td>
<td>test</td>
<td>Stuttering Pictures and/or words + Words Associated with &quot;Good&quot;</td>
<td>Fluent Pictures and/or words + Words Associated with &quot;Bad&quot;</td>
</tr>
<tr>
<td>5</td>
<td>20</td>
<td>practice</td>
<td>Fluent Pictures and/or words</td>
<td>Stuttering Pictures and/or words</td>
</tr>
<tr>
<td>6</td>
<td>20</td>
<td>test</td>
<td>Fluent Pictures and/or words + Words Associated with &quot;Good&quot;</td>
<td>Stuttering Pictures and/or words + Words Associated with &quot;Bad&quot;</td>
</tr>
<tr>
<td>7</td>
<td>40</td>
<td>test</td>
<td>Fluent Pictures and/or words + Words Associated with &quot;Good&quot;</td>
<td>Stuttering Pictures and/or words + Words Associated with &quot;Bad&quot;</td>
</tr>
</tbody>
</table>
The third and fourth stages used the same visual set-up as the first two stages with the exception that both the target concepts and attribute concepts appeared together in pairs in the left and right top corners of the screen (e.g., Left Top Corner- Stuttering Speaker and Good, Right Top Corner- Fluent Speaker and Bad). The only difference between stages three and four is the number of trials. Stage three consisted of five trials (images or words) for each of the two target concepts and each of the two attribute concepts, which totals twenty trials (i.e., Five Stuttering associated stimuli + Five Fluent associated stimuli + Five Good associated stimuli + Five Bad associated stimuli = 20 Total Trials). The fourth stage had ten trials (just doubling trials from stage three) for each concept (target and attribute concepts), for a total of 40 trials.

Stage five was the counterbalance to the first stage. This stage is seen as a training stage for participants in preparation for the last two stages (i.e., stages six and seven) which were counterbalances of stages three and four. Again, like stage one, stage five was a practice stage which featured the target concepts of Fluent Speaker and Stuttering Speaker in the upper left and right corners respectively (thus counterbalancing stage one). Stages six and seven were set up as the counterbalances of stages three and four where the target concepts of Fluent Speaker and Stuttering Speaker were in the upper left and right corners respectively along with the attribute concepts of Good and Bad which remain on their respective sides as they were in stages two, three, and four, left and right respectively. It should be noted that the trial numbers for stages six and seven are the same as stages three and four, (i.e. 20 total trials for stage six and 40 total trials for stage seven).

Analysis was performed on stages three and four as compared to stages six and seven respectively. Effect sizes were measured using Cohen’s D (Cohen, 1988) with the following effect sizes representations: greater than .15=slight (small), greater than .35=moderate
(medium), greater than or equal to .65=strong (large). It should be noted that these effects can be both positive and negative and that they can range from -2 to +2, an advantage to Cohen’s D as compared to Cohen’s d (1977). These effect sizes then translate into strength of association toward one target concept. Associations toward one target concept or another are decided by how fast each individual categorizes a target concept with one attribute concept as compared to the other target concept and other attribute concept (i.e., Compatible Group – Fluent and Good, Stuttering Bad; Incompatible Group – Stuttering and Good, Fluent Bad). The IAT effect will determine the strength an individual associates with either stuttering speakers or fluent speakers as determined by speed of reaction time latencies and the Cohen’s D formula performed by the Inquisit software, discussed later in this chapter.

Explicit self – report measures that typically accompany IATs. Most IATs are accompanied by explicit self-report measures which consist of one Likert scale question and two thermometer type quantitative questions to then examine relationships with implicit results (Baron & Banaji, 2006; Greenwald, McGhee, & Schwartz, 1998; Greenwald, Poelman, Ulmann, & Banaji, 2009; Lane et al., 2007; Nosek, 2007). This field study is no different; it included one Likert scale question pertaining to preference to fluent and stuttering speakers, along with two thermometer questions looking at warmth toward fluent speakers and warmth toward stuttering speakers. It should be noted here that past IATs examining relationships between implicit and explicit measures found low correlations which Banaji (2001) explains as, “in the research world in which conscious and unconscious attitudes are seen to be conceptually distinct, the low correlation or lower correlation between measures within the same family is taken as evidence of validity, not a challenge to it,” (p.143).
Software for the IAT for Stuttering Speakers vs. Fluent Speaker

The Inquisit 3 software (Inquisit, 2008) is computer software developed by Millisecond Software Company for the specific purpose of creating IATs and surveys related to indirect measures. This software stores the following metrics: mean, median, response latencies, standard deviations, percentage or correct responses, along with the ability to develop customized measurements. The programming of the Inquisit software follows similar computer software programming scripts with some basic coding in html along with many tutorials to help the novice programmer. The script writing language is comprised of elements and attributes. The elements are items that make up the script like surveys, blocks, trials, instruction pages while the attributes are the parts of each element that essentially dictates how the element will run (see Appendix H).

Inquisit software was used to program the entire experiment, each portion of the experiment was programmed separately (i.e. Demographics Questions, Picture IAT Script, Word IAT Script, and Post Survey Script) and then they were all “batched” together into one instrument (See Appendices I-M for Software Scripts). The storage of the data for each portion was saved in the same file as the batch script along with the other three scripts and images used for the Picture IAT for the portions that create the entire field study.

Recruitment of participants for the Field Study

A power analysis was performed in order to determine an appropriate sample size for the field study. The number of groups is seven, as determined by the seven stages of each IAT and two degrees of freedom to indicate the two IATs. Also a moderate effect size of .50 was
used in the analysis with a coefficient of .95 which generated a suggestive sample size of 66 participants.

Participants for this study included 66 students who do not stutter. Participants were recruited through the Psychology Department’s Experimetrix research site (which is a way of contacting undergraduates who participate for research hours for psychology classes). Another form of recruitment that was utilized for this study required agents (individuals who do not stutter) that went into classrooms on the BGSU campus, read a script, provided an information page, and asked students to send an email to the researcher to schedule a time to participate in the study face to face (see Appendix N). This type of “convenience volunteer sampling” from a university setting is for the purpose of gathering data and participants that are “easily accessible and willing to participate in a study” (Teddlie & Yu, 2007; p.78). College students being used as a source of information for the fields of stuttering and IAT research has proven to be useful and students seem to report similar types of attitudes and stereotypes as the general public (Collins & Blood, 1990; Cunningham et al., 2001; Gabel et al., 2004; Greenwald et al., 1998; Panico et al., 2005).

Procedure

Participants signed the informed consent form prior to participation (see Appendix O). Participants were then provided a laptop where they completed the entire field study which includes a demographics portion, the Picture IAT, the Word IAT, and a post survey questionnaire with three explicit attitude measures and further questions about familiarity with people who stutter.
The demographics portion of the field study was the first portion (see Appendix P). The first page consisted of demographic questions: gender, age, race, and academic major. Participants clicked the “next” button (at the bottom of the page) to continue to the next page, which consisted of the following demographics questions: education, country, state, and postal code. The answers to some demographic questions (i.e., education, country, state, gender, and occupation) were in the form of drop down menus (e.g., Education – high school graduate, some college, associate’s degree, bachelor’s degree, some graduate school, or graduate degree) while other demographics questions like postal code and age were text boxes. Finally, the “race” question was a question in which participants check off boxes that they felt were the most appropriate to their race (e.g., American Indian/Alaska Native). Participants then clicked the “next” button to continue to the next screen.

The second portion of the field study was the Picture IAT for Stuttering Speakers and Fluent Speakers. The first screen to appear was the instructional screen for this portion of the survey instrument. This IAT portion of the study consisted of four images stimuli for each target concept (i.e., Stuttering Speaker and Fluent Speaker) along with word stimuli for Good and Bad attribute concepts. The directions below were presented on the first page of the Picture IAT (these directions were modified from Baron and Banaji, (2006); p.54, and Greenwald et al., 2007). See Appendix Q for screen shots of the Picture IAT for visual of computer screen.

Put your middle or index fingers on the E and I keys of your keyboard. Pictures representing the categories at the top will appear one-by-one in the middle of the screen. When the item belongs to a category on the left, press the E key; when the item belongs to a category on the right, press the I key. Items belong to only one category. If you make an error, an X will appear - fix the error by hitting the other key.
This is a timed sorting task. GO AS FAST AS YOU CAN while making as few mistakes as possible. Going too slow or making too many errors will result in a score that cannot be interpreted. This task will take about 5 minutes to complete. For best results, avoid distractions and stay focused.

As explained in the instructions above, the participants used the “E” and “I” keys on a computer keyboard to categorize stimuli seen in the center of the screen to the concepts in the top corners of the screen (Greenwald et al., 1998; Ranganath & Nosek 2008). As stated above, IATs are a seven stage test and between each stage was another set of instructions, as seen in Appendix Q. At the end of the Picture IAT portion participants received their calculated IAT Effect and strength of association. Showing the participants their strength of association is a standard practice with IATs and could be seen as providing participants education about themselves. Participants were then asked to “press the spacebar to complete this session.” This action took them to the next portion which was the Word IAT for Stuttering and Fluent Speakers.

The Word IAT for Stuttering Speakers and Fluent Speakers followed the Picture IAT portion. This Word IAT was set up nearly identical to the Picture IAT with the exception of words representing Stuttering Speakers and Fluent Speakers target concepts replacing images of models stuttering and being fluent (see Appendix R). The Word IAT portion always followed the Picture IAT due to the fact that the Inquisit software batching script does not randomly order the scripts so one IAT needed to go first and one second. Past research has indicated that people can take the same IAT multiple times with little change in scores (Lane et al., 2007), however the order of the IATs will be discussed later in this manuscript.
Following the two IATs, participants were asked to complete explicit quantitative measures of attitudes and two questions pertaining to familiarity with someone who stutters. It should be noted that research reports that the order of implicit and explicit measures does not affect association strengths of the implicit measures or the correlation outcomes between implicit and explicit scores (Hofmann et al., 2005; Nosak et al., 2005). The first explicit attitude question, “Which statement best describes you?” was a seven point Likert scale with the following drop down menu answers (See Appendix S).

I strongly prefer fluent speakers to stuttering speakers.

I moderately prefer fluent speakers to stuttering speakers.

I slightly prefer fluent speakers to stuttering speakers.

I like fluent speakers and stuttering speakers equally.

I slightly prefer stuttering speakers to fluent speakers.

I moderately prefer stuttering speakers to fluent speakers.

I strongly prefer stuttering speakers to fluent speakers.

The above question was followed by two questions pertaining to familiarity of knowing someone who stutters: Do you know someone who stutters? If you know someone who stutters, who are they? The first question, “Do you know someone who stutters?” had a check box answer with “Yes” and “No”. The second question, “If you know someone who stutters, who are they?” was also had check box answers with the following answers where participants could pick more than one answer: Friend, Father, Mother, Sibling, Classmate, Coworker, Other, Myself, I don’t know anyone who stutters.
The last two questions are thermometer explicit attitude questions where participants used an eleven point rating scale (0=very cold, 5=neutral, 10=very warm). Thermometer questions accompany most IATs as an attempt to elicit explicit judgments about the two target concepts, in this case Stuttering Speakers and Fluent Speakers (Greenwald et al., 2005). The following thermometer questions were used for this survey (Appendix S):

How warm or cold do you feel toward fluent speakers?

How warm or cold do you feel toward stuttering speakers?

Analysis

Implicit Measures. Analysis of Implicit Association Tests have changed over time, however they have always developed effects sizes using some form of Cohen’s $d$ with the latencies produced from reactions that participants have in order to produce the IAT Effect Score. The newest analysis below uses Cohen D (1988) when examining latencies for the test stages of an IAT (i.e., stages three, four, six and seven). Using Cohen’s D and not other forms of analysis for IATs was explained by Nosek and Sriram (2007) with the following reasoning, “where as simple difference scores could be mistaken as combinations of parallel items, $D$ is only applicable to contrasted performance conditions because it instantiates the psychometric interdependency of the conditions, fitting our psychometric conceptualization” (p.397). The above statement complimented what Greenwald, Nosek, and Sriram (2006) said, “A consequence of using the standard deviation that combines observations in both conditions rather than a pooled within-condition standard deviation (which is used for Cohen’s $d$) is that $D$ is bounded by -2 and +2 (Cohen’s $d$ is unlimited),” (p. 57). The above statements appear to indicate that IAT’s are looking at individuals and thus requires an analysis which is
individually specific to measure a magnitude of association which an effect size like Cohen’s D has been proven to be effective. Both IATs in the field study above used the following analysis described below, taken from Greenwald et al. (2003) and Lane et al. (2007):

1. Any trials that exceed more than 10,000 milliseconds will be deleted.

2. If a participant has more than 10% of trials with timed latency that is less than 300 milliseconds, that participant will be excluded.

3. Calculate the “inclusive” standard deviations for the third and sixth stages along with the fourth and seven stages.

4. Calculate the mean time latency for stages three, four, six, and seven. Each stage is calculated independently and all trials within that stage are included.

5. Calculate the mean differences for stages three and six and stages four and seven as follows: $\text{Mean}_{\text{stage six}} - \text{Mean}_{\text{stage three}}$ and $\text{Mean}_{\text{stage seven}} - \text{Mean}_{\text{stage four}}$.

6. Divide each difference score (from step five) with stages three and six and stages four and seven by their “inclusive” standard deviation (from step three). (E.g. $\frac{\text{Mean}_{\text{stage six}} - \text{Mean}_{\text{stage three}}}{\text{SD}_{\text{stage three}} + \text{SD}_{\text{stage six}}}$)

7. Calculate D effects size (similar to Cohen’s $D$, Cohen, 1988) finding the difference in mean response latencies between the IAT’s two combined tasks of fluency and good, fluency and bad, along with stuttering and good, stuttering and bad (i.e. average the two ratios from step six).

The above procedure of analyses was proposed by Greenwald et al. (2005) and confirmed in Lane et al. (2007) and Schnabel, Asendorpf, and Greenwald (2008). This newest algorithm
from Greenwald et al. (2005) was developed to: improve the IAT effect with better correlations for participants and the mean latencies produced; decrease effect on the score due to order of stages; decrease participant variability with scores if individuals have taken an IAT previously one or more times; increased internal consistency with the use of two repeated measures and counterbalancing tasks; “maximize the correlation between implicit and explicit measures” (Lane et al., 2007; p. 91); “resistance to extraneous factors (e.g., general response speed)” (Schnabel et al., 2008; p. 211); and could reduce a cognitive skill confound of general cognitive ability with respect to how fast a person can process information reported in McFarland and Crouch (2002) and Sriram and Greenwald (2004). The Cohen’s D analysis was computed with the use of Inquisit 3.0 software on stages three and six along with four and seven, which have been reported to produce good psychometric properties (Greenwald et al., 1998; Lane et al., 2007; Nosek et al., 2005). This software automatically counterbalances participants to perform compatible and incompatible stages by having all odd number participants (e.g., participant 1, participant 3) perform the compatible stages (three and four) first and then the incompatible stages (six and seven) next. Thus all even numbered participants perform the incompatible stages first (six and seven) before the compatible stages (three and four).

The following paragraph will provide more information about effects sizes. The term effects sizes “refer to the degree to which sample results diverge from the expectations” (Vacha-Haase, 2004; p. 473). They can be used to judge “practical significance” of a certain study (Kirk, 1996) and to measure strength of association, which is the purpose of an IAT. The American Psychological Association, sixth edition of the Publication Manual, reports that “for a reader to appreciate the magnitude of importance of a study’s findings, it is almost always
necessary to include some measure of effect size” (APA, 2010; p.34) or “strength of relationship” (APA, 2001; p.25). The use of effect sizes, also called magnitude measures, for this analysis is vital to the IAT instrument. IAT instruments are essentially single subject repeated measure analyses that investigate time latency differences within each participant and the use of effects sizes, in this case Cohen D (Cohen, 1988) appears to be an effective analysis for this instrument (Parker & Hagan-Burke, 2007; p. 99). Cohen’s D effect sizes were converted to a strength of association for each participant with both the Picture IAT and Word IAT. See Table 14.

After Cohen’s D IAT Effects were generated, descriptive analysis were conducted with the IAT Effects to determine the frequency that participants associated with target concepts and to what degree of associations. Next Multivariate Analysis of Variance (MANOVAs) and follow up Analysis of Variance (ANOVA)s were conducted to examine the relationships between the two IATs along with ANOVAs conducted to examine differences between compatible and incompatible trial stages with the Picture IAT and the Word IAT separately. Pearson’s Product Moment Correlations (Pearson’s r) analysis were conducted to examine the relationships between the Picture IAT Effect along with the Word IAT Effect.

Further Multivariate Analysis of Variance (MANOVAs) and follow up Univariate Analysis of Variance (AVOVAs) were conducted with demographics of gender and knowing someone who stutters as independent variables and the IAT Effect scores as dependent variables to assess any effects of these independent variables on implicit associations.
### IAT Effect and Strength of Association

<table>
<thead>
<tr>
<th>IAT Effect (Cohen's D)</th>
<th>Strength of Association</th>
</tr>
</thead>
<tbody>
<tr>
<td>Great than or equal to .65</td>
<td>Strong Association Toward Fluent Speakers</td>
</tr>
<tr>
<td>Great than .35</td>
<td>Moderate Association Toward Fluent Speakers</td>
</tr>
<tr>
<td>Greater than .15</td>
<td>Slight Association Toward Fluent Speakers</td>
</tr>
<tr>
<td>Between -.15 and .15</td>
<td>Little to no Association Toward Fluent or Stuttered Speakers</td>
</tr>
<tr>
<td>Less than -.15</td>
<td>Slight Association Toward Stuttering Speakers</td>
</tr>
<tr>
<td>Less than -.35</td>
<td>Moderate Association Toward Stuttering Speakers</td>
</tr>
<tr>
<td>Less than or equal to -.65</td>
<td>Strong Association Toward Stuttering Speakers</td>
</tr>
</tbody>
</table>
Explicit measures analysis. The explicit measures consisted of one seven point Likert scale question and the two thermometer questions. The first analysis conducted was Pearson’s R correlations to investigate the relationship between the three explicit attitudes questions. Next, a series of Multivariate Analysis of Variance (MANOVAs) and Univariate Analysis of Variance (ANOVAs) were conducted with selected demographics information of gender and whether participants knew someone who stutters as independent variables and what effects these variables have on the three explicit attitudes questions of preference to stuttering and fluent speakers, warmth toward fluent speakers, and warmth toward stuttering speakers.

Implicit and explicit Relationships. The last set of analysis conducted were Pearson’s R correlations to investigate the relationship between the implicit measures and explicit measures. The Cohen’s D IAT Effects from both the Picture IAT and Word IAT were separately compared to the explicit attitudes measure of preference to stuttering and fluent speakers, warmth toward fluent speakers, and warmth toward stuttering speakers.

Results

Demographics

The field study for the Implicit Association Test for Fluent Speakers and Stuttering Speakers was completed. A total of 68 college students from a mid-western medium sized university participated in the field study. Two participants were excluded from analysis due to reporting being PWS (this initial field study has a target population of PWDS) leaving a total of 66 participants. The mean age of participants was 19 (standard deviation was 1.1 years of age), with 62% being female. Participants reported being from a variety of majors, but the most often reported were Education (18.2%), Communication Disorders (12.1%), Sports Management
(7.6%), and Business (7.6%), Criminal Justice 4.5%), Visual - Communication Technology (4.5%) (See Table 15 for Summary of Demographics information). Eighty percent of the participants were from Ohio and smaller percentages of participants reported being from Michigan, Illinois, Pennsylvania, Florida, Maryland, New York, and Ontario. A large majority of the participants reported being Caucasian (80%) with 14% being African American, 2% Latino, and 4% reporting “Other” (one person mentioned they were “mixed”).

Of the 66 participants, 72.7 percent knew someone who stuttered, and the most common person known who stuttered was a friend (46.6%). Out of the 48 people who knew someone who stuttered, eight reported knowing more than one person who stuttered. Table 15 provides a summary of the demographic information for these participants.

*Raw latency analysis for the Picture IAT and Word IAT*

To answer research question number one, all 66 participants performed both the Picture IAT and the Word IAT tests. As stated above, the IAT Effect is generated by using Cohen’s D (Cohen, 1988) analysis to develop effect sizes by measuring reaction times for each participant to show how strongly an individual associates toward target concepts as they categorize images and words stimuli with target and attribute concepts presented during compatible and incompatible stages. The Millisecond Inc. software from Inquisit automatically performs this analysis in an ongoing manner as each participant performs an IAT. For each participant, an individual Cohen’s D IAT effect was generated for both the Picture IAT and the Word IAT portions of the field study. The following percentages are the frequencies of the 66 participants and the level of implicit association toward Fluent and/or Stuttering speakers on the Picture IAT portion of the this field study: 48.5% displayed a strong association toward Fluent Speakers, 37.9% displayed a moderate association toward Fluent Speakers, 9.1% displayed a slight
association toward Fluent Speakers, 4.5% displayed equal association toward Fluent Speakers and Stuttering Speakers. The following percentages are the frequencies of the 66 participants and the level of implicit association toward fluent and/or stuttering speakers on the Word IAT portion of the this field study: 83.3% displayed a strong association toward Fluent Speakers, 9.1% displayed a moderate association toward Fluent Speakers, 4.5% displayed a slight association toward Fluent Speakers, 1.5% displayed equal association toward Fluent Speakers and Stuttering Speakers, 1.5% displayed a Strong association toward Stuttering Speakers.

A follow up ANOVA found main effect differences with raw latencies between the Trial Stages (i.e., 20 Trials Compatible, 20 Trials Incompatible, 40 Trials Compatible, 40 Trials Incompatible), \( F(3, 15832) = 790.071, p < .001, \) partial \( \eta^2 = .130, \) observed power = 1.000). Scheffe post hoc test was conducted to determine which trial stages were significantly different. These post hoc tests identified significant differences (\( p < .05 \)) between type of trials (20 vs 40) and compatibility (compatible vs. incompatible).

Also, the result suggest that the combined compatible trials (i.e., including both Picture and Word IATs) produced significantly faster reaction times than the incompatible trials and that the compatible trials were significantly faster for both the Picture and Word IATs than the incompatible trials. These findings are consistent with past research comparing compatible and incompatible trials of IATs (Lane et al, 2007). The results also demonstrate that the compatible and incompatible stages (i.e., 20 Trial and 40 Trails for each) produced significantly different reaction times, with the compatible trials stages (both the 20 and 40 Trial) producing quicker reaction times than the incompatible trials (both the 20 and 40 Trial). This may indicate that increased difficult mental processing produce increased reactions times. See discussion section.
To answer research question number two, first a two way Analysis of Variance (ANOVA) was conducted to determine differences in raw latencies between the Picture IAT (i.e., Target Stimuli-pictures, Attribute Stimuli – words) and the Word IAT (i.e., Target and Attribute Stimuli - words) and the incompatible and compatible stages for the 20 trials and 40 trail stages. ANOVA results, presented in Table 16, show a significant main effect for the latencies with the Picture IAT producing significantly shorter total latencies (i.e., reaction times) when compared with the Word IAT ($F(1, 15832) = 251.70, \ p < .001, \ \eta^2 = .016, \ \text{observed power} = 1.000$), and the Compatible latencies (including the Picture and Word IATs) were significantly shorter than Incompatible latencies ($F(1, 15832) = 1903.33., \ p< .001, \ \eta^2 = .107, \ \text{observed power} = .001$). Interaction effects were noted between the Picture IAT plus Word IAT latencies and Compatible and Incompatible latencies ($F(1, 15832) = 71.806, \ p < .001, \ \eta^2 = .107, \ \text{observed power} = 1.000$).

The above results showed that responses to the Picture IAT were significantly faster latencies when compared to the Word IAT, which may indicate the these two IATs are measuring different types of attitudes. Other factors like cognitive processing of images plus words (Picture IAT) as compared to words only stimuli (Word IAT) may have caused significant reaction time differences. These findings are consistent with the resent Event Related Potentials (ERP) research that found that participants made decisions about words slower as compared to pictures (Azizian, Watson, Parvaz, & Squires, 2006; Simos & Molfese, 1997).

Demographics and IAT Effects for the Picture IAT and the Word IAT. Multivariate Analysis of Variance (MANOVA) and Univariate Analysis of Variance (ANOVAs) were conducted to investigate differences with the IAT Effects for both Picture and Word IATs as the dependent variables with the demographics as the independent variables. A MANOVA was
conducted to examine if the independent variable of gender had an effect on the dependent variable of the Cohen’s D IAT Effect generated for the Picture IAT and Word IAT. No significant effects were found for gender on the combine Cohen’s D IAT Effects for the Picture and Word IAT instruments, ($\text{Wilk’s } \Lambda = .940, F(1, 61) = .979, p = .426$, partial $\eta^2 = .060$, observed power = .292). Follow up ANOVAs indicated no significant effects of the independent variable gender on the Cohen’s D Picture IAT Effect, ($F(1, 64) = 3.591, p = .063$, partial $\eta^2 = .053$, observed power = .463), and the Word IAT effect, ($F(1, 64) = .396, p = .532$, partial $\eta^2 = .006$, observed power = .095).

The next MANOVA was conducted to examine if the independent variable of knowing someone who stutters had an effect on the dependent variable of the Cohen’s D IAT Effect generated for the Picture IAT and Word IAT. No significant effects were found that knowing someone who stuttered on the combined Cohen’s D IAT Effects for the Picture and Word IAT instruments, ($\text{Wilk’s } \Lambda = .900, F(1, 61) = 1.694, p = .163$, partial $\eta^2 = .100$, observed power = .496). A separate Univariate Analysis of Variance (ANOVA) indicated that knowing someone who stuttered had a significant effect on the Cohen’s D Picture IAT Effect, ($F(1, 64) = 4.123, p = .046$, partial $\eta^2 = .061$, observed power = .516), and no significant effect with the Cohen’s D Word IAT Effect, ($F(1, 64) = .226, p = .636$, partial $\eta^2 = .004$, observed power = .075). See Table 18 for means and standard deviation for these of analyses.

A MANOVA was conducted to examine possible interaction effects for the variables gender and knowing someone who stutters on Picture IAT Effect Scores and Word IAT Effect Scores. No significant interaction effects for gender and knowing someone who stutters were shown with the Cohen’s D Word IAT Effect, ($F(1, 66) = 2.858, p = .096$, partial $\eta^2 = .044$, observed power = .384). However, significant interaction effects were evident for the Cohen’s D
Explicit Measures Results

Correlations of explicit attitude measures with each other. In order to answer research question number three, Pearson’s Product Moment Correlations (Pearson’s r) were conducted to examine the relationship with the one Likert scale question (i.e., seven point Likert scale where strong preference toward fluent speakers is 1 and strong preference toward stuttering speakers is 7) pertaining to preference toward PWS and PWDS and each of the thermometer scales (11 point scales) pertaining to warmth toward PWS and warmth toward PWDS. Resulted showed that there was a significant negative correlation between participants’ explicit preference toward PWS and PWDS and their warmth toward people who stutter \([r^2(64) = -.269, p = .029]\) and a significant positive correlation between participants explicit preference toward PWS and PWDS and their warmth toward PWDS \([r^2(64) = .291, p = .018]\). Further correlation analysis showed a significant positive correlation between participants reporting their warmth toward PWS and their warm toward PWDS \([r^2(64) = .400, p = .001]\). For summary of correlations see Table 23. The explicit correlation results indicate that the sample was reporting scores indicative of a preference toward PWDS, warmth toward PWS, warmth toward PWDS, and these measures appeared to correlate in ways that would be expected.

Demographic influences on explicit measures. Multivariate Analysis of variance (MANOVAs) and Analysis of Variance (ANOVAs) were conducted with selected demographic information (independent variables) from participants to investigate any possible influences on explicit attitudes (dependent variables) reported with respect to preference to PWS and PWDS.
(Likert scale explicit question), level of warmth toward PWS, and warmth toward PWDS (the two thermometer explicit attitudes questions).

A MANOVA analysis was conducted to investigate whether the independent variable of knowing a person who stutters may have an effect on the dependent variables of the explicit attitudes measures of preference to PWS and PWDS, warmth toward PWS, and warmth toward PWDS. No significant effects were found for knowing someone who stutters on combined dependent variables of the explicit attitudes measures (Wilke’s $\Lambda = .984$, $F(1, 62) = .333$, $p = .802$, partial $\eta^2 = .016$, observed power = .111). ANOVA results found no significant effects for knowing someone who stutters and participants reported preference to PWDS and PWS, ($F(1,64) = .013$, $p = .911$, partial $\eta^2 < .001$, observed power = .051). Also, no significant effects were found for knowing someone who stutters and participants reported warmth toward PWS ($F(1,64) = .013$, $p = .911$, partial $\eta^2 < .001$, observed power = .051) and reported warmth toward PWDS ($F(1, 64) = .498$, $p = .483$, partial $\eta^2 = .008$, observed power = .107). For summary of means and standard deviations see Table 20.

MANOVA analysis was conducted to investigate any effects that the independent variable of gender may have on the dependent variables of preference to PWS, warmth toward PWDS, and warmth toward PWS. Significant effects were found for gender affecting the combined dependent variables of the explicit attitudes measures (Wilk’s $\Lambda = .846$, $F(1, 62) = 3.771$, $p = .015$, partial $\eta^2 = .154$, observed power = .788). ANOVA results, presented in Table 24, revealed no significant main effect for gender with preference toward PWS and PWDS, ($F(1, 64) = 2.310$, $p = .134$, partial $\eta^2 = .035$, observed power = .322), and no effects for warmth toward PWS, ($F(1,64) = 1.665$, $p = .202$, partial $\eta^2 = .025$, observed power = .246). However, significant effects were shown for gender and warmth toward PWDS ($F(1,64) = 10.935$, $p = .002$.
, partial $\eta^2 = .146$, observed power = .903). For summary of means and standard deviations see Table 21 below.

A separate two-way MANOVA was conducted to investigate where there were any interaction effects between the independent variables of gender and knowing a person who stutters with the dependent variables of the explicit attitude measures. No significant interaction effects were found for gender and knowing a person who stutters with the combined explicit measures, (Wilk’s $\Lambda = .989$, $F(1, 60) = .228$, $p = .876$, partial $\eta^2 = .011$, observed power = .091). Univariate ANOVA results indicated that there was not significant interaction effects for gender and knowing someone who stutters with preferences to PWS and PWDS, ($F(1,62) = .009$, $p = .923$, partial $\eta^2 <.001$, observed power = .051), warmth toward PWS, ($F(1, 62) = .221$, $p = .640$, partial $\eta^2 = .004$, observed power = .075), and warmth toward PWDS, ($F(1,62) = .613$, $p = .437$, partial $\eta^2 = 0$ observed power = .120). However, calculated effects sizes do show small portions for each dependent variable was accounted for by gender and knowing a person who stutters. For summary of means and standard deviations see Table 22.

Correlations between implicit and explicit attitudes.

The Picture IAT relationship with Explicit Measures. In the attempt to answer research question four, Pearson’s Product Moment Correlations (Pearson’s $r$) were completed with all 66 participants to examine the relationship between the Cohen’s D IAT Effect from the Picture IAT with the explicit measures of attitudes. No significant correlations were reported for participants’ explicit preference toward to PWS and PWDS with the Picture IAT effect, [$r^2(64) = -.106$, $p = .99$]. There were also no significant correlations found for explicit warmth toward PWS with the Picture IAT Effect, [$r^2(64) = .099$, $p = .428$]. Lastly, no significant correlations were yielded for explicit warmth toward PWDS as related to the Picture IAT Effect, [$r^2(64) = .070$, $p = .576$].
No significant correlations were found between the Picture IAT Effects and preference and warmth toward PWS and PWDS. These findings may indicate that the implicit measures and explicit measures maybe measuring different attitudes from participants who do not stutter. This will be discussed further in the discussion section. For all correlations see Table 23.

**Word IAT relationship with Explicit Measures.** Pearson’s Product Moment Correlations (Pearson r) were completed to identify the relationship between Cohen’s D IAT Effects from the Word IAT with the explicitly reported preference toward PWS and PWDS, reported warmth toward PWS, and warmth toward PWDS. No correlations were reported for participants’ explicit preference toward to PWS and PWDS and the Word IAT Effect \(r^2(64) = .016, \ p = .896\). There were also no significant correlations of warmth toward PWS and the Word IAT Effect \(r^2(64) = -.135, \ p = .280\). Lastly, no significant correlations with explicit reports of warmth toward PWDS as it relates to the Word IAT Effect, \(r^2(64) = -.046, \ p = .712\).

Like the Pearson’s correlations for the Picture IAT compared with the three explicit measures, the results for the Word IAT as compared to explicit attitudes measures revealed no significant correlations when comparing the Word IAT with the preference toward PWS and PWDS and warmth toward PWS and PWDS. This may indicate that the Word IAT and explicit attitudes questions maybe measuring different attitudes. This will be discussed further in the discussion chapter. For all correlations see Table 23.
Table 15

_Demographics from Field Study_

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>41</td>
<td>62.1</td>
</tr>
<tr>
<td>Male</td>
<td>25</td>
<td>37.9</td>
</tr>
<tr>
<td>Age</td>
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<td></td>
</tr>
<tr>
<td>18</td>
<td>22</td>
<td>33.3</td>
</tr>
<tr>
<td>19</td>
<td>21</td>
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<td>20</td>
<td>15</td>
<td>22.7</td>
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<td>6</td>
<td>9.1</td>
</tr>
<tr>
<td>22</td>
<td>2</td>
<td>3.0</td>
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<tr>
<td>Race</td>
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<td></td>
</tr>
<tr>
<td>White</td>
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<td>80.3</td>
</tr>
<tr>
<td>Black</td>
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<td>13.6</td>
</tr>
<tr>
<td>Other</td>
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<td>4.5</td>
</tr>
<tr>
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<td>1.5</td>
</tr>
<tr>
<td>Academic Major</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>12</td>
<td>18.2</td>
</tr>
<tr>
<td>CDIS</td>
<td>8</td>
<td>12.1</td>
</tr>
<tr>
<td>Business</td>
<td>5</td>
<td>7.6</td>
</tr>
<tr>
<td>Sports Management</td>
<td>5</td>
<td>7.6</td>
</tr>
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Table 15 (continued)

<table>
<thead>
<tr>
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<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Criminal Justice</td>
<td>3</td>
<td>4.5</td>
</tr>
<tr>
<td>Intervention Specialist</td>
<td>3</td>
<td>4.5</td>
</tr>
<tr>
<td>Psychology</td>
<td>3</td>
<td>4.5</td>
</tr>
<tr>
<td>Undecided</td>
<td>3</td>
<td>4.5</td>
</tr>
<tr>
<td>Visual Communication</td>
<td>3</td>
<td>4.5</td>
</tr>
<tr>
<td>Technology</td>
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<td></td>
</tr>
<tr>
<td>Athletic Training</td>
<td>2</td>
<td>3.0</td>
</tr>
<tr>
<td>Construction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management</td>
<td>2</td>
<td>3.0</td>
</tr>
<tr>
<td>Event Planning/Tourism</td>
<td>2</td>
<td>3.0</td>
</tr>
<tr>
<td>Human Development</td>
<td>2</td>
<td>3.0</td>
</tr>
<tr>
<td>Math</td>
<td>2</td>
<td>3.0</td>
</tr>
<tr>
<td>Aviation Studies</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>Communications</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>Computer Science</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>Creative Writing</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>Geography</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>Gerontology</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>Health</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>Interior Design</td>
<td>1</td>
<td>1.5</td>
</tr>
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</table>
Table 15 (continued)

<table>
<thead>
<tr>
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<th>Frequency</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Journalism</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>Pre-dental</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>Recreation</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>State of Origin</td>
<td></td>
<td></td>
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<tr>
<td>Ohio</td>
<td>53</td>
<td>80.3</td>
</tr>
<tr>
<td>Michigan</td>
<td>5</td>
<td>7.6</td>
</tr>
<tr>
<td>Illinois</td>
<td>2</td>
<td>3.0</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>2</td>
<td>3.0</td>
</tr>
<tr>
<td>Florida</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>Maryland</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>New York</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>Ontario</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>Knows Someone Who</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stutters</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>48</td>
<td>72.7</td>
</tr>
<tr>
<td>No</td>
<td>18</td>
<td>27.3</td>
</tr>
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</table>
Table 15 (continued)

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>People Known Who Stuttered</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Friend</td>
<td>27</td>
<td>46.6</td>
</tr>
<tr>
<td>other</td>
<td>13</td>
<td>22.4</td>
</tr>
<tr>
<td>Sibling</td>
<td>10</td>
<td>17.2</td>
</tr>
<tr>
<td>Sibling</td>
<td>3</td>
<td>5.2</td>
</tr>
<tr>
<td>Coworker</td>
<td>3</td>
<td>5.2</td>
</tr>
<tr>
<td>Father</td>
<td>1</td>
<td>1.7</td>
</tr>
<tr>
<td>Mother</td>
<td>1</td>
<td>1.7</td>
</tr>
<tr>
<td>Total Responses from 48 people who knew someone who stuttered</td>
<td>58</td>
<td>100</td>
</tr>
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Table 16

Summary of Mean and Standard Deviations of Raw Latencies for 20 and 40 Trials Compatible and Incompatible Stages

<table>
<thead>
<tr>
<th>Stages</th>
<th>Mean (Std. Deviation)</th>
<th>Mean (Std. Deviation)</th>
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<tbody>
<tr>
<td></td>
<td>Picture IAT&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Word IAT&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>Std.</td>
<td>Std.</td>
</tr>
<tr>
<td>Compatible -20</td>
<td>733.77 (404.249)</td>
<td>799.90 (377.264)</td>
</tr>
<tr>
<td>Trails Stage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compatible -40</td>
<td>683.53 (280.030)</td>
<td>736.99 (332.322)</td>
</tr>
<tr>
<td>Trails Stage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incompatible -20</td>
<td>1148.05 (708.076)</td>
<td>1321.96 (716.833)</td>
</tr>
<tr>
<td>Trails Stage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incompatible -40</td>
<td>835.47 (421.401)</td>
<td>1052.45 (582.873)</td>
</tr>
<tr>
<td>Total</td>
<td>819.97 (470.644)</td>
<td>950.12 (552.049)</td>
</tr>
</tbody>
</table>

<sup>a</sup>N=7920
Table 17

*Summary of Means and Standard Deviations for Effects of Gender on Implicit Measures*

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Female Mean</th>
<th>Female Std. Deviation</th>
<th>Female N</th>
<th>Male Mean</th>
<th>Male Std. Deviation</th>
<th>Male N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Picture IAT Effect</td>
<td>.57618</td>
<td>.333449</td>
<td>41</td>
<td>.72030</td>
<td>.232817</td>
<td>25</td>
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<tr>
<td>Word IAT Effect</td>
<td>.82058</td>
<td>.305113</td>
<td>41</td>
<td>.87355</td>
<td>.372019</td>
<td>25</td>
</tr>
<tr>
<td>Dependent Variable</td>
<td>Knows Someone Who Stutters</td>
<td>Does Not Know Someone Who Stutters</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------</td>
<td>-----------------------------</td>
<td>-----------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Picture IAT Effect</td>
<td>.67647 (.300293 48)</td>
<td>.50892 (.293583 18)</td>
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<tr>
<td>Word IAT Effect</td>
<td>.82874 (.304873 48)</td>
<td>.87239 (.398188 18)</td>
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Table 19

Summary of Means and Standard Deviations for Interactions of Gender and Knowing Someone who Stutters on Implicit Measures

<table>
<thead>
<tr>
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<th>Knows Someone Who Stutters</th>
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<td></td>
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<tr>
<td>Dependent Variable</td>
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<td>Picture IAT</td>
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<tr>
<td>Effect</td>
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<tr>
<td>Word IAT</td>
<td>.83710 .241436</td>
</tr>
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<td>Effect</td>
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Table 19 (continued)

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Does Not Know Someone Who Stutters</th>
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<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Female</td>
<td>Std.</td>
<td>Mean</td>
</tr>
<tr>
<td>Picture IAT Effect</td>
<td>.39630</td>
<td>.261752</td>
<td>.80174</td>
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<tr>
<td>Word IAT Effect</td>
<td>.78500</td>
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Table 20

Summary of Means and Standard Deviations for Effects of Knowing Someone Who Stutters on Explicit Measures

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Knows Someone Who Stutters</th>
<th>Does Not Know Someone Who Stutters</th>
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</thead>
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<tr>
<td></td>
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<td>Std.</td>
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<td></td>
<td>Mean</td>
<td>Deviation</td>
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<td>.977</td>
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<td>Warmth Toward PWS</td>
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<td>2.040</td>
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<tr>
<td>Warmth Toward PWDS</td>
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<td>1.885</td>
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Table 21

Summary of Means and Standard Deviations for Effects of Gender on Explicit Measures

<table>
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<td></td>
<td>Mean</td>
<td>Std. Deviation</td>
<td>N</td>
<td>Mean</td>
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<tr>
<td>Preference to Fluent or Stuttering Speaker</td>
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<td>.977</td>
<td>41</td>
<td>2.04</td>
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<tr>
<td>Warmth Toward PWS</td>
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<td>2.040</td>
<td>41</td>
<td>7.64</td>
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<tr>
<td>Warmth Toward PWDS</td>
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<td>1.885</td>
<td>41</td>
<td>5.12</td>
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Table 22

*Summary of Means and Standard Deviations for Interactions of Gender and Knowing someone who Stutters on Explicit Measures*

<table>
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</thead>
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<td>Mean</td>
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<tr>
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<tr>
<td>Warmth Toward PWDS</td>
<td>6.43</td>
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Table 23

*Correlations of Implicit and Explicit Measures*

<table>
<thead>
<tr>
<th></th>
<th>Likert Scale Preference to Fluent or Stuttering Speaker</th>
<th>Warmth Toward PWS</th>
<th>Warmth Toward PWDS</th>
<th>Picture IAT Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warmth Toward PWS</td>
<td>-.269*</td>
<td></td>
<td></td>
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<tr>
<td>Warmth Toward PWDS</td>
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<td>.400**</td>
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<td>Picture IAT Effect</td>
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<td>.099</td>
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<tr>
<td>Word IAT Effect</td>
<td>.016</td>
<td>-.135</td>
<td>-.046</td>
<td>.282*</td>
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</table>

N = 66 for above Correlations
This study describes the development of two Implicit Association Tests (IATs). The IATs in the field study examine the relationship between implicit attitudes with explicit attitudes in the field of fluency disorders. Three pilot studies were conducted to generate stimuli to be inserted into two separate IATs, one Picture IAT and one Word IAT with target concepts of Fluent Speaker and Stuttering Speaker. Following the development of stimuli, the field study investigated the two IATs (i.e., Picture IAT and Word IAT) to determine implicit attitudes that 66 PWDS had towards fluent and stuttering speakers, to examine relationships that implicit and explicit measures have regarding fluent and stuttering speakers, and if the Picture and Word IATs are testing the same construct (i.e., implicit attitudes toward stuttering and fluent speakers). This chapter will discuss these questions in relation to the results and past research in the area of stuttering, social cognition, and past IATs in other fields.

What are Implicit Association Tests telling us?

Before discussing the results of this study, a summary of past research using IATs is appropriate. In 1998 Greenwald et al. developed the IAT instrument as an attempt to measure implicit social cognition attitudes and stereotypes about race and ethnic groups with target concepts of Black and White, Korean and Japanese, and unconscious attitudes toward insects and flowers. Greenwald et al. concluded that IATs could be an instrument to assess not only unconscious stereotypes, but information about implicit perceptions regarding self esteem, and self concept.

Over twelve years later this type of instrument has been completed by more than 4 and half million participants worldwide (Lane et al., 2007) and research continues to indicate that
IATs measure indirect, unconscious (aware or unaware) bias toward social groups. Implicit Association Tests have been suggested to be indicators of negative or positive acceptance toward social groups which may be an indicator of predicting behaviors like “social judgment, physical responses, social action” (Greenwald, Poehlman, Uhlmann, & Banaji, 2009; Lane et al., 2007; Poehlman et al., 2007). Greenwald et al., (2009) found that IATs are more effective for more socially sensitive topics (e.g., race) than explicit measures. Other studies pertaining to socially sensitive topics such as AIDS (Neumann, Hulsenbeck, & Seibt, 2004) found that implicit measures from an IAT is related with automatic behaviors while explicit measures are related to behavioral intentions toward people with AIDS. Another study that supports the concept of IATs being predictive of social behaviors was Green, Carney, Pallin, Ngo, Raymond, Lezzoni, and Banaji (2006) who found that physicians had no explicit preference towards white and black patients however implicit attitudes generated from an IAT displayed a strong bias toward white patients and a decreased likelihood with treating black patients as compared to white patients with thrombolysis. Also, Greenwald and Farnham (2000) found that a self-esteem IAT predicted participants perceptions of success and failure.

Further, IATs have been thought to be a measure of cultural experiences by people and not culture knowledge of specific concepts presented in an IAT (Nosek & Hansen, 2008). With respect to cultural experiences, Nosek and Hansen said “experience must happen associations must form, and those associations must be available” (p. 589). The idea of availability is similar to the four components of automatic thoughts Anderson et al. (2007), discussed of availability, accessibility, applicability, and self-regulation.
The development of an implicit measure like an IAT for attitudes in the field of stuttering maybe a great way to complement the wealth of explicit attitude research compiled for the past several decades.

*The Picture IAT may be measuring attitudes toward stuttering and fluent “speakers”.*

One of the first interesting findings from the field study above is that the two IATs (i.e., Picture and Word) appear to be producing different results, yet their relationship appears to significantly correlate. Looking at the frequencies of the Cohen’s D IAT Effects for the Picture IAT and Word IAT showed that participants had stronger associations toward Fluent Speakers when performing the Word IAT as compared to the Picture IAT. This is the first indication that the two IATs maybe measuring different attitudes.

The second indication that the two IATs maybe measuring different attitudes is that ANOVAs revealed that participants produced faster reaction times (latencies) when performing the Picture IAT as compared to the Word IAT instrument. As stated in results section, these results are consistent with research performed with neurological Event Related Potentials (ERPs) where images were found to be categorized faster than words (Aziaian et al., 2006; Simos & Molfese, 1997). However, when Pearson’s Product Moment Correlations (Pearson’s r) were performed with IAT Effects to investigate the relationship between the Picture and Word IAT they were significantly correlated. It should be noted here that correlations were below .300, even though analysis yielded “significance”.

These results may indicate that the two IATs are indeed assessing two different attitudes regarding stuttering speakers and stuttering speech. We will address the Picture IAT first. Due to the visual nature of the Picture IAT, this instrument could be measuring implicit attitudes toward fluent and stuttering *speakers*, which was the goal of the field study in this
manuscript. The construct of having participants view models in fluent and stuttering moments (visually with photographs) may influence participants to infer more about the models than simply whether they are producing behaviors of stuttering or fluent speech. Horsley and FitzGibbon (1987) suggested that Speech-Language Pathologists associate internal traits with external behaviors, the significantly faster reaction times for the Picture IAT as compared to the Word may indicate that participants performing were examining potential internal traits of the imaged models producing fluent or stuttered speech and the Picture IAT assessed more automatic, first instinct, attitudes. Participants may have been attempting to judge potential personality characteristics of the imaged models and thus supports research by Wenker et al., (1996) which suggested that participants rated a disfluent live speaker with more favorable personality scores than the fluent individuals and audio recordings. Lastly, the idea of inferring one’s own personal feelings and discomforts toward disfluency and transferring those to attitudes toward PWS has been discussed in several studies above (Doody et al., 1993; Horsley & FitzGibbon, 1987; MacKinnon et al., 2007 White & Collins, 1984). This inferring may be more prevalent when participants are presented with visual imagery of stuttering than with words representing stuttering. So it may be possible that the introduction of a visual component for the Picture IAT may have influenced a participant’s implicit attitudes. Repeated studies with diverse groups of participants (i.e., adults not in college, parents, race, SES) would help to support these speculations.

The question of whether the Picture IAT is giving information about stereotypes may still be hard to answer, however if one were to stick to the definition from Allport (1954) about stereotypes being a “function to justify (rationalize) our conduct in relation to that category” (p. 187), then the Picture IAT may be showing stereotypes that PWDS possess toward people who
stutter. Again, diverse populations performing the Picture IAT may help to answer the questions of stereotyping toward PWS.

_The Word IAT may be measuring attitudes toward stuttering and fluent “speech”. As stated above, the Picture and Word IAT yielded significant different reaction times yet their relationship appeared significant. I believe that the Word IAT performed in this study could be measuring associations or bias toward fluent and stuttered speech and not toward fluent and stuttering speakers. In past studies, where participants were asked to list adjectives about PWS, they were asked to describe more personality characteristics rather than speech behaviors. In the first pilot study, participants were asked to generate words that came to mind when they heard “stuttering” of “fluent,” only two words generated from participants would represent personality adjectives: smart (fluent), nervous (stuttering). The adjectives generated from pilot studies one, two and three all refer to the speech behaviors of stuttering and fluent speech or how the listener may feel (i.e., annoying for “stuttering” speech). Even though the methodology of collecting data about stuttering was consistent with a large groups of studies (mostly performed by Lass in Russello), the results yielded adjectives that were not related to “personality traits” but rather were regarding “speech characteristics.” Thus, the Word IAT may be better described as an implicit measure of attitudes toward fluent and stuttering speech behaviors rather than the fluent and stuttering speakers. More research with these two IATs with diverse populations and along with changing target concepts from “Fluent Speaker” and “Stuttering Speaker” to “Fluent Speech” and “Stuttering Speech” is needed to further examine the suggestion that the Word IAT is indeed assessing implicit attitudes about speech behaviors of fluent and stuttered speech. As stated above with the picture IAT, repeated studies with
these IATs may help to provide more evidence for separating the two IATs and with deciding what attitudes these instruments maybe truly measuring ("speakers" and/or "speech").

*Correlations of implicit and explicit measures.*

Past research performed in a large variety of other disciplines with IATs has shown that implicit attitudes have very low correlations with explicit measures of attitudes (Lane et al., 2007). This study yielded similar results with low and non significant correlations with the Picture and Word IATs as they related to the explicit measures of preference to fluent and stuttering speakers, warmth toward fluent speakers, and warmth toward stuttering speakers. Such findings may further support a growing theory that Wilson, Lindsey, and Schooler (2000) along with Banaji (2000) proposed called a dual processing model of implicit and explicit attitudes. This model speculates that implicit and explicit attitudes are two separate mental processes. This dual model suggested that increased personal awareness or introspection could increase correlation levels with implicit and explicit measures of attitudes.

Another model to consider explaining differences found with implicit and explicit attitude correlations in this field study is the MODE Model (Fazio, 1990). This model, discussed in the literature review chapter, has been shown to explain differences with socially sensitive and non sensitive domains with the construct of motivation. Fazio and Olson (2003) explained this concept by saying “the more sensitive the domain, the greater the likelihood that motivational factors will be evoked and exert some influence on overt responses to an explicit measure” (p. 304). The MODE model and duel processing model explain the lack of correlations that the explicit questions compared to the Picture and Word IATs may indicate that the topic of stuttering is a socially sensitive topic and thus explicit responses to attitude measures of preference and warmth toward PWS and PWDS was influenced and thus non
significant correlations were generated comparing explicit and implicit measures. Further, the MODE model may explain the disparate results of the implicit and explicit measures by motivation being high, due to the socially sensitive nature of the stuttering, along with the opportunity to think about explicit answers is higher than implicit measures, thus the explicit measures are more favorable toward stuttering than the implicit measures. Further research with time stamping how fast participants perform explicit measures of attitudes and then correlation analysis may help to prove or disprove the dual processing theory of attitudes toward fluent and stuttering speakers from both PWDS and PWS.

Gender effects on implicit and explicit attitudes.

Research focusing on whether gender has an effect on explicit attitudes toward stuttering has yielded questionable results ranging from females being more negative than males about attitudes toward stuttering, females being more positive than males, and also no significant gender effects with explicit attitudes about stuttering (Burley, Rinaldi, Dietrich, Jensen, & Williams, 2001; Patterson & Pring, 1991; Weisel & Spektor, 1998). The present study found similar challenges trying to tease out a gender effect as past studies. The lack of significance with gender effects with the two IATs may indicate that males and females have similar unconscious attitudes toward fluent and stuttering speakers and toward fluent and stuttered speech. The one significant difference found was that women in the above field study reported significantly higher warmth ratings toward PWDS than males. This finding may indicate that females display an increased sense of awareness and sense of empathy in the form of “warmth” toward PWS and PWDS (i.e., themselves) which is consistent with the findings by Wang, Davidson, Yakushko, Savoy, Tan, and Bleier (2003) who found that women reported significantly more empathy with respect to feelings, expression, awareness, and acceptance of
cultural differences as compared to men. However the above is just speculation about gender differences, more research exploring this concept of self-awareness may yield a deeper understanding of why females who do not stutter are warmer toward PWDS than males.

*The effect of knowing someone who stutters on implicit and explicit attitudes.*

In the above field study knowing someone who stuttered yielded only one significant effect and that was on the Picture IAT. Participants who know someone who stuttered had significantly higher Picture IAT Cohen’s D Effects. These higher IAT Effects indicate a stronger implicit association or bias toward Fluent Speakers. The visual stimuli in the Picture IAT may have influenced this effect as compared to the Word IAT which did not use any images and yielded no significant effects for knowing someone who stutters. The visual display of people stuttering may influence participants to infer their feelings and discomforts with their own disfluencies and thus increase more negative perceptions toward stuttering because of these inferences, (White & Collins, 1984). Horsley and FitzGibbon (1987) suggested that speech-language pathologist were associating negative internal traits of people who stutter with visual behaviors from experiences they have had with people they know who stutter. Thus, these negative inferences toward their own disfluent behaviors while speaking may have caused an increase in stronger associations toward Fluent Speakers (inversely this may indicate a more negative association toward Stuttering Speakers). Ceschi, Banse, and Van der Linden (2009) investigated how mental imagery of more anxiety prone situations might affect implicit and explicit state and trait anxiety. Their findings indicate that IATs did not change with short term anxiety provoking imagery, which the Picture IAT may have been anxiety provoking imagery of stuttering and fluent models. Ceschi et al further found that “short-lasting mental imagery modifies respondents’ subjective feelings while leaving more
automatic emotional self-concepts unchanged” (p. 217). Future research with the Picture and Word IATs along with qualitative questions may help to probe deeper into the understanding the relationship with knowing someone who stutters and the unconscious effect of attitudes.

**Fakeability of IATs.**

Fakeability of any instrument is always a concern for researchers, as it can influence the validity of the instrument. The difference with IAT instruments as compared to more explicit questionnaires about attitudes is that IATs are assessing the construct of attitudes indirectly. The relation between direct and indirect measures was best explained by the following passage written by Nosek, Greenwald, and Banaji (2007):

> Direct measures make the meaning of the response plain, and allow the respondent to straightforwardly determine response content. Indirect methods attempt to reduce the likelihood of deliberate faking by obscuring what is being measured, how it is being measured, or limiting the ability to control the response content. In this regard, implicit measures comprise a subset of indirect methods. (p. 275)

Studies have shown that IAT measures are less likely to be faked by participants than explicit measures and if IAT scores are faked they are due to the fact that participants have a deeper knowledge about the inner workings of the instrument itself (Steffens, 2004), than the average person.

Like past IAT research, the field study with the Picture and Word IATs generated non significant correlations between explicit and implicit attitudes, which could lend evidence to the idea that IATs are more difficult to fake. Also, the two IATs above showed that fluent
participants’ possessed moderate to strong implicit associations toward fluent speakers (on both IATs), indicating more negative bias toward stuttering speakers. This potentially more negative association toward stuttering speakers may not be something that most participants would want revealed, seeing how explicit measures were less preferential to fluent speech and generated moderate warmth toward both fluent and stuttering speakers.

**Neurological correlates of IATs.**

The use of functional magnetic resonance imagery (fMRI) has been used in conjunction with IATs to examine any neural correlates with implicit and explicit tasks. Past studies have found that when participants possess a strong implicit bias they also show more amygdala activity (Cunningham, Johnson, Raye, Gatenby, Gore & Banaji, 2004). Cunningham et al. also suggested that explicit attitudes (attitudes that participants had more time to consciously process) produced activity in areas of the brain that typically are “associated with inhibition, conflict, and control” (Cunningham et al, 2004; p. 811) like the prefrontal cortex (PFC) and anterior cingulate. This notion that areas of the brain are active with respect to inhibition and conflict may explain why participants in this field study generated significantly longer response latencies for incompatible trials as compared to compatible trials for both the Picture IAT and Word IATs. It could be speculated that when participants were faced with a context that challenged their automatic preferences (i.e., incompatible stages), areas of “control” may have attempted a takes over in the brain, thus longer deliberation of thought occurred. It should be noted that the Cunningham et al. (2004) compared IAT results outside of the fMRI scanner with activities of another categorization activity within the scanner.
Other research had participants perform IATs while in fMRIs scanners in order to examine neural correlates IATs. These results yielded that when participants were performing incompatible implicit tasks associated with stereotyping with moral attitudes (Luo, Nakic, Wheatley, Richell, Martin, & Blair, 2006) and racial bias (Krutson, Mah, Manly, & Grafman, 2007) that the amygdala along with the ventromedial orbitofrontal cortex was stimulated. Both Cunningham et al. and Knutson et al. indicated that PFC activation was seen with participants as they attempted to inhibit potential stereotypes.

Due to the similar results (significant correlations) seen with the Picture and Word IATs performed in this study, one could speculate that if these IATs were performed during an fMRI scan they may yield similar neural activity results with relation to activation of the amygdala during stronger bias toward fluent speakers or speech and more activity in the PFC with explicit questions. The activation of disparate areas of the brain may explain the lack of significant correlations between implicit and explicit measures in the field study above.

Conrey, Sherman, Gawronski, Hugenberg, and Gordan (2005) developed a model to connect neurological activity with psychological processes. The Quad model looks at four processes about implicit measurements: degree the implicit bias is activated to a stimulus (AC), the controlled process of the ability to perceive appropriate response to a stimulus (D), the ability an individual has to overcome a bias which may influence their actions (OB), and the ability an individual possesses to guess a implicit association or automatic response to a stimulus which may influence actions without having the ability to identify a response that could be appropriate to the stimulus. Beer et al. (2008) applied this model with IATs and fMRI scanning and found that the amygdala was active for degree of implicit bias (AC) for ingroups (e.g., Black/Unpleasant trails) than outgroups (i.e., White/Pleasant). They also found that the
detection (D) of appropriate responses was associated with activation of the orbitofrontal cortex while the activation of both the amygdala and orbitofrontal cortex may indicate responses where a reward or a treat is eminent (OB). Lastly, Beer et al. suggest that the caudate nucleus was active in order to prepare a prejudice or feared response, in this case for negative reactions to black faces.

Again, future studies with fMRIs and the above Picture and Word IATs may help to add to the research with the quad model and exploring neurological correlations of implicit and explicit attitudes toward fluent and stuttering speakers or speech.

Limitations to the field study.

This study was created to develop the first implicit test in the field of fluency disorders and communication sciences and disorders. One obvious limitation is the sample size. Most IATs are performed online so they have the opportunity to generate large sample sizes. Although this sample size of 66 PWDS college students appears to be consistent with studies that pioneered this type of instrument, it still could have had more participants from a diverse population. Future research will incorporate larger sample sizes from a more diverse population by having participants perform an online version of the IAT instruments developed in this manuscript (i.e., Picture IAT and Word IAT).

A second limitation of the field study is that the Picture IAT was before the Word IAT in presentation order on the field study instrument. There is no way to tease out an order affect without randomly ordering the Picture IAT and Word IAT. Future studies will address this concern in an attempt to discover if these two IATs are in fact measuring different attitudes about speakers and speech by randomly ordering the Picture and Word IATs.
Another possible order affect for the field study above involves the explicit attitude measures (i.e., preference toward PWS and PWSD, warmth toward PWS, and warmth toward PWDS). Explicit measures were always presented at the end of the field study, after both IATs were performed. It is possible that the performance of the IATs could have influenced the answers that participants gave to these explicit questions. Future studies will randomize presentation of explicit and implicit measures.

Lastly, the addition of open ended qualitative questions encouraging participants to explain their perceptions of fluent and stuttering speakers along with where they feel their attitudes were generated may provide a deeper understanding of implicit and explicit measures in this study. With the addition of qualitative information, triangulation of data may provide a more complete picture of how implicit and explicit perceptions relate.

Future research with implicit measures.

Implicit Association Tests have been performed by millions of people all over the world, mostly on internet based instruments. Internet research has been shown to have several advantages as compared to traditional paper and pencil survey research. Some advantages are: it reduces researcher bias by the physical absence of the researcher; internet research provides a presentation of consistent information; internet research may increase participants’ comfort by allowing them to perform tasks in an environment of their choosing (Nosek & Banaji, 2002; Vadillo, Barcena, & Helena, 2006). Internet based research also presents opportunities for a large and diverse sample size which can possibly translate to increased ability to generalize results (Vadillo et al., 2006). Some financial benefits to internet-based research is savings with survey and feedback publishing costs, survey cost related to distribution, and survey collection
costs (Buchanan & Smith, 1999; Gosling Vazire, Srivastava, & John, 2004; Schmidt, 1997; Vadillo et al., 2006). However, internet research may cause some concern with respect to anonymity (privacy) of participants, consistencies with traditional research methods, and validity of responses (control issues). Recent studies (Gosling et al., 2004; Paine, Reips, Stieger, Joinson, & Buchanan., 2007; Reips, 2002; Schmidt, 1997) have reported that internet-based research is as good as traditional methods and researchers should use either internet-based or traditional methods that best fit with the purpose of their studies. Despite the fact that most internet research has a “selection influence in learning about the site, choosing to visit,” choosing to perform the task, the large sample sizes that are possible, IATs can “characterize a considerable population in its own right” (Nosek et al., 2007, pp. 7-8). This type of methodology might be more effective than comparing several subsamples to develop a normative representation.

The use of Implicit Association Tests in the field of communication disorders appears to have many possibilities. An internet license of the Inquisit’s 3.0 (Inquisit, 2008) software could be purchased in order to put the Picture and Word IATs on the internet in hopes to increase the diversity of the sample size. This will allow increase anonymity of participants along with the hope to reach a greater diverse population. Since this software uses the internal clock of the machine that the participant is using, there is little concern for data inconsistencies. Nosek, Banaji, and Greenwald (2002) noted:

Apple Macintoshes have an error window of 16.7 milliseconds per response, and PC machines have a window of between 50-60 ms. Though imperfect, these windows have little effect on the observed results because IAT effects are large and many trials are used per block. (p. 103).
Participants could perform a web-based version of IATs and explicit measures which is the standard practice for most IATs performed across the world. This type of web-based version could also be performed with PWS and then compare their implicit and explicit associations with PWDS to investigate correlations with these two populations. This data could be compiled with data from PWDS and then comparison could made to discern if there are differences between PWS and PWSD with any predictors of implicit and explicit attitudes (e.g., knowing someone who stutters, gender, knowledge about stuttering).

One major factor that many of the explicit attitudes research performed in stuttering has suggested is that education of the general public along with professionals who work with PWS may help to reduce negative perceptions and stereotypes (e.g., Betz et al, 2008; Lass et al., 1994; Russello & Lass, 1988). A future study that could get at the influence of education on implicit attitudes toward PWS and stuttering speech could consist of a group that is provided with a positive stuttering primer lesson about stuttering prior to performance on the Picture and Word IATs with some participants and no priming for other participants and see if IAT Effects and strength of association scores differ between the two groups. This type of indirect measure using IATs in conjunction with education priming maybe a good manner to try out different education scripts in order to develop one that is most effective with significantly decreasing negative attitudes toward PWS. If successful, an effective script could be mass produced and used as an educational marketing campaign for organizations like the National Stuttering Association (NSA), Stuttering Foundation of America, and the National Association of Young People Who Stutter (FRIENDS).

Another future study with the Picture IAT could be to create an IAT with female picture stimuli and examine any gender effects with pictures of females as compared to
pictures of male models. Past research has been controversial about any gender effects on attitudes (explicit) about stuttering and this type of indirect measure with an IAT is able to shed some more light on this subject from a unique perspective of not asking people direct questions about attitudes in order to assess attitudes. This next “female” imaged IAT could be run with both males and females of PWDS and PWS to investigate a variety of possible gender relationships with implicit and explicit measures of attitude.

The Word IAT stimuli could also be adjusted using several of the more personality adjectives (e.g., nervous, shy, anxious, tense, withdrawn) that past researchers have used with semantic differential scales (Lass et al., 1989; Woods & Williams, 1976; Yairi & Williams, 1970). This type of Word IAT may compliment the Picture IAT in the field study above in examining implicit attitudes about stuttering and fluent people and may show that the words used in the Word IAT above associate more with speech production and not people. This also could be a great way to connect Implicit Association Tests with semantic differential scales and determine any relationships these two measures may have as implicit and explicit instruments respectively.

A child friendly version of the IATs above could be developed and given to children to assess implicit attitudes toward fluent and stuttering speakers and speech. Baron and Banaji (2006) did perform race IATs with children ages six to ten years old where they found some similar attitudes with these children as adults who take Race IATs. If a child sensitive IAT could be constructed with the Picture and Word IATs in this manuscript, it may add to the research about awareness and attitudes of young children with respect to stuttering which indicates awareness of speech differences as early as three years old for CWS and CWDS and negative attitudes developing by five years of age (Ambrose & Yairi, 1994; Boy, Van De

The adolescent population may be one of the least research populations in fluency research. Some limited research about adolescents and attitudes appears to suggest that adolescents who may be trying to hide their stuttering may possess more negative perceptions about their speech (Blood, Blood, Tellis, & Gabel, 2003). An implicit type of instrument which gets at attitudes without asking point blank questions might be very well suited for the adolescent age. This may help PWS along with PWDS adolescents to take a new perspective on their behaviors toward stuttering and fluent speakers by examining these indirect biases.

With respect to structure of the IAT, future studies with different target and attribute concepts maybe used. Target concepts such as “Stuttering” and “Disability” may be used to measure implicit attitudes about participants’ perceptions on stuttering being a disability. Also, changing attribute concepts to words that make the experience more personal (e.g., “like” and “dislike”) may stimulate participants to evaluate target attributes rather than just merely categorizing them (Nosek & Hansen, 2008).

The construct of assessing implicit attitudes is an emerging field of research. I hope to explore other means of assessing this construct with behavioral science research like Facial Action Coding (Ekman & Friesen, 1978; Hager, Ekman, & Friesen, 2002) and facial Electromyography (EMGs) in order to connect attitudes with these types of measures. Paul Ekman has extensive research spanning decades on the idea of connecting subtle changes of facial expressions by the movement of facial muscles being correlated with emotions. If facial coding proves to be successful with connecting perception toward stuttered speech or people
who stutter, this could be a valuable way to measure attitudes from both PWDS and PWS. Additionally, facial coding could be taught to future speech pathologist as a means to read clients’ facial expressions for changes of emotions and attitudes during discussions of stuttering or while present in difficult speaking situations. Collecting facial Electromyography (EMGs) (Achaibou, A., Pourtois, G., Schwartz, S, & Vuilleumier, P., 2008; Tassinary & Cacioppo, 1992) may add to facial coding research by providing some hard science support to the practice of essentially reading a person’s face.

In addition to IATs, facial coding, and facial EMGs, down the road I would like to develop lines of research utilizing other forms of indirect measures like eye tracking and eye blinks in an attempt to explore implicit attitudes with respect to stuttering.
CHAPTER 6

Conclusion

The research of implicit attitudes in the field of fluency disorders is in its infancy at this time. The development of the two IATs above (i.e., Picture IAT and Word IAT) appears to be a starting point to entering into this realm of research. The above pilot studies which generated stimuli for the Picture and Word IATs showed that there may be a visual distinction between fluent and stuttering speech that can be recognized in still frame photos. This information may lead researchers examining attitudes to work more with photographs of PWS and PWDS to determine possible mental representations of these two groups.

The field study in this manuscript had college student participants perform implicit and explicit attitude measures showed that the Word IAT may be measuring implicit associations toward fluent and stuttered speech while the Picture IAT could be measuring implicit associations toward fluent and stuttering speakers. These implicit attitudes taken from the IATs have no significant correlations with explicit questions pertaining to preference and warmth toward fluent and stuttering speakers which is consistent with past IAT research examining relationships of implicit and explicit measures.

Future research with IATs and indirect measures such as facial coding, facial EMGs, and eye tracking may help to develop this line of indirect attitudes research as a great compliment to all the explicit attitudes research the field of stuttering has generated to date.
REFERENCES


Appendix A

Target Word Productions for Models to Produce Stuttering and Fluent Images

<table>
<thead>
<tr>
<th>Sound</th>
<th>Target Word</th>
<th>Type of Stutter</th>
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<tbody>
<tr>
<td>/p/</td>
<td>police</td>
<td>Part Word (SSR)</td>
</tr>
<tr>
<td>/t/</td>
<td>tea</td>
<td>Block (ISP)</td>
</tr>
<tr>
<td>/k/</td>
<td>kissing</td>
<td>Part Word (SSR)</td>
</tr>
<tr>
<td>/f/</td>
<td>foot</td>
<td>Sound Prolongation (ASP)</td>
</tr>
<tr>
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<td>thorn</td>
<td>Part Word (SSR)</td>
</tr>
<tr>
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<td>shadow</td>
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<td>/p/</td>
<td>peach</td>
<td>Block (ISP)</td>
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<td>shovel</td>
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Fluent Productions

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<td>Sound</td>
<td>Word</td>
<td>Fluency</td>
</tr>
<tr>
<td>-------</td>
<td>------------</td>
<td>---------</td>
</tr>
<tr>
<td>/t/</td>
<td>toolbox</td>
<td>fluent</td>
</tr>
<tr>
<td>/k/</td>
<td>can</td>
<td>fluent</td>
</tr>
<tr>
<td>/f/</td>
<td>fish</td>
<td>fluent</td>
</tr>
<tr>
<td>/th/</td>
<td>thanksgiving</td>
<td>fluent</td>
</tr>
<tr>
<td>/sh/</td>
<td>shovel</td>
<td>fluent</td>
</tr>
</tbody>
</table>
Appendix B
Image Development with Research Team

Please type (in the text box below each picture) an “s” for “stuttering” or an “n” for “not stuttering” for each picture that you think best represents the aforementioned labels.
Appendix. C

Pilot Study One

Pilot Study #1 Implicit Association Test for Stuttering

INFORMED CONSENT

Introduction: You are being invited to participate in a study pertaining to perceptions of stuttering and fluent speech. This study will be conducted by Scott Palasik, Rod Gabel Ph. D, Farzan Irari, and Adam Schlagbeck from the Department of Communication Disorders at Bowling Green State University. You are not eligible to participate if you are under 18 years of age, if you have any hearing disorders, and if you are a diagnosed person who stutters. In order to keep participation as anonymous as possible you are not required to sign consent or provide any identification information (e.g. phone number, student number, Social Security Number). By completing the survey and return it to one of the researchers, you are giving consent to participate.

Procedures: Your participation will start with filling out a short demographics questionnaire. After completing the demographics questionnaire, you will be asked to respond to two open-ended questions and then look at 24-30 images pertaining to “stuttering” and “fluent” speaking.

Risks and Benefits: There are no known risks

Payment / Costs: Participation in this study is voluntary. You will receive no payment for participation. Likewise, there will be no financial cost for participating.

Confidentiality: All records related to this research will be maintained in a locked office and will be available only to those assisting with the project.

Questions: If you have any more questions you can contact Scott Palasik MS-CCC-SLP, 419-372-4320 (scotttp@bgsu.edu) and Rod Gabel, 252 Health Center, 419-372-7168 (rgabel@bgsu.edu). If you have questions about the conduct of this study or your rights as a research participant, you may contact the Chair of Bowling Green State University's Human Subjects Review Board at (419) 372-7716 (hsrb@bgsu.edu).
**Consent:** I have been told what will be done in this study. I have also been told how it would be done, what I will have to do, and how long participation will likely take. I am aware that participation in this study is voluntary. I may quit and/or refuse participation at any time without repercussions. If I am a student, the decision to participate or not participate will have no impact on grades, class standing, or relationship to the institution in any way. If I am receiving speech-language-hearing services at BGSU, my decision to participate or not participate will have no effect on my relationship with the institution / clinic or the treatment I receive. If I want it, the investigators will give me a copy of this form to keep for my records.

**Pilot Study #1 Implicit Association Test for Stuttering**

**Demographic Questionnaire**

Age _____________  Gender  M / F

What is your major at BGSU?______________

Ethnicity/Race?______________

Do you know anyone who stutters?  Yes / No

(If Yes, what is the relation of the person you know e.g. mother, friend etc.)

_________________________________________________________________________

**Speech / Language / Hearing History**

1. Do you have any:  1a. Speech deficits (other than stuttering):  Yes / No

   1b. Language deficits:  Yes / No

   1c. Hearing deficits:  Yes / No

2. Have you ever been enrolled in therapy with a Speech Pathologist?  Yes / No
3. Have you participated in speech, language, or hearing studies before:  Yes / No

4. Is American English your first language:  Yes / No

Pilot Study #1 Implicit Association Test for Stuttering

Questionnaire

Please read the two open-ended questions below carefully. Thank you!

1) When you hear the word “stutter” what words come to mind? (try and think of single words please)

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

2) When you hear the word “fluent” what words come to mind? (try and think of single words please)

________________________________________________________________________
Below you will see pictures of people stuttering and speaking fluently. Please circle which answer (i.e. “stuttering”, “fluent”, “I can’t tell”) you think best represents each picture below. Thanks!

Stuttering

I can’t Tell

Fluent

Stuttering

I can’t Tell

Fluent

Stuttering

I can’t Tell

Fluent
Stuttering

I can’t Tell

Fluent

Stuttering

I can’t Tell

Fluent

Stuttering

I can’t Tell

Fluent
Stuttering
I can’t Tell
Fluent
Stuttering
I can’t Tell
Fluent
Stuttering
I can’t Tell
Fluent
Appendix D

Agent Script for Pilot Study One.

Agent Script

Pilot Study Number One

My name is (Adam) or (Farzan) from the Department of Communication Disorders. I am here today to ask you to volunteer to participate in a short research study for a doctoral student in my department. The study will ask you to complete a short questionnaire, and your participation would not only help the student, but it would further the knowledge base of stuttering for the field of Communication Disorders. For the study, people who stutter and individuals under the age of 18 should not participate in this study. You are being excluded because the items on the questionnaire pertain to the perceptions of adults who don’t stutter, not because of any negative bias against you. In order to keep participation as anonymous as possible, you are not required to sign a consent form nor provide any identification information (e.g. phone number, student number, Social Security Number). By completing the survey and returning it to me, you are giving consent to participate.

Please read the first page, the consent form, carefully. Following the consent page you will be asked to fill out a short demographics questionnaire. After the demographic items are complete, you will see two questions with lines underneath each question for you to write you answer. Following these questions you will be asked to look at 36 images pertaining to either “stuttering” or “fluent” (not stuttering) speech. You are asked to circle the answer that you think best represents that picture. Your choices are: Stuttering, I can’t tell, or Fluent (not stuttering). When you are through, please put your survey in the brown envelope at the front of the class.

Thank you very much for your help. Please raise your hand if you would like to participate. Again this is voluntary.
Appendix E

Example of One of Four Versions of Pilot Study #2

**Pilot Study #2 Implicit Association Test for Stuttering**

**Questionnaire – V1**

Please read the words in **bold** and **underlined** and then circle a word (i.e. “stutter”, “fluent”, “I can’t tell”) which best indicates the word in **bold** and **underlined**.

<table>
<thead>
<tr>
<th>CLEAR</th>
<th>STAMMER</th>
<th>HESITATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stuttering</td>
<td>Stuttering</td>
<td>Stuttering</td>
</tr>
<tr>
<td>I can’t Tell</td>
<td>I can’t Tell</td>
<td>I can’t Tell</td>
</tr>
<tr>
<td>Fluent</td>
<td>Fluent</td>
<td>Fluent</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>UNCLEAR</th>
<th>DIFFICULTY</th>
<th>SPUTTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stuttering</td>
<td>Stuttering</td>
<td>Stuttering</td>
</tr>
<tr>
<td>I can’t Tell</td>
<td>I can’t Tell</td>
<td>I can’t Tell</td>
</tr>
<tr>
<td>Fluent</td>
<td>Fluent</td>
<td>Fluent</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FAST</th>
<th>GRACEFUL</th>
<th>IMPAIRMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stuttering</td>
<td>Stuttering</td>
<td>Stuttering</td>
</tr>
<tr>
<td>I can’t Tell</td>
<td>I can’t Tell</td>
<td>I can’t Tell</td>
</tr>
<tr>
<td>Fluent</td>
<td>Fluent</td>
<td>Fluent</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LANGUAGE MPEDIMENT</th>
<th>SLOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stuttering</td>
<td>Stuttering</td>
</tr>
<tr>
<td>I can’t Tell</td>
<td>I can’t Tell</td>
</tr>
<tr>
<td>I can’t tell</td>
<td>I can’t Tell</td>
</tr>
<tr>
<td>Fluent</td>
<td>Fluent</td>
</tr>
<tr>
<td>--------</td>
<td>--------</td>
</tr>
<tr>
<td>REPETITION</td>
<td>STUMBLE</td>
</tr>
<tr>
<td>Stuttering</td>
<td>Stuttering</td>
</tr>
<tr>
<td>I can’t Tell</td>
<td>I can’t Tell</td>
</tr>
<tr>
<td>Fluent</td>
<td>Fluent</td>
</tr>
<tr>
<td>UNDERSTANDABLE</td>
<td>FALTER</td>
</tr>
<tr>
<td>Stuttering</td>
<td>Stuttering</td>
</tr>
<tr>
<td>I can’t Tell</td>
<td>I can’t Tell</td>
</tr>
<tr>
<td>Fluent</td>
<td>Fluent</td>
</tr>
<tr>
<td>ANNOYING</td>
<td>FLOW</td>
</tr>
<tr>
<td>Stuttering</td>
<td>Stuttering</td>
</tr>
<tr>
<td>I can’t Tell</td>
<td>I can’t Tell</td>
</tr>
<tr>
<td>Fluent</td>
<td>Fluent</td>
</tr>
<tr>
<td>SMART</td>
<td>QUICK</td>
</tr>
<tr>
<td>Stuttering</td>
<td>Stuttering</td>
</tr>
<tr>
<td>I can’t Tell</td>
<td>I can’t Tell</td>
</tr>
<tr>
<td>Fluent</td>
<td>Fluent</td>
</tr>
<tr>
<td>ELOQUENT</td>
<td>HARD</td>
</tr>
<tr>
<td>Stuttering</td>
<td>Stuttering</td>
</tr>
<tr>
<td>I can’t Tell</td>
<td>I can’t Tell</td>
</tr>
<tr>
<td>Fluent</td>
<td>Fluent</td>
</tr>
<tr>
<td>CHOPPY</td>
<td>NORMAL</td>
</tr>
<tr>
<td>Stuttering</td>
<td>Stuttering</td>
</tr>
<tr>
<td>I can’t Tell</td>
<td>I can’t Tell</td>
</tr>
</tbody>
</table>
Below you will see pictures of people stuttering and speaking fluently. Please circle which answer (i.e. “stuttering”, “fluent”, “I can’t tell”) you think best represents each picture below. Thanks!

<table>
<thead>
<tr>
<th>Fluent</th>
<th>Fluent</th>
<th>Fluent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EASE</strong></td>
<td><strong>EASY</strong></td>
<td><strong>SMOOTH</strong></td>
</tr>
<tr>
<td>Stuttering</td>
<td>Stuttering</td>
<td>Stuttering</td>
</tr>
<tr>
<td>I can’t Tell</td>
<td>I can’t Tell</td>
<td>I can’t Tell</td>
</tr>
<tr>
<td>Fluent</td>
<td>Fluent</td>
<td>Fluent</td>
</tr>
</tbody>
</table>

**KNOWLEDGEABLE**

- Stuttering
- I can’t Tell
- Fluent

Below you will see pictures of people stuttering and speaking fluently. Please circle which answer (i.e. “stuttering”, “fluent”, “I can’t tell”) you think best represents each picture below. Thanks!

<table>
<thead>
<tr>
<th>Stuttering</th>
<th>Stuttering</th>
<th>Stuttering</th>
</tr>
</thead>
<tbody>
<tr>
<td>I can’t Tell</td>
<td>I can’t Tell</td>
<td>I can’t Tell</td>
</tr>
<tr>
<td>Fluent</td>
<td>Fluent</td>
<td>Fluent</td>
</tr>
</tbody>
</table>
Stuttering     Stuttering     Stuttering
I can’t Tell     I can’t Tell     I can’t Tell
Fluent         Fluent         Fluent
Stuttering     Stuttering     Stuttering
I can’t Tell     I can’t Tell     I can’t Tell
Fluent         Fluent         Fluent
Stuttering     Stuttering     Stuttering
I can’t Tell     I can’t Tell     I can’t Tell
Fluent         Fluent         Fluent
Stuttering     Stuttering     Stuttering
<table>
<thead>
<tr>
<th>Fluent</th>
<th>Fluent</th>
<th>Fluent</th>
</tr>
</thead>
<tbody>
<tr>
<td>I can’t Tell</td>
<td>I can’t Tell</td>
<td>I can’t Tell</td>
</tr>
<tr>
<td>Stuttering</td>
<td>Stuttering</td>
<td>Stuttering</td>
</tr>
<tr>
<td>I can’t Tell</td>
<td>I can’t Tell</td>
<td>I can’t Tell</td>
</tr>
<tr>
<td>Fluent</td>
<td>Fluent</td>
<td>Fluent</td>
</tr>
<tr>
<td>Stuttering</td>
<td>Stuttering</td>
<td>Stuttering</td>
</tr>
<tr>
<td>I can’t Tell</td>
<td>I can’t Tell</td>
<td>I can’t Tell</td>
</tr>
<tr>
<td>Fluent</td>
<td>Fluent</td>
<td>Fluent</td>
</tr>
<tr>
<td>Stuttering</td>
<td>Stuttering</td>
<td>Stuttering</td>
</tr>
<tr>
<td>I can’t Tell</td>
<td>I can’t Tell</td>
<td>I can’t Tell</td>
</tr>
<tr>
<td>Fluent</td>
<td>Fluent</td>
<td>Fluent</td>
</tr>
</tbody>
</table>
Stuttering
I can’t Tell
Fluent

Stuttering
I can’t Tell
Fluent

Stuttering
I can’t Tell
Fluent

Stuttering
I can’t Tell
Fluent

Stuttering
I can’t Tell

Fluent
Appendix F

Four Images that at least 80% of Participants Correctly Identified as Stuttering Images

Can  Fish  Foot  Thanksgiving
Appendix G

Four images that at least 70% of participants identified Correctly.

Can  Kissing  Tea  Police
Appendix H

Description of Script Programming

The first script written was the demographics survey which is presented first (prior to the IAT portion) (see Appendix H for full script). The demographics survey contains general description of the instrument followed by two pages of questions with drop down menus (i.e., gender, occupation, education, state, place of citizenship) textboxes (i.e. age, zip code), and one radio button (i.e. race). After the variables were created the software requires that pages be designated for specific variables. The example below means the second page of the survey is assigned to the gender, age, race, and occupational questions.

< surveypage demographics2>
/ caption = "Thanks for participating in this study! Please answer the following demographic questions"
/ fontstyle = ("Verdana", -16, true, false, false, false, 5, 0)
/ questions = [1=gender; 2=age; 3=race; 4=occupation]
</ surveypage>

Notice that within this item description of each page, the fontstyle can be defined. For the above example this page is written in “Verdana” font style, with 16pt height, with bold letting, no italics, no underlining, no strike out line for the font, the quality if 5 (i.e. Cleartype), and the set is 0 (i.e. ANSI). The last part of writing the demographics script survey was to assign a storage location for data and pages that the survey wants to gather data from.

The next script written was the IAT portion (see Appendix H for full script). This involved defining each target attribute and concept attribute with the item stimuli and where they will be retrieved from respectively. For word item stimuli, the software doesn’t need to “retrieve” them from any location; however images need to be specifically labeled with the
name of the *jpg* file. The example below shows the written code for the target concept and stimuli pictures for “Stuttered Speech.”

```xml
<!-- item targetBlabel -->
/1 = "Stuttered Speech"
</item>

<!-- item targetB -->
/1 = "Can-S-RG.jpg"
/2 = "Fish-S-RG.jpg"
/3 = "Foot-S-RG.jpg"
/4 = "Thanksgiving-S-RG.jpg"
/5 = "Can-S-RG.jpg"
/6 = "Fish-S-RG.jpg"
/7 = "Foot-S-RG.jpg"
/8 = "Thanksgiving-S-RG.jpg"
</item>
```

The label is defined first and then the 8 stimuli named. Since these images are saved in the same folder as the IAT script, the IAT recognizes these names as valid items. After each attribute and items’ code is written, the next lines of code have to do with how participants will navigate through pages from instructions to each IAT stage with use of the hardware present (i.e. mouse, keyboard). In the example below, the “/nextkey = (" ")” indicates the spacebar key is required in order to move from instruction menus to the next stage of the IAT.

```xml
<instruct>
/ nextlabel = "Continue"
/ lastlabel = "Continue"
/ nextkey = (" ")
/ prevkey = (0)
/ inputdevice = mouse
/ windowsize = (90%, 90%)
/ screencolor = (0,0,0)
/ fontstyle = ("Arial", 3%)
/ txcolor = (255, 255, 255)
</instruct>
```
As can be seen from the above script, the fontstyle, and location along with the color of the label “Continue” are defined” in this section of script.

The next section of script for the IAT portion of this instrument defines the magnitude levels that the time latencies will be compared after Cohen’s D (Cohen, 1988) effect sizes are calculated. This section also defines the language participants will be informed to their associations (i.e. “little to no”, “a slight”, “a moderate”, and “a strong”). See example below:

```xml
<trial summary>
/ stimulustimes = [0=summary]
/ validresponse = (" ")
/ recorddata = false
/ ontrialbegin = [values.magnitude = "little to no"]
/ ontrialbegin = [if( abs(expressions.d) > 0.15 ) values.magnitude = "a slight"]
/ ontrialbegin = [if( abs(expressions.d) > 0.35 ) values.magnitude = "a moderate"]
/ ontrialbegin = [if( abs(expressions.d) >= 0.65 ) values.magnitude = "a strong"]
/ ontrialbegin = [if (expressions.d >= 0.0) expressions.preferred = item.targetALabel.1]
/ ontrialbegin = [if (expressions.d < 0.0) expressions.preferred = item.targetBLabel.1]
/ ontrialbegin = [if (expressions.d < 0.0) expressions.notpreferred = item.targetALabel.1]
/ ontrialbegin = [if (expressions.d >= 0.0) expressions.notpreferred = item.targetBLabel.1]
</trial>

<text summary>
/ items = ("Your IAT score (D) was <% expressions.d %>, which suggests <% values.magnitude %> automatic preference for <% expressions.preferred %> compared to <% expressions.notpreferred %>. Press the spacebar to complete this session.")
/ size = (60%, 60%)
/ hjustify = left
</text>
```

The “text summary” script indicates the caption that participants will read on the screen that will contain the magnitude of their association.
The next part of the IAT portion of the script pertains to the instructions pages for the IAT that are before each of the seven stages. This section instructs the software to arrange the instruction pages in a specific order, what the instructions will say, location on the screen, and *font* *style* of the instructions (see Appendix H for entire script). Following the instructions section of the script is the section that defines the concepts (i.e., both target and attribute concepts) with respect to size, color, and position on the screen for each stage. The example below indicates that the label for target concept of “Fluent Speech” will be in the top left corner and the “position” (in percentages), from the top and left side, the target concept word will appear on the screen.

```xml
<text targetAleft>
/ items = targetAlabel
/ valign = top
/ halign = left
/ position = (5%, 5%)
</text>
```

The next section of the IAT script details the parameters of the trials with respect to what responses from the participant are valid (i.e. by using the “E” and “I” keys on the keyboard), and the post trial pause time which is set at 250 milliseconds. This is set up for both the target and attributes concepts respectively. The example below is for the target concept “Fluent Speech”.

```xml
<trial targetAleft>
/ validresponse = ("E", "I")
/ correctresponse = ("E")
/ stimulusframes = [1 = targetA]
/ posttrialpause = 250
</trial>

<trial targetAright>
/ validresponse = ("E", "I")
```

It should be noted that this part of the script has two elements for each of the target concepts because these concepts change sides for counterbalancing measures during stages 5-7 of the IAT portion while the two attribute concepts (i.e. Bad and Good) stay on their respective sides throughout the entire IAT that they are displayed.

Continuing after the trial element is the block element of the IAT script. This part essentially details what each stage of the IAT will be composed of with respect to number of trials from each concept and whether those trials will be presented in a specific sequence or randomized. For this IAT the trails are randomly presented with a set number of total stimuli presented for each concept. This section of the script also instructs which blocks will have their latencies compared (see Appendix H for full version of IAT script pertaining to block section). The rest of the IAT portion of the script has to do with the data collection and what variables will be saved and eventually put into an SPSS file along with the scoring and calculations of the blocks or expressions.

The last script for this instrument consists of the post IAT explicit questions about stuttering and attitudes (see Appendix J. Software Script: Post IAT Questions). This script consists of dropdown menus (not unlike the demographics pre IAT survey script) for Likert type questions related to preference to fluent or stuttered speakers and thermometer questions of warmth toward fluent and stuttering speakers. There is one radio button element question asking if the participants know a person who stutters followed by a checkbox element question asking participant to indicate who they know who stutters. The last two elements are textboxes
that participants can type their answer into regarding two open-ended qualitative questions. Each *element* contains the instructions of what the question is asking (*caption* attribute), the *fontstyle*, text size, along with whether the question should be mandatorily answer. The example below is for the *textbox* question “Where do you think your attitudes come from? (please be as specific as possible).”

```xml
<textbox stutteringimages>
    / caption = "Where do you think your attitudes come from? (please be as specific as possible)."
    / fontstyle = ("Arial", 16pt, true)
    / textboxsize = (50, 25)
    / required = false
</textbox>
```

Similar to the demographics survey script, these questions need to be told where to go with respect to page destination, in another element. Then the last element dictates where the data will be stored.

After all three separate scripts were written (i.e. demographics, IAT, and post IAT explicit questions), a fourth script was written to connect all three and *batch* them together to run in succession (See Appendix K. Software Script: Batching). Even though these are batched together, they still store the data for their respective portions separately. This was chosen by the researcher for the ease of reading data prior to transference to SPSS.
Appendix I
Demographics Script

<dropdown sex>
  / caption = "Sex"
  / options = ("female", "male")
</dropdown>

<textbox age>
  / caption = "Age"
  / mask = positiveinteger
  / range = (7, 110)
</textbox>

<radiobuttons race>
  / caption = "Race"
  / options = ( "American Indian/Alaska Native",
               "East Asian",
               "South Asian",
               "Native Hawaiian or other Pacific Islander",
               "Black or African American",
               "White",
               "More than one race - Black/White")
  / other = "Other"
</radiobuttons>

<dropdown education>
  / caption = "Education"
  / options = ("high school graduate", "some college",
               "associate's degree", "bachelor's degree", "some graduate school", "masters degree", "M.B.A.",
               "J.D.", "M.D.", "Ph.D.", "other advanced degree")
</dropdown>

<dropdown citizenship>
  / caption = "Country/Region of Primary Citizenship"
               "Bosnia and Herzegovina", "Botswana", "Bouvet Island", "Brazil", "British Indian Ocean Territory",
               "Brunei", "Bulgaria", "Burkina Faso", "Burundi", "Cambodia", "Cameroon",
               "Canada", "Cape Verde", "Cayman Islands", "Central African Republic", "Chad", "Chile",
               "China", "Christmas Island", "Cocos (Keeling) Islands", "Colombia", "Comoros", "Congo",
               "Congo, Democratic Republic of the", "Cook Islands", "Costa Rica", "Cote D'Ivoire (Ivory Coast)",
               "Croatia (Hrvatska)", "Cuba", "Cyprus", "Czech Republic", "Denmark", "Djibouti",..."

</dropdown>

<textbox state>
/ caption = "What state are you from?"
</textbox>

<textbox zipcode>
/ caption = "Permanent residence postal code"
</textbox>

<textbox major>
/ caption = "What is your academic major?"
</textbox>

<surveypage demographics1>
/ caption = "Please answer the following demographic questions"
/ fontstyle = ("Verdana", -16, true, false, false, false, 5, 0)
/ questions = [1=sex; 2=age; 3=race; 4=major]
</surveypage>

<surveypage demographics2>
/ caption = "Please answer the following demographic questions (continued)"
/ fontstyle = ("Verdana", -16, true, false, false, false, 5, 0)
/ questions = [1=education; 2=citizenship; 3=state; 4=zipcode]
</surveypage>

<survey demographics>
/ pages = [1=demographics1; 2=demographics2]
/ responsefontstyle = ("Verdana", -12, false, false, false, false, 5, 0)
/ itemfontstyle = ("Verdana", -13, false, false, false, false, 5, 0)
/ itemsspacing = 2%
/ showpagenumbers = false
</survey>
Appendix J

Picture IAT Script

<item attributeAlabel>
/1 = "Good"
</item>

<item attributeA>
/1 = "Marvelous"
/2 = "Superb"
/3 = "Pleasure"
/4 = "Beautiful"
/5 = "Joyful"
/6 = "Glorious"
/7 = "Lovely"
/8 = "Wonderful"
</item>

<item attributeBlabel>
/1 = "Bad"
</item>

<item attributeB>
/1 = "Tragic"
/2 = "Horrible"
/3 = "Agony"
/4 = "Painful"
/5 = "Terrible"
/6 = "Awful"
/7 = "Humiliating"
/8 = "Nasty"
</item>

<item targetAlabel>
/1 = "Fluent Speaker"
</item>

<item targetAText>
/1 = "Flowing"
/2 = "Clear"
/3 = "Smooth"
/4 = "Flow"
</item>

<item targetAPictures>
<item targetBlabel>
/1 = "Stuttering Speaker"
</item>

<item targetBPictures>
/1 = "Can-S-RG.jpg"
/2 = "Fish-S-RG.jpg"
/3 = "Foot-S-RG.jpg"
/4 = "Thanksgiving-S-RG.jpg"
</item>

<item targetBText>
/1 = "Stammer"
/2 = "Sputter"
/3 = "Stumble"
/4 = "Choppy"
</item>

<instruct>
/ nextlabel = "Continue"
/ lastlabel = "Continue"
/ nextkey = (" ")
/ prevkey = (0)
/ inputdevice = mouse
/ windowsize = (90%, 90%)
/ screencolor = (0,0,0)
/ fontstyle = ("Arial", 3%)
/ txcolor = (255, 255, 255)
</instruct>

<trial summary>
/ stimulustimes = [0=sumMARY]
/ validresponse = (" ")
/ recorddata = false
/ ontrialbegin = [values.magnitude = "little to no"]
/ ontrialbegin = [if( abs(expressions.d) > 0.15 ) values.magnitude = "a slight"]
/ ontrialbegin = [if( abs(expressions.d) > 0.35 ) values.magnitude = "a moderate"]
ontrialbegin = [if (abs(expressions.d) >= 0.65 ) values.magnitude = "a strong"]

ontrialbegin = [if (expressions.d >= 0.0) expressions.preferred = item.targetALabel.1]

ontrialbegin = [if (expressions.d < 0.0) expressions.preferred = item.targetBLabel.1]

ontrialbegin = [if (expressions.d < 0.0) expressions.notpreferred= item.targetALabel.1]

ontrialbegin = [if (expressions.d >= 0.0) expressions.notpreferred= item.targetBLabel.1]

</trial>

<text summary>
/ items = ("Your IAT score (D) was < expressions.d >, which suggests <%
values.magnitude %> automatic preference for < expressions.preferred %> compared to <%
expressions.notpreferred >.-n--n-Press the spacebar to complete this session.")
/ size = (60%, 60%)
/ hjustify = left
</text>

<counter instructions>
/ resetinterval = 20
/ select = sequence(1, 2, 3, 4, 5, 6, 7)
</counter>

<trial instructions>
/ stimulustimes = [1=instructions, spacebar]
/ correctresponse = (" ")
/ errormessage = false
/ recorddata = false
</trial>

<text instructions>
/ items = instructions
/ hjustify = left
/ size = (90%, 60%)
/ position = (50%, 85%)
/ valign = bottom
/ select = instructions
/ fontstyle = ("Arial", 3.5%)
</text>

)item instructions>
/ 1 = "Put your middle or index fingers on the E and I keys of your keyboard. Pictures
representing the categories at the top will appear one-by-one in the middle of the screen. When
the item belongs to a category on the left, press the E key; when the item belongs to a category
on the right, press the I key. Items belong to only one category. If you make an error, an X will
appear - fix the error by hitting the other key."
This is a timed sorting task. GO AS FAST AS YOU CAN while making as few mistakes as possible. Going too slow or making too many errors will result in an uninterpretable score. This task will take about 5 minutes to complete. For best results, avoid distractions and stay focused."

/ 2 = "See above, the categories have changed. The items for sorting have changed as well. The rules, however, are the same.

When the item belongs to a category on the left, press the E key; when the item belongs to a category on the right, press the I key. Items belong to only one category. An X appears after an error - fix the error by hitting the other key. GO AS FAST AS YOU CAN."

/ 3 = "See above, the four categories you saw separately now appear together. Remember, each item belongs to only one group. For example, if the categories fluent speech and good appeared on the separate sides above - pictures or words meaning fluent speech would go in the fluent speech category, not the good category.

The green and white labels and items may help to identify the appropriate category. Use the E and I keys to categorize items into four groups left and right, and correct errors by hitting the other key." 

/ 4 = "Sort the same four categories again. Remember to go as fast as you can while making as few mistakes as possible.

The green and white labels and items may help to identify the appropriate category. Use the E and I keys to categorize items into the four groups left and right, and correct errors by hitting the other key." 

/ 5 = "Notice above, there are only two categories and they have switched positions. The concept that was previously on the left is now on the right, and the concept that was on the right is now on the left. Practice this new configuration.

Use the E and I keys to categorize items left and right, and correct errors by hitting the other key." 

/ 6 = "See above, the four categories now appear together in a new configuration. Remember, each item belongs to only one group.

The green and white labels and items may help to identify the appropriate category. Use the E and I keys to categorize items into the four groups left and right, and correct errors by hitting the other key." 

/ 7 = "Sort the same four categories again. Remember to go as fast as you can while making as few mistakes as possible.

The green and white labels and items may help to identify the appropriate category. Use the E and I keys to categorize items into the four groups left and right, and correct errors by hitting the other key."
Trials

<trial attributeA>
/ validresponse = ("E", "I")
/ correctresponse = ("E")
/ stimulusframes = [1 = attributeA]
/ posttrialpause = 250
</trial>

<trial attributeB>
/ validresponse = ("E", "I")
/ correctresponse = ("I")
/ stimulusframes = [1 = attributeB]
/ posttrialpause = 250
</trial>

<trial targetBleft>
/ validresponse = ("E", "I")
/ correctresponse = ("E")
/ stimulusframes = [1 = targetB]
/ posttrialpause = 250
</trial>

<trial targetBright>
/ validresponse = ("E", "I")
/ correctresponse = ("I")
/ stimulusframes = [1 = targetB]
/ posttrialpause = 250
</trial>

<trial targetAleft>
/ validresponse = ("E", "I")
/ correctresponse = ("E")
/ stimulusframes = [1 = targetA]
/ posttrialpause = 250
</trial>

<trial targetAright>
/ validresponse = ("E", "I")
/ correctresponse = ("I")
/ stimulusframes = [1 = targetA]
/ posttrialpause = 250
</trial>

***********************************************************************
Blocks
***********************************************************************

<block attributepractice>
/ bgstim = (attributeAleft, attributeBright)
/ trials = [1=instructions;2-21 = random(attributeA, attributeB)]
/ errormessage = true(error,200)
/ responsemode = correct
</block>

<block targetcompatiblepractice>
/ bgstim = (targetAleft, targetBright)
/ trials = [1=instructions;2-21 = random(targetAleft, targetBright)]
/ errormessage = true(error,200)
/ responsemode = correct
</block>

<block targetincompatiblepractice>
/ bgstim = (targetAright, targetBleft)
/ trials = [1=instructions;2-21 = random(targetAright, targetBleft)]
/ errormessage = true(error,200)
/ responsemode = correct
</block>

<block targetcompatiblepracticeswitch>
/ bgstim = (targetAleft, targetBright)
/ trials = [1=instructions;2-41 = random(targetAleft, targetBright)]
/ errormessage = true(error,200)
/ responsemode = correct
</block>

<block targetincompatiblepracticeswitch>
/ bgstim = (targetAright, targetBleft)
/ trials = [1=instructions;2-41 = random(targetAright, targetBleft)]
/ errormessage = true(error,200)
/ responsemode = correct
</block>

<block compatibletest1>
/ bgstim = (targetAleft, orleft, attributeAleftmixed, targetBright, orright, attributeBrightmixed)
/ trials = [1=instructions;
3,5,7,9,11,13,15,17,19,21 = random(targetAleft, targetBright);
2,4,6,8,10,12,14,16,18,20 = random(attributeA, attributeB)]
/ errormessage = true(error,200)
/ responsemode = correct
/ ontrialend = [if (block.compatibletest1.latency  <= 10000 &&
block.compatibletest1.currenttrialnumber != 1 ) values.sum1a =  values.sum1a +
block.compatibletest1.latency]
/ ontrialend = [if (block.compatibletest1.latency  <= 10000 &&
block.compatibletest1.currenttrialnumber != 1 ) values.n1a =  values.n1a + 1]
/ ontrialend = [if (block.compatibletest1.latency  <= 10000 &&
block.compatibletest1.currenttrialnumber != 1 ) values.ss1a =  values.ss1a +
(block.compatibletest1.latency * block.compatibletest1.latency)]
</block>

<block compatibletest2>
/ bgstim = (targetAleft, orleft, attributeAleftmixed, targetBright, orright, attributeBrightmixed)
/ trials = [2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38,40 = random(targetAleft, targetBright);
1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39 = random(attributeA, attributeB)]
/ errormessage = true(error,200)
/ responsemode = correct
/ ontrialend = [if (block.compatibletest2.latency  <= 10000) values.sum1b =  values.sum1b +
block.compatibletest2.latency]
/ ontrialend = [if (block.compatibletest2.latency  <= 10000) values.n1b =  values.n1b + 1]
/ ontrialend = [if (block.compatibletest2.latency  <= 10000) values.ss1b =  values.ss1b +
(block.compatibletest2.latency * block.compatibletest2.latency)]
<block incompatibletest1>
/ bgstim = (targetBleft, orleft, attributeAleftmixed, targetAright, orright, attributeBrightmixed)
/ trials = [ 1=instructions;
3,5,7,9,11,13,15,17,19,21 = random(targetBleft, targetAright);
2,4,6,8,10,12,14,16,18,20 = random(attributeA, attributeB)]
/ errormessage = true(error,200)
/ responsemode = correct
/ ontrialend = [if (block.incompatibletest1.latency <= 10000 &&
block.incompatibletest1.currenttrialnumber != 1) values.sum2a = values.sum2a +
block.incompatibletest1.latency]
/ ontrialend = [if (block.incompatibletest1.latency <= 10000 &&
block.incompatibletest1.currenttrialnumber != 1) values.n2a = values.n2a + 1]
/ ontrialend = [if (block.incompatibletest1.latency <= 10000 &&
block.incompatibletest1.currenttrialnumber != 1) values.ss2a = values.ss2a +
(block.incompatibletest1.latency * block.incompatibletest1.latency)]
</block>

<block incompatibletest2>
/ bgstim = (targetBleft, orleft, attributeAleftmixed, targetAright, orright, attributeBrightmixed)
/ trials = [
2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38,40 = random(targetBleft, targetAright);
1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39 = random(attributeA, attributeB)]
/ errormessage = true(error,200)
/ responsemode = correct
/ ontrialend = [if (block.incompatibletest2.latency <= 10000) values.sum2b = values.sum2b +
block.incompatibletest2.latency]
/ ontrialend = [if (block.incompatibletest2.latency <= 10000) values.n2b = values.n2b + 1]
/ ontrialend = [if (block.incompatibletest2.latency <= 10000) values.ss2b = values.ss2b +
(block.incompatibletest2.latency * block.incompatibletest2.latency)]
</block>

<block compatibletestinstructions>
/ bgstim = (targetAleft, orleft, attributeAleftmixed, targetBright, orright, attributeBrightmixed)
/ trials = [1=instructions]
/ recorddata = false
</block>

<block incompatibletestinstructions>
/ bgstim = (targetBleft, orleft, attributeAleftmixed, targetAright, orright, attributeBrightmixed)
/ trials = [1=instructions]
/ recorddata = false
</block>
<block summary>
/ trials = [1=summary]
/ recorddata = false
</block>

***********************************************************************
Experiment
***********************************************************************

<defaults>
/ fontstyle = ("Arial", 3.5%)
/ screencolor = (0,0,0)
/ txbgcolor = (0,0,0)
/ txcolor = (255, 255, 255)
/ minimumversion = "$3.0.0.0"
</defaults>

<expt>
/ blocks = [1=block1; 2=attributepractice; 3=block3; 4=block4; 5=block5; 6=block6; 7=block7; 8=block8; 9=block9; 10=summary]
</expt>

<variables>
/ group = (1 of 2) (block1=targetcompatiblepractice; block3=compatibletest1; block4=compatibletestinstructions; block5=compatibletest2; block6=targetincompatiblepractice; block7=incompatibletest1; block8=incompatibletestinstructions; block9=incompatibletest2)
/ group = (2 of 2) (block1=targetincompatiblepractice; block3=incompatibletest1; block4=incompatibletestinstructions; block5=incompatibletest2; block6=targetcompatiblepractice; block7=compatibletest1; block8=compatibletestinstructions; block9=compatibletest2)
</variables>

***********************************************************************
Data Columns
***********************************************************************

<data pictureIATSF>
/ columns = [date, time, subject, latency, blockcode, blocknum, trialcode, trialnum, response, correct, stimulusnumber, stimulusitem, expressions.da, expressions.db, expressions.d ]
</data>

***********************************************************************
Test Monkey
***********************************************************************

<monkey>
/ latencydistribution = normal(500, 100)
/ percentcorrect = 90
</monkey>

***********************************************************************
Scoring
***********************************************************************

<values>
/ sum1a = 0
/ sum2a = 0
/ sum1b = 0
/ sum2b = 0
/ n1a = 0
/ n2a = 0
/ n1b = 0
/ n2b = 0
/ ss1a = 0
/ ss2a = 0
/ ss1b = 0
/ ss2b = 0
/ magnitude = "unknown"
</values>

* 1 is compatible, 2 is incompatible
* a is first block, b is second block

<expressions>
/ m1a = values.sum1a / values.n1a
/ m2a = values.sum2a / values.n2a
/ m1b = values.sum1b / values.n1b
/ m2b = values.sum2b / values.n2b
/ sd1a = sqrt((values.ss1a - (values.n1a * (expressions.m1a * expressions.m1a))) / (values.n1a - 1))
/ sd2a = sqrt((values.ss2a - (values.n2a * (expressions.m2a * expressions.m2a))) / (values.n2a - 1))
/ sd1b = sqrt((values.ss1b - (values.n1b * (expressions.m1b * expressions.m1b))) / (values.n1b - 1))
/ sd2b = sqrt((values.ss2b - (values.n2b * (expressions.m2b * expressions.m2b))) / (values.n2b - 1))
/ sda = sqrt(((values.n1a - 1) * (expressions.sd1a * expressions.sd1a) + (values.n2a - 1) * (expressions.sd2a * expressions.sd2a)) + ((values.n1a + values.n2a) * ((expressions.m1a - expressions.m2a) * (expressions.m1a - expressions.m2a)) / 4)) / (values.n1a + values.n2a - 1)
/ sdb = sqrt(((values.n1b - 1) * (expressions.sd1b * expressions.sd1b) + (values.n2b - 1) * (expressions.sd2b * expressions.sd2b)) + ((values.n1b + values.n2b) * ((expressions.m1b - expressions.m2b) * (expressions.m1b - expressions.m2b)) / 4)) / (values.n1b + values.n2b - 1)
)
/ da = (m2a - m1a) / expressions.sda
/ db = (m2b - m1b) / expressions.sdb
/ d = (expressions.da + expressions.db) / 2
/ preferred = "unknown"
/ notpreferred = "unknown"
</expressions>
Appendix K

Word IAT Script

<item attributeAlabel>
/1 = "Good"
</item>

<item attributeA>
/1 = "Marvelous"
/2 = "Superb"
/3 = "Pleasure"
/4 = "Beautiful"
/5 = "Joyful"
/6 = "Glorious"
/7 = "Lovely"
/8 = "Wonderful"
</item>

<item attributeBlabel>
/1 = "Bad"
</item>

<item attributeB>
/1 = "Tragic"
/2 = "Horrible"
/3 = "Agony"
/4 = "Painful"
/5 = "Terrible"
/6 = "Awful"
/7 = "Humiliate"
/8 = "Nasty"
</item>

<item targetAlabel>
/1 = "Fluent Speaker"
</item>

<item targetAText>
/1 = "Flowing"
/2 = "Clear"
/3 = "Smooth"
/4 = "Flow"
</item>
<item targetAPictures>
/1 = "Can-F-ER.jpg"
/2 = "Kissing-F-ER.jpg"
/3 = "Police-F-ER.jpg"
/4 = "Tea-F-ER.jpg"
</item>

<item targetBlabel>
/1 = "Stuttering Speaker"
</item>

<item targetBPictures>
/1 = "Can-S-RG.jpg"
/2 = "Fish-S-RG.jpg"
/3 = "Foot-S-RG.jpg"
/4 = "Thanksgiving-S-RG.jpg"
</item>

<item targetBText>
/1 = "Stammer"
/2 = "Sputter"
/3 = "Stumble"
/4 = "Choppy"
</item>

</instruct>

<trial summary>
/stimulustimes = [0=summary]
/validresponse = (" ")
/recorddata = false
/ontrialbegin = [values.magnitude = "little to no"]
/ontrialbegin = [if( abs(expressions.d) > 0.15 ) values.magnitude = "a slight"]
/ ontrialbegin = [if( abs(expressions.d) > 0.35 ) values.magnitude = "a moderate"]
/ ontrialbegin = [if( abs(expressions.d) >= 0.65 ) values.magnitude = "a strong"]
/ ontrialbegin = [if (expressions.d >= 0.0) expressions.preferred = item.targetALabel.1]
/ ontrialbegin = [if (expressions.d < 0.0) expressions.preferred = item.targetBLabel.1]
/ ontrialbegin = [if (expressions.d < 0.0) expressions.notpreferred= item.targetALabel.1]
/ ontrialbegin = [if (expressions.d >= 0.0) expressions.notpreferred= item.targetBLabel.1]
</trial>

/text summary>
/ items = ("Your IAT score (D) was <% expressions.d %>, which suggests <%
values.magnitude %> automatic preference for <% expressions.preferred %>
compared to <% expressions.notpreferred %>.~n~n~nPress the spacebar to complete this session.")
/ size = (60%, 60%)
/ hjustify = left
</text>

/counter instructions>
/ resetinterval = 20
/ select = sequence(1, 2, 3, 4, 5, 6, 7)
</counter>

/trial instructions>
/ stimulustimes = [1=instructions, spacebar]
/ correctresponse = (" ")
/ errormessage = false
/ recorddata = false
</trial>

/text instructions>
/ items = instructions
/ hjustify = left
/ size = (90%, 60%)
/ position = (50%, 85%)
/ valign = bottom
/ select = instructions
/ fontstyle = ("Arial", 3.5%)
</text>

/item instructions>
/ 1 = "Put your middle or index fingers on the E and I keys of your keyboard. Words
representing the categories at the top will appear one-by-one in the middle of the screen. When
the item belongs to a category on the left, press the E key; when the item belongs to a category
on the right, press the I key. Items belong to only one category. If you make an error, an X will
appear - fix the error by hitting the other key."
This is a timed sorting task. GO AS FAST AS YOU CAN while making as few mistakes as possible. Going too slow or making too many errors will result in an uninterpretable score. This task will take about 5 minutes to complete. For best results, avoid distractions and stay focused."

/2 = "See above, the categories have changed. The items for sorting have changed as well. The rules, however, are the same.

When the item belongs to a category on the left, press the E key; when the item belongs to a category on the right, press the I key. Items belong to only one category. An X appears after an error - fix the error by hitting the other key. GO AS FAST AS YOU CAN."

/3 = "See above, the four categories you saw separately now appear together. Remember, each item belongs to only one group. For example, if the categories fluent speech and good appeared on the separate sides above - pictures or words meaning fluent speech would go in the fluent speech category, not the good category.

The green and white labels and items may help to identify the appropriate category. Use the E and I keys to categorize items into four groups left and right, and correct errors by hitting the other key."

/4 = "Sort the same four categories again. Remember to go as fast as you can while making as few mistakes as possible.

The green and white labels and items may help to identify the appropriate category. Use the E and I keys to categorize items into the four groups left and right, and correct errors by hitting the other key."

/5 = "Notice above, there are only two categories and they have switched positions. The concept that was previously on the left is now on the right, and the concept that was on the right is now on the left. Practice this new configuration.

Use the E and I keys to categorize items left and right, and correct errors by hitting the other key."

/6 = "See above, the four categories now appear together in a new configuration. Remember, each item belongs to only one group.

The green and white labels and items may help to identify the appropriate category. Use the E and I keys to categorize items into the four groups left and right, and correct errors by hitting the other key."

/7 = "Sort the same four categories again. Remember to go as fast as you can while making as few mistakes as possible.

The green and white labels and items may help to identify the appropriate category. Use the E and I keys to categorize items into the four groups left and right, and correct errors by hitting the other key."
Press the SPACE BAR to begin.
Trials

<trial attributeA>
    <validresponse>("E", "I")</validresponse>
    <correctresponse>("E")</correctresponse>
    <stimulusframes>[1 = attributeA]</stimulusframes>
    <posttrialpause>250</posttrialpause>
</trial>

<trial attributeB>
    <validresponse>("E", "I")</validresponse>
    <correctresponse>("I")</correctresponse>
    <stimulusframes>[1 = attributeB]</stimulusframes>
    <posttrialpause>250</posttrialpause>
</trial>

<trial targetBleft>
    <validresponse>("E", "I")</validresponse>
</trial>
**Blocks**

```xml
<block attributepractice>
  / bgstim = (attributeAleft, attributeBright)
  / trials = [1=instructions;2-21 = random(attributeA, attributeB)]
  / errormessage = true(error,200)
  / responsemode = correct
</block>

<block targetcompatiblepractice>
  / bgstim = (targetAleft, targetBright)
  / trials = [1=instructions;2-21 = random(targetAleft, targetBright)]
  / errormessage = true(error,200)
  / responsemode = correct
</block>

<block targetincompatiblepractice>
  / bgstim = (targetAright, targetBleft)
```
trials = [1=instructions; 2-21 = random(targetAright, targetBleft)]
errormessage = true(error, 200)
responsemode = correct
</block>

<block targetcompatiblepracticeswitch>
bgstim = (targetAleft, targetBright)
trials = [1=instructions; 2-41 = random(targetAleft, targetBright)]
errormessage = true(error, 200)
responsemode = correct
</block>

<block targetincompatiblepracticeswitch>
bgstim = (targetAright, targetBleft)
trials = [1=instructions; 2-41 = random(targetAright, targetBleft)]
errormessage = true(error, 200)
responsemode = correct
</block>

<block compatibletest1>
bgstim = (targetAleft, orleft, attributeAleftmixed, targetBright, orright, attributeBrightmixed)
trials = [1=instructions;
3,5,7,9,11,13,15,17,19,21 = random(targetAleft, targetBright);
2,4,6,8,10,12,14,16,18,20 = random(attributeA, attributeB)]
errormessage = true(error, 200)
responsemode = correct
ontrialend = [if (block.compatibletest1.latency  <= 10000 &&
block.compatibletest1.currenttrialnumber != 1 ) values.sum1a = values.sum1a +
block.compatibletest1.latency]
ontrialend = [if (block.compatibletest1.latency  <= 10000 &&
block.compatibletest1.currenttrialnumber != 1 ) values.n1a = values.n1a + 1]
ontrialend = [if (block.compatibletest1.latency  <= 10000 &&
block.compatibletest1.currenttrialnumber != 1 ) values.ss1a = values.ss1a +
(block.compatibletest1.latency * block.compatibletest1.latency)]
</block>

<block compatibletest2>
bgstim = (targetAleft, orleft, attributeAleftmixed, targetBright, orright, attributeBrightmixed)
trials = [2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38,40 = random(targetAleft, targetBright);
1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39 = random(attributeA, attributeB)]
errormessage = true(error, 200)
responsemode = correct
ontrialend = [if (block.compatibletest2.latency  <= 10000) values.sum1b = values.sum1b +
block.compatibletest2.latency]
ontrialend = [if (block.compatibletest2.latency  <= 10000) values.n1b = values.n1b + 1]
/ ontrialend = [if (block.compatibletest2.latency <= 10000) values.ss1b = values.ss1b +
(block.compatibletest2.latency * block.compatibletest2.latency)]
</block>

<block incompatibletest1>
/ bgstim = (targetBleft, orleft, attributeAleftmixed, targetAright, orright, attributeBrightmixed)
/ trials = [1=instructions;
3,5,7,9,11,13,15,17,19,21 = random(targetBleft, targetAright);
2,4,6,8,10,12,14,16,18,20 = random(attributeA, attributeB)]
/ errormessage = true(error,200)
/ responsemode = correct
/ ontrialend = [if (block.incompatibletest1.latency <= 10000 &&
block.incompatibletest1.currenttrialnumber != 1) values.sum2a = values.sum2a +
(block.incompatibletest1.latency)]
/ ontrialend = [if (block.incompatibletest1.latency <= 10000 &&
block.incompatibletest1.currenttrialnumber != 1 ) values.n2a = values.n2a + 1]
/ ontrialend = [if (block.incompatibletest1.latency <= 10000 &&
block.incompatibletest1.currenttrialnumber != 1 ) values.ss2a = values.ss2a +
(block.incompatibletest1.latency * block.incompatibletest1.latency)]
</block>

<block incompatibletest2>
/ bgstim = (targetBleft, orleft, attributeAleftmixed, targetAright, orright, attributeBrightmixed)
/ trials = [
2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38,40 = random(targetBleft, targetAright);
1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39 = random(attributeA, attributeB)]
/ errormessage = true(error,200)
/ responsemode = correct
/ ontrialend = [if (block.incompatibletest2.latency <= 10000) values.sum2b = values.sum2b +
block.incompatibletest2.latency]
/ ontrialend = [if (block.incompatibletest2.latency <= 10000) values.n2b = values.n2b + 1]
/ ontrialend = [if (block.incompatibletest2.latency <= 10000) values.ss2b = values.ss2b +
(block.incompatibletest2.latency * block.incompatibletest2.latency)]
</block>

<block compatibletestinstructions>
/ bgstim = (targetAleft, orleft, attributeAleftmixed, targetBright, orright, attributeBrightmixed)
/ trials = [1=instructions]
/ recorddata = false
</block>

<block incompatibletestinstructions>
/ bgstim = (targetBleft, orleft, attributeAleftmixed, targetAright, orright, attributeBrightmixed)
/ trials = [1=instructions]
/ recorddata = false
Experiment

<Data Columns>

<Data pictureIATSF>

Test Monkey
<monkey>
/ latencydistribution = normal(500, 100)
/ percentcorrect = 90
</monkey>

Scoring

<values>
/ sum1a = 0
/ sum2a = 0
/ sum1b = 0
/ sum2b = 0
/ n1a = 0
/ n2a = 0
/ n1b = 0
/ n2b = 0
/ ss1a = 0
/ ss2a = 0
/ ss1b = 0
/ ss2b = 0
/ magnitude = "unknown"
</values>

* 1 is compatible, 2 is incompatible
* a is first block, b is second block

<expressions>
/ m1a = values.sum1a / values.n1a
/ m2a = values.sum2a / values.n2a
/ m1b = values.sum1b / values.n1b
/ m2b = values.sum2b / values.n2b
/ sd1a = sqrt((values.ss1a - (values.n1a * (expressions.m1a * expressions.m1a))) / (values.n1a - 1))
/ sd2a = sqrt((values.ss2a - (values.n2a * (expressions.m2a * expressions.m2a))) / (values.n2a - 1))
/ sd1b = sqrt((values.ss1b - (values.n1b * (expressions.m1b * expressions.m1b))) / (values.n1b - 1))
/ sd2b = sqrt((values.ss2b - (values.n2b * (expressions.m2b * expressions.m2b))) / (values.n2b - 1))
/ sda = sqrt(((values.n1a - 1) * (expressions.sd1a * expressions.sd1a) + (values.n2a - 1) * (expressions.sd2a * expressions.sd2a)) + ((values.n1a + values.n2a) * ((expressions.m1a - expressions.m2a) * (expressions.m1a - expressions.m2a)) / 4) / (values.n1a + values.n2a - 1))
/ sdb = sqrt(((values.n1b - 1) * (expressions.sd1b * expressions.sd1b) + (values.n2b - 1) * (expressions.sd2b * expressions.sd2b)) + ((values.n1b + values.n2b) * ((expressions.m1b - expressions.m2b) * (expressions.m1b - expressions.m2b)) / 4) / (values.n1b + values.n2b - 1))
expressions.m2b) * (expressions.m1b - expressions.m2b)) / 4) ) / (values.n1b + values.n2b - 1)
)
/ da = (m2a - m1a) / expressions.sda
/ db = (m2b - m1b) / expressions.sdb
/ d = (expressions.da + expressions.db) / 2
/ preferred = "unknown"
/ notpreferred = "unknown"
</expressions>
Appendix L
Post Survey Script

<dropdown preferenceto>
/caption = "Which statement best describes you?"
/options = ("I strongly prefer fluent speakers to stuttering speakers.", "I moderately prefer fluent speakers to stuttering speakers.", "I slightly prefer fluent speakers to stuttering speakers.", "I like fluent speakers and stuttering speakers equally.", "I slightly prefer stuttering speakers to fluent speakers.", "I moderately prefer stuttering speakers to fluent speakers.", "I strongly prefer stuttering speakers to fluent speakers.")
/fontstyle = ("Arial", 16pt, true)
</dropdown>

<dropdown warmthstutter>
/caption = "How warm or cold do you feel toward fluent speakers?"
/options = ("0=Very Cold", "1", "2", "3", "4", "5=Neutral", "6", "7", "8", "9", "10=Very Warm")
/optionvalues = ("0", "1", "2", "3", "4", "5", "6", "7", "8", "9", "10")
/fontstyle = ("Arial", 16pt, true)
</dropdown>

<dropdown warmthfluent>
/caption = "How warm or cold do you feel toward stuttering speakers?"
/options = ("0=Very Cold", "1", "2", "3", "4", "5=Neutral", "6", "7", "8", "9", "10=Very Warm")
/optionvalues = ("0", "1", "2", "3", "4", "5", "6", "7", "8", "9", "10")
/fontstyle = ("Arial", 16pt, true)
</dropdown>

<radiobuttons doyouknow>
/caption = "Do you know someone who stutters?"
/options = ("Yes", "No")
/fontstyle = ("Arial", 16pt, true)
</radiobutton>

<checkboxes ifyeswho>
/caption = "If you know someone who stutters, what relation are they to you?"
/options = ("Friend", "Father", "Mother", "Sibling", "Classmate", "Coworker", "Other", "Myself", "I don't know someone who stutters")
/fontstyle = ("Arial", 16pt, true)
</checkboxes>

<textbox stutteringimages>
Where do you think attitudes (in general) come from? Please be as specific as possible.

What do you think influenced the development of your perceptions toward fluent and stuttered speech? Again please be as specific as possible.

Thank you for participating in this research study. Your honest participation will hopefully benefit the field of speech pathology and the community of people who stutter with respect to attitudes, perceptions, and stereotypes. Have a great day!

If you need credit for participating in this study for a psychology class, please let the researcher know.

Thanks again!
Appendix M

Batched Script

<batch>
/ file = "demographics survey.exp"
/ file = "SF PICTURE IAT 10-20-09.exp"
/ file = "SF WORD IAT 10-20-09.exp"
/ file = "postsurvey.exp"
</batch>
Appendix N

Agent Script for Field Study

Agent Script (for classroom recruitment)

Field Study for the Implicit Association Test (IAT)

for Stuttered versus Fluent Speech

HI! A study is being conducted by Scott Palasik from the department of Communication Sciences and Disorders. Its purpose is to examine implicit attitudes verse explicit attitudes about stuttering and fluent speakers. Participating in the study is voluntary, if you choose to participate you will be entered into a drawing to win a IPOD 2GB 4th Generation Shuffle. It will not cost you anything to participate and there are no known risks. The entire survey should take no more than fifteen minutes.

If interested please contact Scott Palasik at the following email: scotttp@bgsu.edu.

The survey will take place in room 186 in the Health Center Building (scheduled for a time that is convenient for you). You will read an informed consent form (very similar to this one) and if you choose to participate, you will sign the form and the survey will begin. The survey is a computer based instrument. First, you will read a short description of the study and then fill out a few demographics questions. After completing the demographics questionnaire, one or two seven stage reaction time tasks using the computer keyboard (you will read a set of instruction before each stage, which should take no more than a minute or two per stage). Lastly you will complete a few questions about stuttered and fluent speakers. The entire survey should take no more than 15 minutes.

Thank you very much for your help. This research could help us understand perceptions about stuttered and fluent speakers.
Appendix O

Informed Consent form for Field Study

Field Study for the Implicit Association Test (IAT)

for Stuttered versus Fluent Speakers

INFORMED CONSENT

Introduction: You are being invited to participate in a study pertaining to perceptions of stuttering and fluent speakers. This study will be conducted by Scott Palasik in the Department of Communication Sciences and Disorders at Bowling Green State University. You are not eligible to participate if you are under 18 years of age.

Procedures: The survey will take place in room 186 in the Health Center Building (scheduled for a time that is convenient for you). You will read an informed consent form (very similar to this one) and if you choose to participate, you will sign the form and the survey will begin. The survey is a computer based instrument. First, you will read a short description of the study and then fill out a few demographics questions. After completing the demographics questionnaire, you will perform one or two seven stage reaction time task using the computer keyboard (you will read a set of instruction before each stage, which should take no more than a minute or two per stage). Lastly you will complete a few questions about stuttered and fluent speakers. The entire survey should take no more than 15 minutes. Participants will be entered into a chance to win an IPOD shuffle.

Risks and Benefits: There are no known risks

Payment / Costs: Participation in this study is voluntary, participants can choose to enter their names into a drawing to win an IPOD Shuffle 2GB 4th Generation. If you are completing this survey through Experimetrix you will be given a copy of the consent form for proof of your participation. There will be no financial cost for participating.

Confidentiality: All records related to this research will be maintained in a locked office and will be available only to those assisting with the project.

Questions: If you have any more questions you can contact Scott Palasik MS-CCC-SLP, 419-372- (scotttp@bgsu.edu) or his Advisor Rod Gabel, 242 Health Center, 419-372-7168 (rgabel@bgsu.edu). If you have questions about the conduct of this study or your rights as a research participant, you may contact the Chair of Bowling Green State University's Human Subjects Review Board at (419) 372-7716 (hsrc@bgsu.edu).

Consent: I have been told what will be done in this study. I have also been told how it would be done, what I will have to do, and how long participation will likely take. I am aware that participation in this study is voluntary. I may quit and/or refuse participation at any time
without repercussions. If I am a student, the decision to participate or not participate will have no impact on grades, class standing, or relationship to the institution in any way. If I am receiving speech-language-hearing services at BGSU, my decision to participate or not participate will have no effect on my relationship with the institution / clinic or the treatment I receive. This is my copy of this form to keep for my records.

Participant Signature: _________________________________  Date: __________________
Appendix P

Demographics Screen Shots

Please answer the following demographic questions

1. Sex
   
2. Age
   
3. Race
   - American Indian/Alaska Native
   - East Asian
   - South Asian
   - Native Hawaiian or other Pacific Islander
   - Black or African American
   - White
   - More than one race - Black/White
   - Other

4. What is your academic major?
Please answer the following demographic questions (continued)

5). Education

6). Country/Region of Primary Citizenship

7). What state are you from?

8). Permanent residence postal code
Appendix Q

Picture IAT Screen Shots

Put your middle or index fingers on the E and I keys of your keyboard. Pictures representing the categories at the top will appear one-by-one in the middle of the screen. When the item belongs to a category on the left, press the E key; when the item belongs to a category on the right, press the I key. Items belong to only one category. If you make an error, an X will appear - fix the error by hitting the other key.

This is a timed sorting task. GO AS FAST AS YOU CAN while making as few mistakes as possible. Going too slow or making too many errors will result in an uninterpretable score. This task will take about 5 minutes to complete. For best results, avoid distractions and stay focused.

Press the SPACE BAR to begin.
See above, the categories have changed. The items for sorting have changed as well. The rules, however, are the same.

When the item belongs to a category on the left, press the E key; when the item belongs to a category on the right, press the I key. Items belong to only one category. An X appears after an error - fix the error by hitting the other key. GO AS FAST AS YOU CAN.

Press the SPACE BAR to begin.
Stuttering Speaker
or
Good

Fluent Speaker
or
Bad

See above, the four categories you saw separately now appear together. Remember, each item belongs to only one group. For example, if the categories fluent speech and good appeared on the separate sides above - pictures or words meaning fluent speech would go in the fluent speech category, not the good category.

The green and white labels and items may help to identify the appropriate category. Use the E and I keys to categorize items into four groups left and right, and correct errors by hitting the other key.

Press the SPACE BAR to begin.
Stuttering Speaker or Good
Fluent Speaker or Bad

Tragic
Stuttering Speaker
or
Good

Fluent Speaker
or
Bad

Pleasure
Stuttering Speaker
or
Good
Sort the same four categories again. Remember to go as fast as you can while making as few mistakes as possible.

The green and white labels and items may help to identify the appropriate category. Use the E and I keys to categorize items into the four groups left and right, and correct errors by hitting the other key.

Press the SPACE BAR to begin.

Stuttering Speaker
or
Good
Fluent Speaker
or
Bad

Agony
Stuttering Speaker  Fluent Speaker
or or
Good Bad

Notice above, there are only two categories and they have switched positions. The concept that was previously on the left is now on the right, and the concept that was on the right is now on the left. Practice this new configuration.

Use the E and I keys to categorize items left and right, and correct errors by hitting the other key.

Press the SPACE BAR to begin.
Fluent Speaker or Good
Stuttering Speaker or Bad

See above, the four categories now appear together in a new configuration. Remember, each item belongs to only one group.

The green and white labels and items may help to identify the appropriate category. Use the E and I keys to categorize items into the four groups left and right, and correct errors by hitting the other key.

Press the SPACE BAR to begin.
Fluent Speaker
or
Good

Stuttering Speaker
or
Bad

Sort the same four categories again. Remember to go as fast as you can while making as few mistakes as possible.

The green and white labels and items may help to identify the appropriate category. Use the E and I keys to categorize items into the four groups left and right, and correct errors by hitting the other key.

Press the SPACE BAR to begin.
Fluent Speaker     Stuttering Speaker
or                 or
Good               Bad

Glorious
Your IAT score (D) was 0.10, which suggests little to no automatic preference for Fluent Speaker compared to Stuttering Speaker.

Press the spacebar to complete this session.
Appendix R

Word IAT Screen Shots

Put your middle or index fingers on the E and I keys of your keyboard. Words representing the categories at the top will appear one-by-one in the middle of the screen. When the item belongs to a category on the left, press the E key; when the item belongs to a category on the right, press the I key. Items belong to only one category. If you make an error, an X will appear - fix the error by hitting the other key.

This is a timed sorting task. GO AS FAST AS YOU CAN while making as few mistakes as possible. Going too slow or making too many errors will result in an uninterpretable score. This task will take about 5 minutes to complete. For best results, avoid distractions and stay focused.

Press the SPACE BAR to begin.
Stuttering Speaker

Fluent Speaker

Smooth

Good

Bad

See above, the categories have changed. The items for sorting have changed as well. The rules, however, are the same.

When the item belongs to a category on the left, press the E key; when the item belongs to a category on the right, press the I key. Items belong to only one category. An X appears after an error - fix the error by hitting the other key. GO AS FAST AS YOU CAN.

Press the SPACE BAR to begin.
Stuttering Speaker
or
Good
Fluent Speaker
or
Bad

See above, the four categories you saw separately now appear together. Remember, each item belongs to only one group. For example, if the categories fluent speech and good appeared on the separate sides above - pictures or words meaning fluent speech would go in the fluent speech category, not the good category.

The green and white labels and items may help to identify the appropriate category. Use the E and I keys to categorize items into four groups left and right, and correct errors by hitting the other key.

Press the SPACE BAR to begin.
Stuttering Speaker or Good

Stumble

Fluent Speaker or Bad

Stuttering Speaker or Good

Horrible
Stuttering Speaker  or  Good
Fluent Speaker  or  Bad

Smooth

Stuttering Speaker  or  Good
Fluent Speaker  or  Bad

Sort the same four categories again. Remember to go as fast as you can while making as few mistakes as possible.

The green and white labels and items may help to identify the appropriate category. Use the E and I keys to categorize items into the four groups left and right, and correct errors by hitting the other key.

Press the SPACE BAR to begin.
Stuttering Speaker or Good

Tragic

Stuttering Speaker or Good

Stumble

Fluent Speaker or Bad

Bad
Stuttering Speaker
or
Good

Fluent Speaker
or
Bad

Pleasure

Flow
Fluent Speaker  

Stuttering Speaker

Notice above, there are only two categories and they have switched positions. The concept that was previously on the left is now on the right, and the concept that was on the right is now on the left. Practice this new configuration.

Use the E and I keys to categorize items left and right, and correct errors by hitting the other key.

Press the SPACE BAR to begin.

Fluent Speaker  

Stuttering Speaker

Smooth
Fluent Speaker          Stuttering Speaker

Stammer

Fluent Speaker          Stuttering Speaker
or                      or
Good                    Bad

See above, the four categories now appear together in a new configuration. Remember, each item belongs to only one group.

The green and white labels and items may help to identify the appropriate category. Use the E and I keys to categorize items into the four groups left and right, and correct errors by hitting the other key.

Press the SPACE BAR to begin.
Fluent Speaker or Good

Stuttering Speaker or Bad

Sort the same four categories again. Remember to go as fast as you can while making as few mistakes as possible.

The green and white labels and items may help to identify the appropriate category. Use the E and I keys to categorize items into the four groups left and right, and correct errors by hitting the other key.

Press the SPACE BAR to begin.

Fluent Speaker or Good

Stuttering Speaker or Bad

Glorious
<table>
<thead>
<tr>
<th>Fluent Speaker</th>
<th>Stuttering Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>or</td>
<td>or</td>
</tr>
<tr>
<td>Good</td>
<td>Bad</td>
</tr>
</tbody>
</table>

**Clear**

<table>
<thead>
<tr>
<th>Fluent Speaker</th>
<th>Stuttering Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>or</td>
<td>or</td>
</tr>
<tr>
<td>Good</td>
<td>Bad</td>
</tr>
</tbody>
</table>

**Awful**
Stammer

Your IAT score (D) was -0.30, which suggests a slight automatic preference for Stuttering Speaker compared to Fluent Speaker.

Press the spacebar to complete this session.
Appendix S

Post Survey Screen Shots

1). Which statement best describes you?

2). Do you know someone who stutters?
   - Yes
   - No

3). If you know someone who stutters, what relation are they to you?
   - Friend
   - Father
   - Mother
   - Sibling
   - Classmate
   - Coworker
   - Other
   - Myself
   - I don’t know someone who stutters

4). How warm or cold do you feel toward fluent speakers?

5). How warm or cold do you feel toward stuttering speakers?
6). Where do you think attitudes (in general) come from? Please be as specific as possible.

7). What do you think influenced the development of your perceptions toward fluent and stuttered speech? Again please be as specific as possible.

Thank you for participating in this research study.

Your honest participation will hopefully benefit the field of speech pathology and the community of people who stutter with respect to attitudes, perspectives, and stereotypes. Have a great day!

If you need credit for participating in this study for a psychology class, please let the researcher know.

Thanks again!