Abstract

CULTURAL INFLUENCE ON LISTENER RESPONSES TO STUTTERING

by

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Stuttering is a developmental, involuntary, and intermittent fluency disorder. During moments of stuttering, people who stutter demonstrate sudden onsets and offsets of the aberrant struggling behaviors, with primary behaviors affecting mainly speech organs and secondary, ancillary behaviors affecting more distal body parts. Listeners generally respond to stuttering behaviors with negative emotional arousal that is manifested at behavioral, physiological, and emotional levels, and tend to attribute negative, stereotypical personality traits to people who stutter. These listener responses can be an important factor in the development and maintenance of stuttering. Therefore, the nature and properties of listener responses, e.g., the role of culture in shaping listener responses to stuttering, merit further examination.

Culture refers to the characteristics of various groups of people relative to their material traits, social norms, beliefs, attitudes, and values. The value system is believed by many researchers to be the core of most cultural variations. Along with individual biological disposition, culture regulates how people perceive, explain, and respond to various phenomena. Numerous studies have converged to indicate significant contrasts between Easterners and Westerners in cognitions, emotions, and behaviors. In the

United States, European-American and African-Americans also show differences in their value systems and many other aspects.

     The purpose of this dissertation was to investigate listener responses to stuttering in ethno-racially different groups. Specifically, the investigation focused on listeners' eye gaze responses and physiological responses when witnessing stuttering, and their perceptions toward people who stutter before and after observing stuttering. Participants were recruited from three groups: African-Americans, Chinese, and European-Americans. Results indicated that generally, listeners responded to stuttering in a similar manner at physiological, behavioral, and attitudinal levels. That is, listeners showed increased skin conductance and decreased heart rate in response to stuttering rather than fluent speech; listeners focused more on the speaker's mouth, and reduced their gaze fixation duration on the eyes, when the speaker stuttered. Furthermore, listeners had generally negative perceptions toward people who stutter, and these perceptions did not change significantly with exposure to stuttering. Cultural differences were found mainly between Chinese and American listeners in gaze behaviors and perceptions. Chinese tended to explore the background information while Americans tended to focus on the speaker's eyes and mouth, and Chinese participants considered the people who stutter duller than the normally fluent speaker while Americans did not show such a perception. The interaction of culture by fluency indicated that, when Americans focused more of their gaze on the speaker's mouth when the speaker stuttered, Chinese participants reduced their gaze on the mouth; also, whereas African-Americans considered the stuttering speaker to be more self-derogatory demeanor after observing the stuttering speech, Chinese participants judged the speaker as carrying

the same degree of self-derogatory compared to normally fluent speakers, and European-Americans considered the personality trait weakened after witnessing stuttering.

These results indicated that generally, stuttering is able to evoke negative emotional arousal in listeners, regardless of the listener's cultural background. These negative arousals can be manifested at behavioral, physiological, and attitudinal levels. Culture plays a role in regulating some aspects of these negative responses, suggesting that people who stutter in Chinese or African-American societies may undergo more severe social penalties for their stuttering, compared to those in European-American culture. Results from this study have implications in the treatment of people who stutter, and provide quantitative data for stuttering help groups to develop culture-specific strategies to raise social awareness of stuttering.

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LIST OF SYMBOLS AND ABBREVIATIONS

AFD	Average fixation time on the ROI
ANOVA	Analysis of variance
ASD	Autism spectrum disorders
BLOD	Blood-oxygen-level dependent
CATS	Clinicians' Attitudes Toward Stuttering
CN	Cranial nerve
CNS	Central nervous system
CWS	Child who stutters; Children who stutter
df	Degrees of freedom
ECG	Electrocardiogram
EDA	Electrodermal activity
ESL	English as second language
F	*F* ratio
FC	Fixation count on the ROI
fMRI	functional magnetic resonance imaging
GSR	Galvanic skin conductance
HR	Heart rate
IBM	International Business Machines
LSD	Least-significant-difference
MANOVA	Multivariate analysis of variance
MNS	Mirror neural system
ms	millisecond
PET	Positron emission tomography

PNS	Parasympathetic nervous system
PT	Percent of time spent in the ROI
PWS	Person who stutters; Persons who stutter
p	Probability
ROI	Region of interest
s	Second
SAM	Self-Assessment Manikin
SD	Standard deviation
SE	Standard error of the mean
SLP	Speech-language pathologist
SNS	Sympathetic nervous system
STS	Superior temporal sulcus
ToM	Theory of mind
WVS	World Values Survey
Φ	Power
η²	Partial Etta square

CHAPTER I

INTRODUCTION

Listener Responses to Stuttering

Listener responses have been deemed as an important factor in the development and treatment of stuttering. In his seminal diagnosogenic theory of stuttering, Johnson (1959) proposed that stuttering is caused by primary caregivers' verbal labeling of children's normal dysfluencies as stuttering. Accordingly, his semantic therapy concentrated on neutralizing the effect of others' mislabeling (Van Riper, 1982). Although this theory has not been supported by experimental studies (Ambrose & Yairi, 2002), the notion that listener responses, especially those from parents, play an auxiliary or supportive role in the development of stuttering has never dissipated. This idea has been corroborated by reports indicating that parents of children who stutter (CWS) talk significantly faster and interrupt the speech of CWS more often than parents of normally fluent children (Guitar, Schaefer, Donahue-Kilburg, & Bond, 1992; Kelly, 1994; Kelly & Conture, 1992; Meyers & Freeman, 1985; Yaruss & Conture, 1995).

In the treatment of stuttering, responses from parents have been considered a pivotal factor. Currently, one of the most popular treatment programs for CWS, the Lidcombe program, focuses almost entirely on adjusting parents' contingent verbal responses with their stuttering children (The Australian Stuttering Research Centre, 2006). For adolescents and adults who stutter, as Leith and Mims (1975) suggested, responses from peers and society have much

stronger pressures than those from clinicians in changing their stuttering

behaviors. Listener responses are essential in motivating a person who stutters

(PWS) to seek therapy and improve fluency, or vice versa.

Listener responses also are crucial for the emotional and psychological

wellbeing of PWS. A unique example involves six participants of Johnson's 1939

experiment. In the experiment, the participants were labeled as CWS, although

they never developed authentic stuttering. Six decades later, they collectively

sued the state of Iowa and the University of Iowa for lifelong sufferings from

psychological and emotional distress caused by the label of stuttering and they

won the case (Reynolds, 2003). Compared to the six persons temporarily labeled

as having stuttering, PWS, with their uncontrolled, aberrant stuttering behaviors,

probably have a much higher chance to become the targets of negative listener

responses (e.g., interrupting, mocking, walking away, or laughing) as well as

social discrimination and stigmatization. Negative listener responses may be

noticed from as early as the preschool years (Langevin, Packman, & Onslow,

2009). Later in school, listeners' negative responses may be expressed in the

form of bullying (e.g., name calling, physical bullying, and threats), of which a

high percentage of CWS become victims (Hugh-Jones & Smith, 1999). Fear of

negative responses from others has been found to linger in PWS from

adolescence (Mulcahy, Hennessey, Beilby, & Byrnes, 2008) to 55 years old and

above (Bricker-Katz, Lincoln, & McCabe, 2009). As the consequences of

negative listener responses, PWS are held in less favorable positions in various

important life aspects, including finding employment, getting promotion, dating, friendship-seeking, and general quality of life (Zhang, Saltuklaroglu, Hough, & Kalinowski, 2009b).

Traditionally, listener responses to stuttering have been studied using paper-and-pencil methods (e.g., Doody, Kalinowski, Armson, & Stuart, 1993; Woods & Williams, 1976). These studies have made tremendous contributions to our understanding of listener responses to stuttering across various groups of people, and have provided valuable clues to the nature, genesis, and progression of listener responses. However, a comprehensive understanding of listener responses to stuttering requires addressing the topic from various orientations, such as cognition, behavior, physiology, and emotion. In this way, the mechanism of how stuttering behaviors elicit negative perceptions toward stuttering in listeners will be probed at a deeper level, and culture-appropriate clinical and social strategies will be devised to offer better help to PWS.

Perceptions that PWS are introverted, insecure, nervous, tense, shy, reticent, afraid, anxious, passive, and more sensitive compared to normally fluent speakers (Hulit & Wirtz, 1994; Van Riper, 1982; Woods & Williams, 1976) are some of the most robust findings in the literature on stuttering. These stereotypical perceptions have been observed by various groups of researchers (e.g., Craig, Tran, & Craig, 2003; Evans, Healey, Kawai, & Rowland, 2008; Franck, Jackson, Pimentel, & Greenwood, 2003; Kalinowski, Armson, Stuart, & Lerman, 1993). Modifications or alterations of the stuttering stereotype appear to

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be difficult, if not impossible (Leahy, 2005; McGee, Kalinowski, & Stuart, 1996). However, numerous studies support the notion that as a group, PWS have the same personality traits as others (for a review, see Bloodstein & Bernstein-Ratner, 2008). Efforts have been made to locate the source of these negative perceptions and devise strategies to modify them. White and Collins (1984) proposed that these perceptions are based on listeners' experiences of their own stutter-like dysfluencies. MacKinnon, Hall, and Macintyre (2007) reported a similar finding, indicating that these perceptions are adjusted at a minuscule scale based on listeners' frequent judgments to the speakers.

Physiological responses in listeners when witnessing stuttering were first systematically examined by Guntupalli and colleagues (Guntupalli, Everhart, Kalinowski, Nanjundeswaran, & Saltuklaroglu, 2007; Guntupalli, Kalinowski, Nanjundeswaran, Saltuklaroglu, & Everhart, 2006), in which skin conductance response (SCR) and heart rate (HR) data were collected from normally fluent listeners. A significant increase in SCR was noted during the presentation of stuttering speech samples, with an accompanying significant decrease in HR. Whereas SCR showed a fast adaptation effect over trials, HR decrease was relatively stable. Psychophysiology studies (e.g., Codispoti, Bradley, & Lang, 2001; Lang, Greenwald, Bradley, & Hamm, 1993; Porges, 1997; Rolls, 2005) suggest that this pattern of SCR and HR co-variation denotes unpleasant emotional arousal. These physiological responses were found to be consistent

with self-reported emotional responses to stuttering, such as anxiety, embarrassment, unpleasantness, and nervousness (Guntupalli, et al., 2007).

Eye gaze has been noted as one of the most important cues in nonverbal communication (DePaulo & Friedman, 1998). Mutual gaze is involved with the majority of nonverbal communication (e.g., emotion, turn taking, pragmatic intent, and perceived comprehension; Doherty-Sneddon & Phelps, 2005). In socializing, normally competent individuals spend a high proportion of fixation on other's eye region (Klin, Jones, Schultz, Volkmar, & Cohen, 2002). When aroused, uneasy, inattentive, or cognitively overloaded when processing difficult information, both speakers and listeners tend to reduce eye gaze fixations on others (Driver et al., 1999; Emery, 2000; George & Conty, 2008; Klin, et al., 2002).

Expecting stuttering and listening to stuttering are both deemed as cognitively difficult tasks (Brutten, Bakker, Janssen, & van der Meulen, 1984; Brutten & Janssen, 1979; Glenberg, Schroeder, & Robertson, 1998; Senju & Johnson, 2009). Consequently, it is not surprising that averting eye contact is among the most common listener responses to stuttering, which indicates cognitive difficulty and negative emotional status (Kamhi, 2003). Experimental studies have lent support to this notion. For example, Rosenberg and Curtis (1954) reported that listeners reduced eye contact with the PWS during interaction. Recently, the development of eye tracking devices has provided researchers with the potential to make more accurate observations of listeners' eye movement pattern when observing stuttering. In a pilot study, Bowers,

Crawcour, Saltuklaroglu, and Kalinowski (2009) reported that when observing fluent speech, listeners focused their eye gaze on the speaker's eyes; when observing stuttering speech, listeners diverted their eye gaze from the speaker's eyes to the nose.

Cultural Impact on Listener Response

In this context, culture refers to the attitudes, values, and beliefs held by a racially or ethnically different group of people. Every individual is immersed in his or her culture. Culture is frequently compared to the lens, through which people see the world (Battle, 2002). Culture influences one's behaviors and cognitions, including perception, attention, memory, emotional expression, etc. (Hedden et al., 2008; Saito, 2000). Previous studies have found cultural differences in nearly all life aspects at both individual and societal scales, such as parenting, education, and social control (e.g., stigmatization, tolerance, and repair; Dijker & Koomen, 2007).

Cultural differences exist in people's perceptions and attitudes toward communication disorders. For example, Bebout and Arthur (1992, 1997) investigated attitudes toward various communication disorders among racio-ethnic different groups of people. They reported that Chinese individuals tend to blame people with cleft palate or stuttering for not being able to speak normally. Recently, a comparison study between African-Americans and European-Americans suggested that African-Americans are more likely to believe that PWS are responsible for their dysfluency (Mayo, Mayo, Jenkins, & Graves, 2004).

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Listeners' behavioral responses are under the influence of their respective culture. A large part of listeners' nonverbal responses are self-regulated (DePaulo & Friedman, 1998) with their social norms of communication style and pragmatics, and therefore based on cultural background. For example, African-Americans show less direct eye contact when conversing with their superiors or elders (Terrell & Jackson, 2002). Chua, Boland, and Nisbett (2005) found that Chinese individuals spent more time on background information relative to foreground objects when looking at pictures (e.g., an image of an animal with realistic background). Rayner, Li, Williams, Cave and Well (2007) found that Chinese individuals showed more fixations but of shorter duration than their American counterparts while viewing faces.

Culture also contributes to differential emotional and physiological reactions in listeners. African-American individuals have been found to show generally lower skin conductance than European-Americans (Davis & Cowles, 1989). Fredrikson (1986) suggested that compared to European-American individuals, African-Americans showed a smaller increase in HR in response to mental stress. Tsai (1999) indicated that compared to Chinese newborns, European-American newborns showed more dynamic emotional changes. The impact of culture in shaping one's emotional reactivity is especially evident in immigrants. Takenaka and Zaichkowsky (1990) reported that Japanese immigrants who had stayed in the United States for over one year showed less

physiological arousal (i.e., reduced HR and increased skin temperature) relative to other Japanese individuals with shorter stay.

Significance of areas of investigation

Demographic diversity is a prominent feature of the United States. The 2005-2007 American Community Survey 3-Year Estimates indicated that, of the total population of 299 million people, 14.7% were Hispanic, 12.4% were African-American, and 4.3% were Asian (U.S. Census Bureau, n. d.-b). In addition, another 9.3% belonged to American Indian or Alaska Native, Hawaiian and other Pacific Islander, others, and two or more races. Another prominent feature of the American demography is that it is becoming more diverse. Compared to the Census 2000 data (U.S. Census Bureau, n. d.-a), in less than a decade, the percentage of Hispanic individuals increased by 2.2 points, African-Americans by 0.1 point, and Asians by 0.7 point (U.S. Census Bureau, n. d.-b).

Because stuttering is estimated to have an incidence of about 5% and a prevalence of about 1% in all racio-ethnic groups (Bloodstein & Bernstein-Ratner, 2008; Kalinowski & Saltuklaroglu, 2006; Van Riper, 1982), these demographic changes suggest an increasing need for stuttering treatment in Non-White, Non-Hispanic populations. However, the cultural diversity of the United States is not appropriately represented in the group of speech-language pathologists (SLPs). At the end of 2008, in the total of 115,415 SLP members of American Speech-Language-Hearing Association, only 10.3% of these individuals belonged to a racio-ethnic minority group (Asian 2%, African-American 2.9%, and Hispanic or

Latino 3.5%; American Speech-Language-Hearing Association, 2009).

Furthermore, SLPs usually do not have adequate training or experience with

stuttering treatment. Not infrequently SLPs are reported to feel uncomfortable in

treating PWS (Brisk, Healey, & Hux, 1997; Kelly et al., 1997). Compared to white

PWS, SLPs are reported to have less confidence and capability in treating Non-

White PWS (Wright & Sherrard, 1994a, 1994b).

Racio-ethnic minority groups also are ignored in research on stuttering.

There is limited information about stuttering and PWS outside North America and

Europe. Only a few studies have directly addressed cultural influence on

treatment program development and efficacy (Cooper & Rustin, 1985; Langevin

et al., 2006).

As aforementioned, one's cultural background may change one's

perceptual, behavioral, physiological, and affective responses to stuttering.

Listener responses are important in the development of stuttering for CWS,

probably pivotal in the treatment of stuttering for both children and adults, and

definitely essential for the emotional and psychological wellbeing of PWS.

Therefore, listeners' cultural background should be included in research about

the development and treatment of stuttering.

Research of cultural influence on stuttering from listeners' perspective will

increase our understanding of listener responses to stuttering in a culturally

diverse society, with regard to its role in the development and treatment of

stuttering. On one hand, the knowledge thus garnered will equip SLPs with

increased cultural sensitivity to their clients' cultural background, enabling SLPs to provide counseling to their clients about listener responses in the context of the clients' cultural background. In addition, cultural sensitivity will enable SLPs to modify therapy components to achieve the maximum benefit for the client, and therefore, enhance the stuttering therapy efficacy (Langevin, et al., 2006; Robinson & Crowe, 1987). On the other hand, understanding the etiology, manifestation and variety of listener response will provide PWS with more realistic expectation and positive attitudes of listener responses (e.g., listeners' judgments, eye contact, etc.), help them develop culture-appropriate social skills, and improve their emotional and psychological wellbeing.

Purpose of study

In the current investigation, the primary interest was listeners' attitudinal, physiological, and behavioral responses to stuttering as a function of culture.

Three experiments were launched to examine normally fluent listeners' responses to stuttering speech samples relative to fluent speech samples. The participants were from European-American, African-American, and Chinese populations. The first experiment examined listeners' perceptions toward PWS before and after viewing and listening to stuttering speech. The second experiment examined listeners' psychophysiological responses (e.g., SCR and HR) to stuttering speech relative to fluent speech. The third experiment examined listeners' eye gaze movement as a function of the fluency of speech samples presented to participants.

It was expected that differences would be found between responses to stuttered and fluent speech, and across cultural groups, for each of the three major variables. Specifically, listeners' attitudes toward PWS were expected to be negative compared to normally fluent speakers, stuttering speech was expected to evoke in listeners increased SCR and decreased HR, and reduced gaze fixation on the speaker's eyes, compared to fluent speech samples. Based on previous research, the Chinese group was expected to show the most negative attitudes toward PWS; African-Americans were predicted to show the lowest SCR and lowest change in HR; and Chinese and African-Americans were expected to show less gaze fixation on the stuttering speaker's eyes compared to European-Americans.

CHAPTER II

REVIEW OF LITERATURE

Stuttering and Perceptions toward PWS

"I am a stutterer. I am not like other people. I must think differently, act

differently, live differently – because I stutter."

Wendell Johnson, in Bloodstein (1993), p. vii.

Stuttering is a developmental fluency disorder characterized by involuntary

and intermittent disruptions in the forward flow of normal, rhythmic speech

(Kalinowski & Saltuklaroglu, 2006; Perkins, 1990). Its core behaviors consist of

sudden onsets and offsets of aberrant speech disruption (e.g., syllabic repetition,

sound prolongation, and silent postural fixation). Oftentimes, in moderate-severe

cases, tense and struggling behaviors are observed during moments of stuttering.

These ancillary behaviors include lip biting, tongue protruding, eyes blinking,

gaze averting, finger tapping, arm jerking, feet stomping, etc. During the

developmental course of stuttering, these core and ancillary behaviors often

change with time.

The onset of stuttering is typically from 2-6 years of age (Ambrose & Yairi,

1999; Van Riper, 1982; Yairi & Ambrose, 1999), but can be as early as 18

months of age (Bloodstein & Bernstein-Ratner, 2008). This time range coincides

with what has been referred to as the critical period of language development

(Mintz & Larry, 2009). Stuttering affects about 5 percent of children (Bloodstein &

Bernstein-Ratner, 2008); however, about 70-80 percent of CWS spontaneously

grow out of the pathology before they reach adulthood (Conture, 1996; Ingham &
Bothe, 2001; Kalinowski & Saltuklaroglu, 2006; Yairi & Ambrose, 1999).
Therefore, individuals with persistent stuttering are usually estimated as about 1
percent of adults (Bloodstein & Bernstein-Ratner, 2008; Craig, Hancock, Tran,
Craig, & Peters, 2002; Kalinowski & Saltuklaroglu, 2006; Yairi & Ambrose, 1992).
These individuals have a slim chance to recover from stuttering. Stuttering is
known to exist in every culture and ethnic group (Van Riper, 1982). Therefore,
the number of people with persistent stuttering can be estimated at about 3
million in the United States and 60 million world-wide.

Stuttering has been found to be strongly related to genetic factors
(Dworzynski, Remington, Rijsdijk, Howell, & Plomin, 2007; Yairi, Ambrose, & Cox,
1996). Stuttering afflicts 3-4 times more males than females in adults (Bloodstein
& Bernstein-Ratner, 2008; Kalinowski & Saltuklaroglu, 2006; Van Riper, 1982).
However, it seems that this gender gap is not evident at the innocuous phase of
stuttering; it becomes widened as more young girls spontaneously recover from
stuttering with increased age than boys (Ambrose & Yairi, 1999; Yairi & Ambrose,
1999).Stuttering is oftentimes complicated by PWS' emotional and psychological
responses to stuttering. The observed behavioral manifestation of stuttering is
only the "tip of the iceberg" (Sheehan, 1958); many of the symptoms are hidden
under the perceivable surface. Among these hidden components are fear and
anxiety. Through their struggles with stuttering from childhood, PWS have
learned that certain phonemes, words, situations, and persons, etc., are more

possible than others in evoking stuttering, and consequently, they have developed fears of these difficulties (Van Riper, 1982). Although PWS generally do not possess excessive anxiety, their anticipation of stuttering is usually coupled with a heightened state anxiety (Craig, 1990).

Avoidance strategies are often devised, attuned, intensified, for individuals to escape from stuttering, to repel their fear and anxiety, and to reduce the social punishment accompanying stuttering (Kalinowski & Saltuklaroglu, 2006). These strategies include avoiding certain sounds, words, phrases, situations, and persons, and using substitution and circumlocution when expressing their thoughts. Secondary behaviors also can be seen part of the avoidance strategies. It is evident that these avoidance strategies are often at odds with communication efficiency, efficacy, and effectiveness. Thus, the outcome may go beyond the scope of communication and adversely affect general quality of life of PWS.

There are wide-spread perceptions that PWS are reticent, quiet, shy, introverted, sensitive, nervous, tense, guarded, avoiding, passive, afraid, and self-derogatory, compared to people who do not stutter. These stereotypical perceptions have been found to exist in various groups, including students (Dorsey & Guenther, 2000; St. Louis & Lass, 1981; White & Collins, 1984), teachers and professors (Crowe & Walton, 1981; Dorsey & Guenther, 2000; Yeakle & Cooper, 1986), parents of PWS (Fowlie & Cooper, 1978; Woods & Williams, 1976), SLPs (Cooper & Cooper, 1985, 1996; Cooper & Rustin, 1985;

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Lass, Ruscello, Pannbacker, Schmitt, & Everly-Myers, 1989; Rami, Kalinowski, Stuart, & Rastatter, 2003; Turnbaugh, Guitar, & Hoffman, 1979; Yairi & Williams, 1970), PWS (Kalinowski, Lerman, & Watt, 1987; Lass et al., 1995), vocational rehabilitation counselors (Hurst & Cooper, 1983a), employers (Hurst & Cooper, 1983b), people who have never had any direct contact with PWS (Craig, et al., 2003), as well as relatives and family members of PWS (Doody, et al., 1993).

These stereotypical perceptions have been found to be resistant to exposure and education. Exposure to stuttering, oftentimes considered a solution to make observers ignore the superficial abnormality of stuttering behaviors and see the goodness of the soul, does not ameliorate these negative perceptions. Questionnaire surveys have revealed that groups such as SLPs, relatives and family members of PWS, and parents of PWS, who have numerous opportunities to view the depth inside the PWS, still maintain these stereotypical perceptions toward PWS (Cooper & Cooper, 1985, 1996; Fowlie & Cooper, 1978; Lass et al., 1995; Lass et al., 1989; Rami et al., 2003; Turnbaugh et al., 1979; Woods & Williams, 1976; Yairi & Williams, 1970).

Education also has limited influence on changing listeners' perceptions toward PWS. For example, McGee et al. (1996) asked high school students to rate a hypothetical high school male who stutters and a typical high school male before and after viewing a 20-minute documentary videotape about an adolescent who stutters. The hypothetical stuttering male was perceived as more self-derogatory, fearful, inflexible, withdrawn, reticent, and fearful, than the typical

high school male. Furthermore, listeners' negativity increased with viewing of the video. Snyder (2001) measured the attitudes toward stuttering in graduate student speech clinicians before and after viewing a factual video about the immediate stuttering-ameliorating effect of altered auditory feedback, or viewing a story about a young girl struggling with her stuttering. Neither of the videos appeared to be successful in influencing or changing these student clinicians' attitudes toward stuttering.

The stereotypical perceptions toward stuttering suggest that PWS have abnormal, neurotic personality traits. However, data obtained from experimental studies do not support this notion. Bloodstein and Bernstein-Ratner (2008) reviewed an extensive body of studies on personality traits of PWS (e.g., including personality test, projective test, Rorschach test, handwriting analysis, and role perception, etc.), and concluded that, "the theory that stuttering reflects a deep-lying neurotic abnormality necessitating an essentially psychiatric method of treatment has been all but abandoned by professional workers…" (p. 210). In other words, as a group, PWS are not neurotic or mentally disturbed. Individual PWS might be, to some degree, socially maladjusted, but this appears to be rooted in the individual's difficulty in speaking, not their personality traits (Bloodstein & Bernstein-Ratner, 2008).

Researchers have searched for other possible sources of the stereotypical perceptions toward PWS. Woods and Williams (1976) posed that these perceptions are formed from exposure to stuttering. In other words, without

exposure to stuttering, one should not have formed these perceptions toward

PWS; also, one's perceptions should become intensified with repeated exposure

to stuttering. To test their hypothesis, they gave a 25-item semantic differential

bipolar scale to people with various degrees of exposure to stuttering, including

parents of CWS, parents of children with speech pathologies unrelated to fluency,

parents of normal-speaking children, classroom teachers in elementary grades,

public school speech clinicians, and college students. Contrary to their

hypothesis, they found that the stereotypical perceptions toward stuttering

existed for all groups, and their strength did not change with exposure to actual

PWS.

White and Collins (1984) proposed that listeners make judgment of PWS

with inference from their own moments of dysfluent speech. They reasoned that

normally fluent people occasionally experience stutter-like dysfluencies, during

which they have attendant negative feelings of embarrassment, shyness,

nervousness, tenseness, etc; consequently, when listeners view and listen to

stuttering speech, which is a seemingly similar, yet more severe, form of fluency

disruption compared to their own stutter-like dysfluencies, they deduce that PWS

have the same type of internal experiences, only at a greater magnitude. Using

the same 25-item bipolar scale as Woods and Williams (1976), White and Collins

had one group of 40 participants rate a hypothetical typical male PWS, and

another group of 40 participants rate "a normally fluent adult male speaker who

suddenly starts to stutter for a short period of time, after which he speaks fluently

again" (p. 568). They found high positive correlations between the two groups' ratings (e.g., from 0.77 to 0.92), and interpreted these results as support for their hypothesis.

A revision to this model was recently presented by MacKinnon et al. (2007). They supported the notion that the stereotypical perceptions are based on listeners' own experience with stutter-like dysfluencies; they added that these perceptions are under frequent, rapid adjustment. Using the same bipolar questionnaire (Woods & Williams, 1976), the authors randomly assigned 183 college students to an experimental group and a control group. Participants in the experimental group were asked to rate two persons, a hypothetical typical PWS and a "normally fluent adult male speaker who suddenly begins to stutter for a short period of time, after which he speaks fluently again" (p. 301; MacKinnon, et al., 2007). Participants in the control group were asked to rate a typical fluent male on the same scale. Like White and Collins (1984), they reported a high positive correlation between perceptions toward the hypothetical PWS and the temporarily stuttering person. In addition, their results indicated that the temporarily stuttering person was rated as more afraid, fearful, nervous, tense, anxious, introverted, and unpleasant, as compared to the hypothetical PWS. The authors suggested that these small, yet significant changes in listeners' perceptions reflect participants' belief that PWS should be able to adapt better to their stuttering and consequently become less negatively affected by stuttering as compared to the person who is temporarily stuttering.

It is suggested that these stereotypical perceptions toward PWS have psychophysiological correlates (Guntupalli, et al., 2007; Guntupalli, et al., 2006; Zhang, Kalinowski, Saltuklaroglu, & Hudock, 2009a). In their first experiment (Guntupalli, et al., 2006), a group of typical fluent individuals listened to and viewed a series of video clips of stuttered and fluent speech samples. Participants responded with significantly increased SCR and significantly decreased HR to the stuttering speech compared to the fluent speech samples. While SCR showed quick adaptation, change in HR was found to be consistent across stuttering speech presentations. In their second experiment (Guntupalli, et al., 2007), participants were asked to self-report their arousal and valence status on a culture-free Self-Assessment Manikin (SAM; Bradley & Lang, 1994) and their affect on a 9-point Likert scale, before the experiment and after viewing each video clip of stuttered or fluent speech. Psychophysiological responses were found similar to those from their previous study. The SAM results indicated that participants felt significantly aroused and significantly unpleasant when observing stuttering speech relative to fluent speech. Participants self-reported feeling more nervous, uncomfortable, sad, tense, unpleasant, avoiding, embarrassed, annoyed, etc., when observing stuttering speech relative to fluent speech. These visceral, emotional, and perceptual responses were consistent, suggesting that the emotional and physiological responses might be the basis of the stereotypical perceptions of stuttering. The authors also noted that the pattern of visceral responses observed in these two experiments had been

observed in other studies as responses to blood-mutilated scenes (Palomba, Angrilli, & Mini, 1997).

In another experiment (Zhang, et al., 2009a), psychophysiological responses (e.g., SCR and HR) to stuttering and fluent speech were measured from groups of PWS and normally fluent speakers. The two groups demonstrated a similar pattern of physiological responses to stuttering speech relative to fluent speech. Specifically, relative to fluent speech in listeners, stuttering samples evoked significantly increased SCR and significantly decreased HR; SCR attenuated after the first presentation of stuttering speech, whereas HR decrease remained steady. This study indicated that listeners' visceral responses are independent of listeners' fluency status (e.g., fluent or stuttering), suggesting that the negative perceptions toward stuttering are persistent and robust, and may not be mediated by exposure to or experience of stuttering.

The findings of above-mentioned psychophysiological studies on the stereotypical perceptions toward stuttering are consistent with results from social psychological studies addressing stereotype and prejudice. Devine (1989) argued that in-group members have natural stereotypical perceptions, or prejudices, toward out-group members. These stereotypical perceptions are automatic in nature, and can express at emotional, behavioral, and cognitive levels. Furthermore, the emotional and behavioral manifestations of the stereotypical perceptions are processed at a rather low level, and are difficult to inhibit with cognitive effect. Rudman, Phelan, and Heppen (2007) pointed out that

different from reported, explicit attitude, implicit attitude is influenced by earlier memories. White, Crites, Taylor and Corral (2009) demonstrated that word pairs that were incongruent with gender stereotypes were associated with larger N400 event-related potentials and longer reaction times, indicating that the stereotype can be perceived at a pre-attentive level.

Social Punishment of Stuttering

The social punishment of stuttering is self-evident in terms of the origin of the noun that describes the person afflicted with the disorder. The word "stutterer," as Shell (2006) pointed out, is linguistically the same as Barbarian. Both words refer to "those people who do not speak our language" or "those people who, although they *do* speak our language, do not speak it 'in our way'" (p. 73, italics in original). In this sense, PWS and barbarian are not "us," because their way of speaking, their fluency or accent, differ from "ours." Therefore, these people are aliens, outsiders, others; they are unrefined, uncivilized, inferior (Leahy, 2005); they are disregarded, ignored, stereotyped, and stigmatized (Leahy, 2005; Tafarodi et al., 2009). By labeling a PWS as a "stutterer," a PWS is not an individual, but one of the "others," one that is ascribed with characteristics of the stereotype: "the collection of attributes believed to define or characterize the members of a social group" (Oakes, Haslam, & Turner, 1994, p. 1).

Stereotypes toward PWS are nearly ubiquitous. However, the social punishment of stuttering does not limit itself at the level of perception and attitude; it infiltrates almost every aspect of a PWS' life, and dramatically lowers his or her

quality of life. For example, Van Riper (1982) indicated that PWS have limited choices related to jobs, friends, spouses, and children. Corcoran and Stewart (1998) reported that in the eyes of PWS, suffering was the primary theme of their life story. Zhang et al. (2009b) suggested that stuttering affects a PWS' romantic relationship, vocational development, family, friendships, social life, daily activities, and general quality of life, among which the most disrupted compartments are vocational development, romantic relationships, and daily activities.

Probably the most studied area of the social impact of stuttering on PWS is related to jobs. In Hurst and Cooper's (1983b) questionnaire survey on 644 employers in North America, 60 percent of the employers agreed that a PWS is less likely to be employed, 40 percent agreed that a PWS is less likely to be promoted, and 80 percent agreed that stuttering makes them uncomfortable. In Silverman and Paynter (1990), both a stuttering lawyer and a stuttering factory worker were considered by undergraduate students as occupationally incompetent, with the lawyer who stutters being more incompetent. Silverman and Bongey (1997) reported that nurses perceived physicians who stutter as less competent. Gabel, Blood, Tellis, and Althouse (2004) termed the perceived vocational incompetence of PWS as "role entrapment." In their study, normally fluent people judged that 20 careers, especially those related to law enforcement, health care, or providing guidance to others, as inappropriate choices for PWS. The careers that these participants advised PWS to take were computer

programmer, statistician, publication editor, accountant, engineer, etc., that require limited interpersonal interactions.

Difficulties encountered in the workplace also have been reported by PWS. Rice and Kroll (1997) surveyed 586 PWS in North America about their workplace experiences, including employment opportunities, job promotion, job responsibilities, performance evaluation, and feelings of social alienation at work. These PWS reported significant discrimination in all these areas, with the more severe PWS receiving the stronger discrimination. Klein and Hood (2004) surveyed 232 PWS in North America. Over 70 percent of them agreed that stuttering decreased their chances of being hired or promoted, 69 percent believed that stuttering hindered their job performance, 50 percent had applied for jobs requiring little speaking, and 21 percent even turned down promotions or new jobs requiring more speaking. A majority of their PWS participants believed that the employers have negative perceptions toward PWS. In another study, PWS reported to feel limited in their work progress, and feel relieved when they retired (Bricker-Katz, et al., 2009).

Only a limited number of studies have examined the impact of stuttering on intimate relationship. It seems that the main difficulty for PWS is limited possibilities in initiating an intimate relationship. Both the questionnaire surveys of Doody et al. (1993) and Kalinowski et al. (1987) suggested that, PWS have limited chances to develop intimate relationships because of the negative stereotypes of stuttering. Boberg and Boberg (1990) investigated the impact of

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stuttering on intimate relationships from the perspective of wives of PWS. Most of the 15 respondents reported that during their first date they did not notice their future husbands' stuttering, and during the time of their marriage they did not talk about stuttering. The authors reasoned that, first, the PWS had to hide their stuttering when dating, and secondly, wives and other family members might still have the stereotypes toward PWS because the couples pretended that stuttering did not affect their lives by not talking about it. In Zhang et al. (2009b), normally fluent college students were asked to imagine being a PWS and complete a questionnaire survey containing 56 questions covering various aspects of life. The results implied that although PWS are thought to have only slightly fewer opportunities to meet potential partners, ask for a date, or go on blind dates, their opportunities to develop romantic relationships are greatly diminished. PWS are thought to have notable difficulties in impressing, or communicating with the potential romantic partner, asking someone to dance, and being introduced to the family of the potential romantic partner.

Stuttering also handicaps one's ability to complete daily activities which involve speaking with others (Zhang, et al., 2009b). Yaruss and Quesal (2006) pointed out that stuttering can significantly limit a person's ability to participate in daily activities and has a negative impact on the person's overall quality of life.

The most debilitating experiences stuttering bestows on an individual happen at an early age, when the individual is mentally and emotionally not ready to deal with various life perils, and when parents and peers exert great

impact on one's psychological wellbeing. Riley and Riley (2000) identified three types of negative listener responses related to CWS, including disruptive communication environment (e.g., not giving attention to child's speech, rushing the child to speak, interrupting the child when speaking, teasing, and making critical, negative, or sarcastic comments), secondary gains (e.g., giving special privileges or excessive attention to the child because of the stuttering), and teasing and bullying. Negative listener responses from parents and peers, especially teasing and bullying, can create low self-esteem, fear, anxiety, and negative attitudes in CWS, with long-term effects. Parents reportedly have negative perceptions toward their stuttering children (Fowlie & Cooper, 1978; Woods & Williams, 1976); however, compared to other environmental settings, family is probably the most secure place for PWS (Zhang, et al., 2009b) where, with possible secondary benefit gained from parents, the negative impact of stuttering may be diluted, or neutralized (Yovetich, Leschied, & Flicht, 2000).

The suffering for PWS, thus, most probably comes from peers. Children start to notice stuttering and develop a negative perception toward stuttering at around 5 years of age (Boey et al., 2009; Ezrati-Vinacour, Platzky, & Yairi, 2001). Therefore, almost all adults who stutter, and CWS older than 5, may have been subject to the scrutiny of peers. Davis, Howell, and Cooke (2002) concluded that CWS are more likely to be rejected by peers and are less likely to be popular. Weisel and Spektor (1998) looked into adolescents' attitudes toward stuttering, and suggested that stuttering causes low self-esteem and loneliness in

adolescents who stutter. Blood, Blood, Tellis, and Gabel (2001, 2003) reported that compared to fluent adolescents, adolescents who stutter tend to have more fear and anxiety about speaking, and more stigmatized attitudes toward stuttering.

In Crichton-Smith (2002), 14 adult PWS from the United Kingdom reported their first recalls of stuttering. All of these recalls were linked to social settings, such as at school, rather than within the family. Hugh-Jones and Smith (1999) surveyed 276 adult PWS from the British Stammering Association, a national association for PWS in Britain. Most of the respondents recalled being the subject of bully at school. The bullying was reported to impart an immediate negative personal effect on a majority of the respondents and some long-term negative effect on almost half of them. The fear of negative evaluation from peers remains vivid in memory even when the PWS becomes 70 years old (Bricker-Katz, et al., 2009).

Intuitively, it seems correct that social punishment of stuttering has a positive linear correlation with stuttering severity. The more severe one's stuttering is, the more difficult one's social life. For example, Bramlett, Bothe, and Franic (2006) showed that stuttering severity is related to the perceived health status of PWS. They presented videos to graduate students depicting mild, moderate, and severe stuttering. These students were requested to imagine that they speak like these PWS for a year, and then rate the health states for the hypothetical mild, moderate, or severe PWS, or themselves. The average rating

of the health status was found to be correlated with the severity of stuttering, with the severe PWS rated as most unfavorable. However, this question is not adequately studied and current data contain inconsistent findings. For example, in Andrade, Sassi, Juste, and Ercolin (2008), mild and severe Brazilian PWS reported similar impact of stuttering at affective, behavioral, and cognitive levels. Their findings were in accordance with the "iceberg" analogy (Sheehan, 1958) which indicates that the stuttering symptom means far more than the perceived behaviors, and the mild PWS may suffer no less than the severe ones.

The social punishment of stuttering seems universal, but a PWS' coping strategy may make a difference in mitigating the impact of the social punishment. Plexico, Manning, and DiLollo (2005) suggested that listeners' negative reactions and PWS' negative reactions to listeners' responses are intertwined. A "vicious circle" is initiated when, in fear of listeners' negative reactions, a PWS starts to avoid social interaction, lead a restrictive lifestyle, and generate negative attitudes toward others; consequently, these behaviors intensify listeners' stereotypical perceptions toward PWS. The "vicious circle" is completed when the PWS reacts with more avoidances and stronger negative attitudes toward others because of their intensified negative reactions. When this "vicious circle" is at work, it is self-strengthening and makes stuttering treatment inadequate to modify the behaviors, attitude, and belief systems of the PWS.

Plexico, Manning, and Levitt (2009a) proposed an emotion-based approach model for coping with stuttering. Within this model, listeners' negative

responses, PWS' avoidance and escape, and PWS' anxiety and negative emotionally feeling of therapy work in concert to reduce the quality of life for PWS. It is suggested that this "vicious circle" can be broken with cognitive-based coping strategies (Plexico, Manning, & Levitt, 2009b), which starts with self acceptance and strong motivations for therapy and ends with increased quality of life. However, when teased and bullied, unfairly treated in a working environment, having trouble in initiating a romantic relationship, struggling with stuttering which one does not have control of and others don't understand, it is easy for a PWS to feel frustrated and helpless, and have difficulty in making positive adjustments in one's emotions and behaviors (Bloodstein & Bernstein-Ratner, 2008).

Culture may be a factor that differentiates the type and strength of social punishment of stuttering. Listeners' behavioral and emotional responses to stuttering are regulated by social norms, and their perceptions toward stuttering may be related to the general degree of discrimination toward disorders. In their analysis of stereotype and stigma to deviance, Dijker and Koomen (2007) considered stigmatization, tolerance, and repair as three forms of social control, methods to manage one's membership as in-group or out-group. To tolerate is to accept one's deviance, to repair is to punish one's deviance without depriving one's in-group membership, and to stigmatize is to exclude one from the society because of the deviance. A society with more priority in individual autonomy and independence, and with more security, may show more tolerance toward deviant behaviors and individuals. In comparison, a society with less security, high

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hierarchical structure, and collectivism, may use repair and stigmatization more frequently. The choice among these social control methods, as Dijker and Koomen argued, depends on the perceived controllability (high or low) and nature (active or passive) of the deviance, which reflect cultural influences. Uncontrollable-passive deviances (e.g., illness) are to be repaired, controllable-passive deviances (e.g., laziness) tolerated, and active deviances, whether uncontrollable (e.g., madness) or controllable (e.g., crime), are to be stigmatized. People respond to uncontrollable-passive deviances with caring and tenderness, controllable-passive deviances with tenderness and anger, uncontrollable-active deviances with mainly fear (and also anger) and flight, and controllable-active deviances with mainly anger (and also fear) and fight. Dijker and Koomen suggested that observers' emotional and behavioral responses reflect different activation patterns of the fight-flight system and the caring system. In the case of stuttering, showing mainly overt or covert stuttering behaviors makes a difference in the perceived nature of the deviance (e.g., offensive or not); the knowledge and beliefs of the controllability of stuttering makes another difference (e.g., whether a PWS could try hard to speak more fluently).

Understanding Culture

Culture has been proposed to explain differences in politics, social structure, economic development, business, and group behaviors, etc., across nations, races, and ethnic groups (Landes, 2000). Essays about cultural differences, e.g., East versus West, White versus Black, are ubiquitous in mass

media. However, the term "culture" is frequently used without a clear definition, or too broad a definition. It can be material, as represented in culinary, architecture, fashion, dance, music, and visual art; it can be social, as related to family, marriage, and gender roles; and it can be subjective, consisting of widely held beliefs, values, and shared behavioral scripts (Chiu & Hong, 2006). Culture can refer to the characteristics of a race, a country, a regional area, an institution, an organization, a company, or any other kind of a group of people. Culture is studied by anthropologists, economists, sociologists, psychologists, linguistics, and other social scientists from various standpoints. The ambiguity and rich connotations of the term "culture" reflect the nature of culture itself, that culture is what one grows out from and everything in one's social life is culture-specific. Individuals are immersed in their cultures. Consciously or unconsciously, culture influences what one sees, how one interprets and responds to what one sees. However, culture is a collective concept and one only shares a portion of the culture in which one is immersed (Chiu & Hong, 2006). Researchers can grasp the gist of culture only with group studies, or the results will be confounded by individual characteristics.

Pertaining to the aim of this dissertation, culture is defined as the attitudes, values, and beliefs held by a group of people that is ethnically and racially different from other groups of people. This definition is similar to that provided by Hofstede (2001) that culture is "the collective programming of the mind that

distinguishes the members of one group or category of people from another" (p. 9).

        This definition limits the grouping of people at the level of race and ethnicity. Race is the classification of people based on their physical markers, such as skin color, and ethnicity is traditionally related to a nation or tribe (Okun, Fried, & Okun, 1999). Phinney (1996) indicated that ethnicity is mostly used as a natural boundary of culture. Quah and Sales (2000) defined an ethnic group as having commonality in the members' ancestry, nationality, language, religion, and/or physical appearance. A combination of race and ethnicity is usually taken in demographic studies. For example, the United States Census Bureau divide people into White or Caucasian, Black or African-American, American Indian and Alaska Native, Asian, Hawaiian and Other Pacific Islander, some other race, and two or more races (U.S. Census Bureau, n. d.-a). Additionally, Hispanic or Latino is established as a single entity, with large overlapping with Whites. This dissertation involves three groups of individuals: African-American, Chinese, and European-American. Chinese refer to the Chinese people who originally came from the People's Republic of China and currently live in North America. African-Americans refer to Black people living in North America with African ancestors. European-Americans refer to the Caucasian individuals living in North America with European ancestors. Both African- and European-Americans are Americans. African-American culture is sometimes included in the American, or Western culture, when comparing to Asian, or Eastern culture (Nisbett, 2003).

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Attitudes, values, and beliefs are the subjective aspects of the broadly-defined culture (Chiu & Hong, 2006). The value system is considered as the core of the culture (Hofstede, 2001). A value is "a broad tendency to prefer certain states of affairs over others" (Hofstede, 2001, p. 5) and can be seen as the attitude toward relatively abstract goals (Eagly & Chaiken, 1998). Schwartz and Sagiv (1995) defined values as "desirable goals, varying in importance, that serve as guiding principles in people's lives" (p. 93). Eagly and Chaiken (1998) defined an attitude as a tendency to evaluate, or to discriminate an object, with degrees of favor or disfavor. Attitude can be explicit (e.g., as verbally reported or consciously experienced) or implicit (e.g., as expressed at emotional and behavioral levels). Eagly and Chaiken pointed out that attitude may be named differently according to the object it refers to. For example, prejudice is toward another group of people, attraction or liking is toward another individual, self-esteem is toward oneself, and values are toward relatively abstract goals. Hitlin and Piliavin (2004) stressed that values are more abstract than attitudes, and have a higher place in one's evaluative hierarchy. Beliefs can be broadly defined as expectations that are not empirically discovered or analytically proved, and are identical within group members and commonly known by them (Greif, 1994). Therefore, beliefs are attitudes, or preferences, toward objects in the future. In short, the essence of culture in this context is discriminating, or preferring; attitudes, values, and beliefs are intertwining components of the discriminating

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processes toward different objects. Whereas values and beliefs are relatively

abstract, attitudes are targeted toward more specific objects.

Measuring culture

There are mainly two approaches to study cultural variations. The first is to

provide fine-grained, full-fledged descriptions and interpretations of various

cultures, and the second is to examine the content of culture along a few

dimensions, or orientations. The first descriptive approach is frequently employed

in cultural studies. For example, in The Chinese Culture Connection (1987), 40

words denoting 40 values were listed and surveyed. A list of descriptions of

different cultures is provided by Okun et al. (1999), where African-Americans are

associated with interdependence, emotional vitality, collective survival, oral

tradition, rhythm, improvisation, and spirituality. Asian Americans are tied with

precedence of group interests over individual interests, harmonious relationships,

importance of fulfilling obligations, respect for elders, control of undesirable

emotions, outward calmness, open expression and confrontation avoidance, and

high value on education. European-Americans are known by their independence,

autonomy, and direct communication. These descriptions are not based on

theoretical models, and therefore, they lack psychological construct (Chiu &

Hong, 2006) and are not able to guide further studies. Furthermore, previous

attempts to classify cultures usually have low content validity; e.g., the

descriptive culture classifications do not cover, or represent, the universe of

culture (Hofstede, 2001). In short, it is inadequate and inaccurate to understand culture based on "folklores."

The second approach involves systematic studies and theoretical models, and it is probably a better way to measure and compare cultures. In recent years, three popular theoretical models of cultural values have been proposed and revised. These models include Hofstede's cultural dimensions (Hofstede, 1980, 2001), Inglehart's World Values Surveys (Inglehart, 2006; Inglehart, Basanez, & Moreno, 1998), and Schwartz's cultural value orientations (Schwartz, 1992, 2006). All of these models focus on the quantification of the value system, which is theorized as the core of the culture. All of these models are built upon large-scale, longitudinal questionnaire surveys across nations.

Hofstede's cultural dimensions. Hofstede (1980) started the paper-and-pencil survey of work-related values in 1968 and 1972. His affiliation with International Business Machine (IBM) gave him the unique advantage of recruiting more than 100,000 occupation-, age-, and gender-matched participants from over 50 countries. Originally, a 4-dimension model was proposed to describe cultural variations (Hofstede, 1980); later, another dimension was added with development in cross-cultural studies (The Chinese Culture Connection, 1987). Hofstede (2001) defined these 5 dimensions as:

1. *Power distance, which is related to the different solutions to the basic problem of human inequality*

2. *Uncertainty avoidance, which is related to the level of stress in a society in the face of an unknown future*

3. *Individualism versus collectivism, which is related to the integration of individuals into primary groups*

4. *Masculinity versus femininity, which is related to the division of emotional roles between men and women*

5. *Long-term versus short-term orientation, which is related to the choice of focus for people's efforts: the future or the present (p. 29)*

Raw scores of the 5 dimensions for 56 countries and regions can be found at www.geert-hofstede.com. The information is at the nation/region level; subcultures within a nation, such as African-American in the United States, are not heeded. Table 1 is a list of the scores of the 5 dimensions for the United States, China, and West and East Africa. It is expected that the data from West and East Africa may provide clues about the African-American culture, because African-Americans share common ancestries with the Africans, and they have kept some African values, beliefs, and traditions. However, the African-American culture has been influenced by factors that are unique to Blacks living in North America, such as slavery and African-American English, as well as interactions with cultures of European-Americans and other minority groups in the United States (Terrell & Jackson, 2002). Therefore, African culture does not equal to African-American culture and precautions should be taken when applying these data to African-Americans.

Among these countries/regions, the United States has the lowest power distance and highest individualism; China has lowest individualism, highest masculinity, lowest uncertainty avoidance, and an extremely high long-term orientation index. The Africa (both West and East Africa) has the highest uncertainty avoidance index and lowest long-term orientation index.

The scores imply that, firstly, whereas American people have an expectation of equal power distribution, Chinese and African people accept authoritative powers more easily. Secondly, whereas American people put individuals beyond group, Chinese and African people are more collectivistic and emphasize interpersonal relationships. Thirdly, compared to African societies, both American and Chinese societies have relatively specialized gender roles (e.g., in the United States and China, men are expected to show assertiveness and competitiveness). Fourthly, Chinese culture is shown as the most uncertainty accepting and African culture the most uncertainty avoiding. The uncertainty avoidance index measures the degree to which a society reduces insecurity by applying strict laws and rules; in other words, people in uncertainty accepting countries are more probably relativists and atheists. Lastly, an extremely high score on long-term orientation is attached to Chinese culture, suggesting that in comparison to American and African cultures, Chinese society values thrift and perseverance and Chinese people are more likely to sacrifice present enjoyment for the future.

It is important to keep in mind that Hofstede's model was originally proposed for theoretical considerations of business management and economic growth. For example, the fifth dimension, long-term orientation, also called Confucian work dynamism, was found when survey results correlated with economic growth in Eastern Asian countries in 1960-1980s (e.g., Taiwan, Hong Kong, Japan, Thailand, South Korean; The Chinese Culture Connection, 1987). His model also has received criticisms from many authors regarding the methodology, analysis, and interpretations (for a review, see McSweeney, 2002; Sondergaard, 1994). Relative to the current study, it should be noted that little has been done to apply this theory to studies of stereotypes or listeners' emotional and perceptual responses to deviances. The original study data were acquired from a narrowly-selected group, e.g., employees of IBM, which is probably not representative of the communication partners of PWS.

Table 1: *Cultural Variability in Selected Countries Using Hofsted's 5-Dimension Model*

	China	USA	West Africa	East Africa
Power Distance Index	80	40	77	64
Individualism	20	91	20	27
Masculinity	66	62	46	41
Uncertainty Avoidance Index	30	46	54	52
Long-Term Orientation	118	29	16	25

Note. Data were adapted from "Geert Hofstede Dimensions raw scores,"

http://www.geert-hofstede.com/hofstede_dimensions.php.

World Values Survey. The World Values Survey (WVS; Inglehart & Baker, 2000; Inglehart, et al., 1998) is probably the largest, most complicated, longitudinal cross-cultural study. Originated from the European Values Survey in 1981, the WVS has collected data from five waves of studies (e.g., initiated in 1981, 1989, 1994, 1999, and 2005, respectively), covering more than 80 societies and more than 85 percent of the world's population (World Values Survey, n.d.). Aggregated nation-level data suggested that about 70 percent of cross-cultural differences could be explained using only two bipolar factors, or dimensions (Inglehart & Baker, 2000). The first dimension is traditional versus secular-rational orientations toward authority, and the second is survival versus self-expression values. Traditional societies are characterized with "relatively low levels of tolerance for abortion, divorce, and homosexuality; tend to emphasize male dominance in economic and political life, deference to parental authority, and the importance of family life; most of them place strong emphasis on religion" (Inglehart & Baker, 2000, pp. 23-24). Societies on the secular-rational pole emphasize opposite values. On the other dimension, people living in societies on the survival extreme are "shaped by insecurity and low levels of well-being, tend to emphasize economic and physical security above all other goals, and feel threatened by foreigners, by ethnic diversity and by cultural change" (Inglehart & Baker, 2000, pp. 25-26), and people living in societies on the self-expression polar show "trust, tolerance, subjective well-being, political activism, and self-

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expression that emerges in postindustrial societies with high levels of security" (Inglehart & Baker, 2000, pp. 25-26).

A two-dimension map of world cultures (Inglehart, 2006) is presented in Figure 1, representing all societies under investigation. The horizontal axis of this map denotes survival versus self-expression values, and the vertical axis represents traditional versus secure-rational values. The societies are divided into 8 groups, including Protestant Europe, English speaking, Catholic Europe, Latin America, Africa, South Asia, Confucian, and Ex-Communist, with the Ex-Communist societies overlapping South Asia, Catholic Europe, and Confucian groups. These group boundaries were not identified by statistical analysis (e.g., clustering), but theoretically driven (Inglehart & Baker, 2000). Inglehart and colleagues (Inglehart, 2006; Inglehart & Baker, 2000; Inglehart, et al., 1998) asserted that the cultural variances across groups are relatively stable because the societies within a cultural group usually have historical heritage and religious tradition in common.

A map like the one presented in Figure 1 provides direct information regarding cultural similarities and distances among different societies. For example, Northern European countries (e.g., Sweden, Norway) and Eastern African countries (e.g., Zimbabwe, Tanzania) demonstrate probably the biggest cultural discrepancies by occupying the opposing corners. Ex-Communist societies, especially those separated from the Union of Soviet Socialist Republics, are distant from Latin American societies on both dimensions. However, similar

to Hofstede's model (Hofstede, 2001), subcultures such as African-American culture is not considered. African-American culture might be estimated by looking at the cultural dimensions of African countries; however, caution should be taken in drawing conclusions.

From the map in Figure 1, China and African countries have similar, relatively medium positions on the survival values dimension. This indicates that their countries still lack economic and physical security, and their people may not have a high degree of trust of others and tolerance of deviances. In contrast, the United States is among a few countries with highest self-expression values score, indicating high levels of tolerance and individual autonomy. On the dimension of traditional versus secular-rational values, China, the United States, and African countries are separate from each other, with China having the highest position on the secular-rational pole, African countries leaning toward the traditional pole, and the United States in the middle. This pattern indicates that African cultures emphasize religions, Chinese culture is probably the most utilitarian, and the United States is influenced by both traditional and secular ideas.

Figure 1. Inglehart-Welzel Cultural Map of the World.
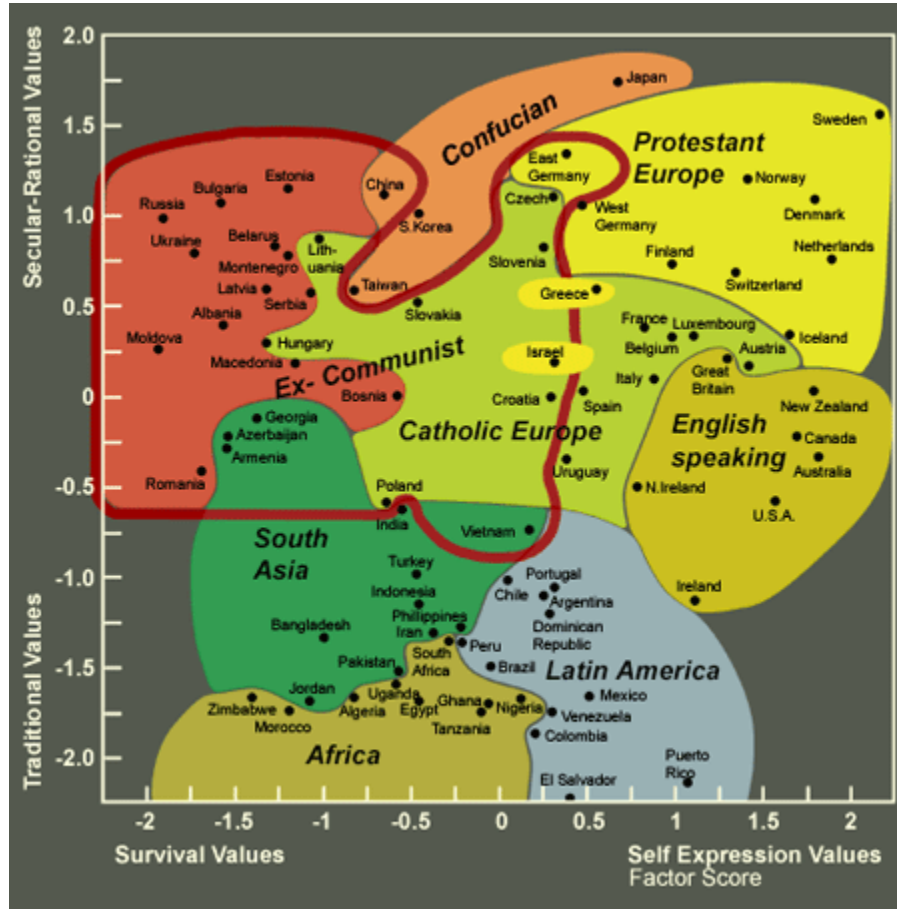
Note. From *World Values Survey Cultural Map of the World,* by Inglehart, Ronald and Welzel, Christian. Copyright 2009 by WVSA, www.worldvaluessurvey.org. Reprinted with permission.

Schwartz's cultural value orientations. Schwartz (1992) reasoned that human values represented their motivations relating to human biology, group functioning, and coordination of group activities. He and colleagues (Schwartz et al., 2001; Schwartz & Sagiv, 1995) derived 10 values serving for these motivational goals, including power, achievement, hedonism, stimulation, self-direction, universalism, benevolence, tradition, conformity, and security. Empirical support for Schwartz's framework initially came from Schwartz and colleagues' questionnaire surveys from 1988 to 1993 (Schwartz, 1992, 2006; Schwartz & Bardi, 2001). Over 25,000 participants in 44 countries were requested to rate on a 9-point Likert scale, among a series of 56 different values, an item's congruence with their culture. Their data supported their categorization of the values.

Later, Schwartz and colleagues (Schwartz, 2006; Schwartz & Boehnke, 2004; Schwartz et al., 2001) presented a modified model of cultural structure with additional data from different samples using. Culture is considered as containing three fundamental dimensions: autonomy versus embeddedness, egalitarianism versus hierarchy, and harmony versus mastery (Schwartz, 2006). Autonomy is further divided into intellectual autonomy and affective autonomy, therefore making a total of 7 cultural orientations. A prototypic structural model is reprinted in Figure 2. Similar to Inglehart (2006), a world map of culture was sketched (Schwartz, 2006) and is reprinted as Figure 3. The seven orientations are inserted into this two dimensional map, with vectors showing directions of

increasing scores. Thus, the location of a society on the map reveals its distance from and similarity with other societies. Schwartz categorized 76 societies into 7 cultural groups: West European, English-speaking, Latin American, East European, South Asian, Confucian influenced, and African and Middle Eastern. This categorization is highly similar to those of Hofstede (2001) and Inglehart (2006).

One advantage of Schwartz and colleagues' work is that they have continuously tested the validity and reliability of their model (Schwartz, 2006; Schwartz & Boehnke, 2004; Schwartz, et al., 2001; Schwartz & Sagiv, 1995). Another advantage is that they provided more detailed information when comparing cultures in the culture map. However, again, their model does not provide any direct information on African-Americans, and approximation has to be made with African societies.

Schwartz's culture map (Schwartz, 2006) reveals that the United States emphasizes mastery and affective autonomy at the cost of harmony. Compared to China and African cultures, the United States has the highest score in intellectual autonomy, and the lowest in embeddedness and hierarchy, indicating that the United States is more individualistic than the other two societies. China shows the highest score in hierarchy, and a high score in mastery, together with strong rejections of egalitarianism (social equality) and harmony. China emphasizes embeddedness more than America but less than African societies.

African culture is extremely high in embeddedness, and extremely low in affective and intellectual autonomy and egalitarianism.

Figure 2. Schwartz's Seven Cultural Orientations.
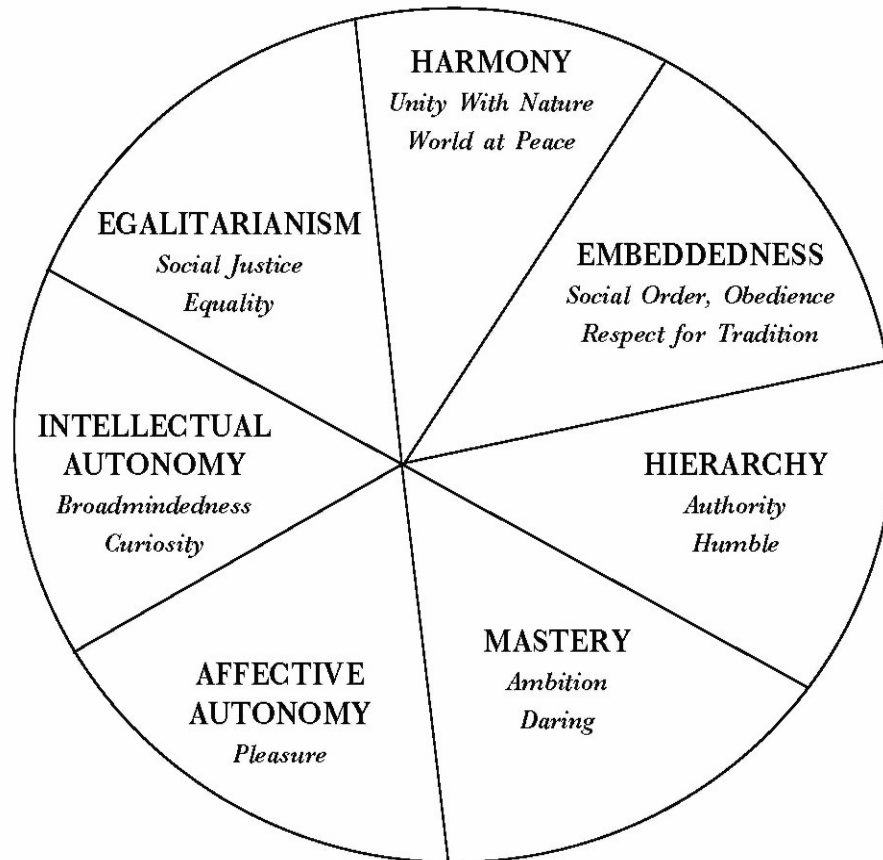
Note. From "A theory of cultural value orientations: Explication and applications," by Shalom H. Schwartz, 2006, *Comparative Sociology, 5*, 137-182. Copyright 2006 by Brill. Reprinted with permission.

Figure 3. Schwartz's Map of 76 National Groups on 7 Cultural Orientations.

Cultural impact on human behaviors, emotions, and cognitions

Cross-cultural variations in human cognition were addressed by pioneers of cognitive psychology, such as Sir Frederic Charles Bartlett (for a review, see Saito, 2000). However, for years, cross-cultural studies were focused on political, economic, and linguistic differences. Regarding human cognition, emotion, and behavior, psychologists have endeavored to find the universals (e.g., Ekman, 1994; Ekman & Friesen, 1971; Ekman et al., 1987). Choi, Han, and Kim (2007) argued that the slow development of cross-cultural studies of psychological constructs is confounded by two main difficulties. The first is that people, even those under influence of the same culture, are not homologous; thus, their responses are to a large degree determined by idiosyncratic traits. The second issue is that emotion and behavior, when considered as cultural phenomena, are interpersonal, situational in nature, whereas many established methodologies treat emotion and behavior as intrapsychic. Only recently, with development in methodologies and theoretical understandings of culture, cross-cultural studies of cognition, emotion, and behavior have started to expand.

Nisbett (2003) summarized the findings of widely distributed differences in cognitions between Easterners and Westerners, including science and mathematics, attention and perception, causal inference, organization of knowledge, and reasoning. For example, Asians pay more attention to others' emotional status and context; Asians believe that one's behavior is influenced more by context rather than one's disposition. Nisbett and colleagues (Boduroglu,

Shah, & Nisbett, 2009; Nisbett & Miyamoto, 2005; Nisbett, Peng, Choi, &

Norenzayan, 2001) proposed that these variations most probably occur because

Asian cognition is holistic, whereas Western cognition is analytic.

The above mentioned differences were found to be reflected in visual

processing. Chua et al. (2005) recorded and compared American and Chinese

participants' eye movements when looking at naturalistic pictures. They found

that relative to Americans, Chinese had more saccades toward the background,

and were slower to look at the focal object. Boduroglu et al. (2009) demonstrated

that Asians have more broad visual attention compared to Americans in detecting

visual changes. Blais, Jack, Scheepers, Fiset, and Caldara (2008) recorded

Western Caucasians and East Asians' gaze patterns when they learned,

recognized, and categorized Western Caucasian and East Asian faces. They

found that neither race of the face nor culture of the observer was significant,

although observers showed advantage in recognizing same-race faces. They

also reported that whereas Caucasians looked more at the eyes, Asians spent

more time on the central area of the face (e.g., the nose), which could be seen as

the optimal and economic area to integrate visual information. The authors

considered that this might be because of the connotation of disrespect in direct

eye contact, and the holistic manner of visual processing in East Asian culture.

Rayner et al. (2007) compared Chinese and American participants' eye

movement in a series of tasks, including face and scene perception. They found

that, compatible with the findings of Chua et al. (2005), Chinese participants

showed more fixations and shorter fixation time on faces and scenes. In another

study (Masuda et al., 2008), Japanese and Caucasians were presented with

cartoons depicting a person with a certain emotional expression and surrounding

persons with emotional expressions different from or same as the central figure.

Eye tracking data indicated that Japanese spent more time looking at the

surrounding cartoon figures. Additionally, the emotion perception of the central

cartoon figure was found to be influenced by the surrounding cartoon figures for

Japanese viewers, but not American viewers.

Aside from holistic versus analytic perceptions, another commonly

employed orientation in cross-cultural studies of cognition, emotion, and behavior

is individualism and collectivism (Markus & Kitayama, 1991). Oyserman and Lee

(2008) reviewed comparative studies between individualistic and collectivistic

cultures, and concluded that the cultural differences based on this orientation are

salient and consistent. They also stressed that the differences are dynamic, not

static, e.g., the effect size changes with time and situation. Okazaki and

coworkers (Okazaki, 1997, 2000; Okazaki, Liu, Longworth, & Minn, 2002)

observed that Asian Americans, compared to European Americans, show more

depression and social anxiety. The authors reasoned that this is because in a

collectivistic culture one may need to inhibit self-expression more frequently. The

authors also noted that behavioral recordings, such as gaze aversion and

fidgeting, could not reflect the reportedly heightened levels of depression and

social anxiety in Asian Americans. This is because, as the authors argued, the

behavioral recordings may not be sensitive enough to register cultural difference, especially when the collectivistic culture encourages inhibiting behavioral expression of emotion. Park and Kim (2008) reasoned that because Asian culture encourages self-control of emotion, Asian participants should be found to use less open communication style and more nonverbal expression than Whites.

Dijker and Koomen (2007) used the data from the WVS to test their theories of social control. From hundreds of items in the WVS questionnaire, they selected questions asking participants' preferences of neighbors who have various deviances, e.g., drug addiction, AIDS, different race, different religion, different language, etc. The authors coupled participants' percentage rejection to the dimension of collectivism versus individualism. They found that African and Asian participants responded most negatively to all deviances with similar magnitude, Europeans showed least negativity with greatest variations toward these deviances, and Latin American and English speaking societies responded similarly, with more tolerance than Africans and Asians.

Hofstede's (2001) model was tested by Matsumoto, Nezlek, and Koopmann (2007) who used the data from Scherer and Wallbott (1994). Scherer and Wallbott collected data from about 3,000 participants across 37 countries using a questionnaire survey about anger, disgust, fear, happiness, sadness, shame, and guilt. Participants were required to describe situations that evoke these emotions in themselves, rate their subjective feelings, describe their reactions, and give appraisal of the situation. Matsumoto et al. compared the

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country-level means of emotions to Hofstede's (2001) scores of 5 cultural dimensions. They found that most of the differences in emotion were at an individual level; only a small portion of the differences could be explained by Hofstede's cultural dimensions. However, the authors suggested that culture may play a more important role in the expression of emotion, rather than emotional experience and subjective control, because social norms may exert a larger control on explicit behaviors.

Sorrentino et al. (2008) analyzed data from 58 Canadian university students and 64 Japanese university students on the uncertainty-avoidance dimension. Japanese culture was considered as uncertainty-avoided, and Canadian culture as certainty-oriented. Participants' orientation to certainty-uncertainty was assessed, and their emotions were measured by asking them to rate their usual emotional feelings on a 7-point scale, which were roughly divided into categories of active or passive, and positive or negative. Their findings indicated that an individual may experience more positive and fewer negative emotions if one's certainty-uncertainty orientation matches with that of one's culture (e.g., an uncertainty-oriented Canadian experiences more positive emotions than certainty-oriented Canadians).

Kitayama, Markus, and Kurokawa (2000) applied Schwartz's cultural orientations in their study contrasting Japanese and American college students' "good feelings." Focusing on Schwartz's orientations of autonomy and hierarchy, they differentiated engaged and disengaged emotions. Engaged emotions are

those related to others, e.g., shame, sadness, friendly, etc. For example, shame is evoked by failure to meet with others' expectations. Disengaged emotions, e.g., anger, disgust, joy, pride, put one's self over others. They expected to see discouraged expression of negative emotions in highly hierarchical societies (e.g., Japan), whereas negative emotion expression are thought as challenges to authority. Their results indicated that emotional wellbeing is positively correlated with positively "engaged" emotions for Japanese students, and positively "disengaged" emotions for American students, therefore supporting the two orientations of Schwartz's models.

Wong, Bond, and Mosquera (2008) tested Schwartz's value orientations using the data set from Scherer and Wallbott (1994). Wong and colleagues reported that nonverbal expression of shame, guilt, and fear is negatively associated with hierarchy, nonverbal expression of joy is positively related to autonomy, and verbal expression of anger is negatively related to anger. Their findings supported Kitayama et al. (2000) that a hierarchical society suppresses expression of negative emotions. The authors suggested that nonverbal expression of joy is an indication of individualism, and verbal expression of anger may reveal one's inability to achieve in a mastery society.

Compared to the studies contrasting East and West, fewer studies have focused on differences between White and Black. One of such studies (Haun, Rapold, Call, Janzen, & Levinson, 2006) examined spatial cognition in adults and children in Dutch and Namibia natives using a hiding-finding game, and reported

that the difference in spatial cognition is consistently correlated with differences in culture and language. However, the current study recruited African-Americans, who differ from African Blacks significantly in their cultures and languages, and many other aspects. It should be noted that African-Americans are usually counted as Westerners when contrasting with Easterners (Nisbett, 2003). Even though the previously reviewed literature discussed cultural differences among China, the United States, and African countries, the value systems of the African countries should not be applied to African-American culture without cautions; rather, African-American culture may have the value systems similar to European-Americans.

Culture and Stuttering

It appears that culture is not involved in the etiology of stuttering (Furnham & Davis, 2004) because stuttering afflicts approximately the same percentage of adults and children in each cultural group. However, culture may play an important role in the development and maintenance of stuttering. Starkweather (2002) remarked,

The preschool child's frustration at not being able to communicate rapidly is probably influenced by cultural norms and expectations of how quickly speech should be produced. If the child's reactions are not influenced by these norms, then at least the parents' reactions are influenced by them. So this is the first connection between the behavior of stuttering and the cultural milieu in which the child speaks. The child simply wants to express himself or herself, and is

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frustrated by the time the repeated syllables occupy. At this stage of stuttering

development, it is the child's, or perhaps the parents', culturally determined

expectation of how quickly speech should flow that contextually influences his or

her reaction. (p. 279)

Culture exerts influences on the development of stuttering indirectly via its

impact on various life aspects related to communication, e.g., the socially

acceptable communication style, and attitudes and behaviors of people that

communicate with PWS (e.g., parents, spouse, children, other family members

and relatives, friends, etc). Aberrant disruptions in the normal, rhythmic flow of

speech not only impair the efficacy and efficiency of face-to-face communication,

but also provoke emotional and psychological consequences in both PWS and

listeners. How PWS and listeners react to the abnormal breakdown in oral

communication, how strong is the society's negative perceptions toward PWS,

and what kind of help or discrimination the society gives to PWS, depend on

each individual's attitudes, values, and beliefs, which, collectively, reflect the

culture to which these individuals belong.

Culture may have an impact on the behaviors and emotions of PWS.

Faced with potential social punishment for their aberrant, yet uncontrollable

stuttering behaviors, PWS are known to have developed various forms of

secondary behaviors (e.g., lips biting, eyes blinking, tongue protruding, arms

swinging, foot stomping, etc.) and avoiding strategies (e.g., avoiding, substitution,

or circumlocution of certain sounds, words, situations). The pattern of these

compensatory strategies, as well as the frequency of the applications of them in daily life, seems to be conditioned by the social punishment to stuttering. The more severely one is punished because of one's stuttering behaviors, the more probable one will hide the stuttering behaviors with compensatory strategies. PWS' self-esteem and psychological well-being might also be conditioned by social punishment. People living in a more collectivistic society may have more depression and social anxiety because of the social norms to inhibit self-expression (Kitayama, et al., 2000); using the same logic, PWS in a more collectivistic society may feel more depressed, distanced, anxious, and unhappy, because of the stronger social control on deviances.

Culture also shapes the behaviors and emotions of those that interact with PWS. Different parenting styles were reported across cultural groups (Julian, McKenry, & McKelvey, 1994), which may cause differences in the development of stuttering, e.g., parents who emphasize self-control and school success may be more likely to apply higher standard on their children's fluency and evoke stuttering in their children. Support for this notion comes from Wendell Johnson's diagnosogenic hypothesis of stuttering, which suggested that parents, by mislabeling child's normal dysfluencies as true stuttering, cause stuttering in child (Johnson, 1959). Although this theory has been proven faulty, his idea still reverberates in modern stuttering treatment for children (e.g., the Lidcombe program; The Australian Stuttering Research Centre, 2006), which highlights adjusting parents' behaviors, rather than their stuttering child's speech. Support

regarding parents' role in the development of stuttering also comes from the demands and capacities model of stuttering (Manning, 2000). This model suggests that stuttering is triggered when social demand of speech ability far surpasses child's speech capacities. Therefore, high demands of speech ability increase child's possibility to develop stuttering. In adults, PWS consistently report that listeners' attitudes and reactions improve or worsen their fluency (Bobrick, 1996; Carlisle, 1985; Jezer, 1997; Klassen, 1995, 2002). Plexico and colleagues (Plexico, et al., 2005; Plexico, et al., 2009a, 2009b) investigated PWS' coping strategies to stuttering, and suggested that listeners' responses, together with PWS' emotional reactions to stuttering, constitute influential factors in the therapeutic efficacy of stuttering treatment as well as PWS' fluency level. As discussed previously, listeners' responses (e.g., eye contact, other nonverbal communications, emotions, perceptions, etc.) are influenced by their cultural background.

Cultural influence on stuttering also is externalized in various life aspects, limiting PWS' chances to establish friendships, start romantic relations, and get jobs, and reducing PWS' performance in jobs, ability to run daily activities, and general quality of life (Zhang, et al., 2009b). These social punishments of stuttering have been discussed previously as evidence of social discrimination, stereotypes, or stigma, against PWS, and may be seen as forms of social control that vary with cultures (Dijker & Koomen, 2007). A comparison across cultures in

social discrimination against PWS is not the focus of the current study, and thus will not be further addressed.

At this time, there are only a few empirical studies focused on PWS relative to racio-ethnic minorities (Robinson & Crowe, 2002). Proctor, Yairi, Duff, and Zhang (2008) pointed out that from 1916 to 2008, there were only four published papers specifically directed toward African-American PWS. Compared to Western cultures, where extensive studies of stuttering date back from 19th century (Rockey, 1980), PWS from other cultures, or minority groups in Western cultures, have received little attention from researchers. The lack of studies on stuttering parallels the lack of professionals in communication disorders in non-Western cultures and minority groups (American Speech-Language-Hearing Association, 2009). Whereas formal academic faculty was established in the United States in 1920s (Kalinowski & Saltuklaroglu, 2006), the year 2009 saw the first scientific publications on stuttering in peer-reviewed journals independently completed by researchers from mainland China (Lu et al., 2009; Lu et al., 2010), a country with about 1.3 billion people and approximately 13 million PWS.

Numerous studies have examined stuttering in Caucasian PWS. By default, when workers in the field of stuttering talked about PWS, they referr to European Caucasian PWS. Therefore, the previous literature review may be seen as primarily related to stuttering in Caucasians, if not specified as related to other ethno-racial groups. The largely neglected cultural variations of stuttering

necessitate a short discussion of stuttering in African-Americans and Chinese populations.

African-Americans. It is suspected that African-Americans may have a higher risk for stuttering and other developmental disorders (Mayo, et al., 2004). Blood, Blood, Kreiger, O'Connor, and Qualls (2008) reported that, African-American CWS are more likely to have coexisting learning disabilities, literacy disorders, attention deficit disorders, and behavioral disorders than White, Hispanic, or Asian CWS. However, this notion was not supported by the most recent prevalence study of stuttering in preschool African-American and European-American children (Proctor, et al., 2008), which indicated that the percentage of CWS was comparable in the two groups.

Leith and Mims (1975) reported that, in 25 African-American adolescents who stutter, a majority of them showed mainly covert stuttering behaviors, whereas most of their 25 White adolescents in their study showed overt stuttering behaviors. The authors reported that it seemed that the African-American PWS tried much harder to avoid and hide their stuttering, and they used more speech modifiers. The authors related the stuttering behaviors in the African-American PWS to the high status of oral ability and the different sociolinguistic connotation of "fluency" and "cool" in the Black community. Simply put, "fluency" requires a speaker to have continuous verbalization, and "cool" asks one to have total control of one's emotions. Therefore, African-American PWS tended to inhibit their overt stuttering behaviors to appear "fluent" or "cool." However, Olsen,

Steelman, Buffalo, and Montague's (1999) study could not repeat Leith and Mims'
(1975) finding. They contrasted behavioral characteristics of 15 African-American
and 15 White CWS in reading or conversing, and did not find significant
differences in primary, secondary behaviors, or attitudes toward speaking
situations.

Some of the social norms in African-American culture may have a
negative impact on PWS. Terrell and Jackson (2002) noted that some
components of African-American culture may impede oral communication for
PWS. For example, challenges to authorities, or disrespect to superiors are
inhibited (e.g., reducing direct eye contact with authorities); therefore, PWS may
have more chance to avoid communicating with authorities. The rule of turn-
taking also is not beneficial to PWS. One needs to be aggressive and assertive
to win the turn of speaking, and interrupting is commonly observed. With their
avoidance of speaking in public, as well as avoidance of speaking to authorities,
African-American PWS are more likely to be attached with negative stereotypes.

Knowledge of the cause and treatment of stuttering may be mythical or
stereotypical in African-American society. Mayo et al. (2004) conducted a
questionnaire survey comparing attitudes toward stuttering in 200 Caucasians
and 200 African-Americans. They reported that a majority of African-Americans
thought prayer as an effective treatment for stuttering, and more African-
Americans believed that stuttering could be controlled by the speaker. Similarly,
Robinson and Crowe (2002) reported that African-Americans maintain that

stuttering may be caused by mythical forces (e.g., the work of the devil, or the mother dropped the child as a baby).

In summary, it seems that stuttering does not affect African-Americans more than other ethnic groups. African-American culture may demand that PWS employ more avoidance strategies as compared to Caucasian PWS, but the difference may be small and may change over time. African-American listeners generally have a lack of knowledge about the etiology and treatment of stuttering.

Chinese. People's Republic of China is the most populous country in the world, and it has probably the largest population of PWS at the country level. The documentation of stuttering in China goes back to at least 2,000 years ago (Van Riper, 1982). However, there is a dearth of systematic research and evidence-based clinical treatment of stuttering.

To the best of the author's knowledge, there is no published data of the prevalence of stuttering in mainland China. In English literature, there is only one published paper about social awareness of stuttering in China (Ming, Jing, Wen, & Van Borsel, 2001), along with a number of casual observations. Sheree Reese from New Jersey, USA, traveled to China for four weeks in 1999, and talked to a few well-educated, young Chinese about stuttering (Reese, Hoffmann, & Li, 1999). Her impression was that these individuals did not have contact with PWS, knew nothing about professional help for PWS, and agreed that CWS should "exercise" on their fluency. Almost all of her respondents believed that stuttering could significantly limit employment opportunities.

With help from Van Borsel, Ming and her colleagues (Ming, et al., 2001) launched an "on the street" questionnaire survey in Shanghai about layperson's awareness of stuttering. Their data from 1,968 participants were compared to previous studies on Belgian people. Results indicated that Chinese people are more likely to believe that stuttering is a learned disorder, or with complicated origin, and show more eagerness to get their stuttering child treated.

Because of the lack of data, listeners' attitudes and responses to stuttering in mainland China can only be inferred from studies on Chinese that live outside China, or other Eastern Asians, regarding their perceptions toward stuttering and other communication disorders. For example, two studies completed in the United States by Bebout and Arthur (1992, 1997) indicated that Chinese tend to believe PWS could improve their fluency with hard work. Altenberg and Ferrand (2006) compared attitudes toward voice-disordered speakers among monolingual English, bilingual Cantonese-English, and bilingual Russian-English young females. They indicated that Chinese had the most negative perceptions toward severe voice disorders. Chan, McPherson, and Whitehill (2006) reported that Hong Kong Chinese have misapprehensions and superstitions toward people with cleft palate.

A unique effort was seen in Wright and Sherrard (1994a, 1994b) that examined therapy effectiveness as a factor of culture. They sent questionnaire surveys to 87 stuttering therapists in Britain, asking for stuttering treatment results for British Asian children and adolescents and White children and

adolescents. These clinicians reported a lower-than-expected number of Asian clients, and perceived less-effective therapies to Asian clients. The authors ruled out the possibility that clinicians' experience, exposure to Asian culture, and language barrier are causes for the less effectiveness with Asian clients. Instead, they stressed the importance of parental attitudes toward CWS and stuttering treatments for treatment effectiveness.

In summary, China remains a land where systematic study of stuttering is only fledging. There is no data regarding prevalence and incidence of stuttering in the Chinese population, albeit it might be safe to provide an estimation of 1 percent of prevalence and 5 percent of incidence. Different than Western countries, Chinese culture, language and social structures may contribute to different behavioral manifestation of stuttering, but no data are currently available. It is suspected that a large percentage of Chinese PWS might be victims of explicit discrimination against PWS in vocation, romantic relationships, schooling, etc., because of the society's collectivism and hierarchy.

CHAPTER III

SUMMARY AND RATIONALE

Stuttering is an involuntary and intermittent loss of control in the forward flow of rhythmic speech. It causes impairment in the oral communication and quality of life for PWS. Primary stuttering behaviors, such as syllabic repetitions, sound prolongations, and silent fixations, are oftentimes accompanied by struggling and tension-filled ancillary behaviors. These behavioral manifestations of stuttering may seem aberrant and threatening to listeners. Listeners usually respond to stuttering with negative emotional feelings, and have negative stereotypical perceptions toward PWS. Listener responses, especially those from parents and peers, have immediate and long-lasting influences on the psychological well-being of PWS. They are involved in PWS' motivation for therapy and therapy efficacy, and may contribute to the social punishment of PWS, limiting PWS in many life aspects, especially vocation and romantic relationship, and reducing their general quality of life. It is suspected that culture may play an important role in regulating listener responses to stuttering and consequently, the social punishment to PWS. Furthermore, culture, such as social norms of fluency and parenting styles, may exert influence on the development of stuttering in children.

The core component of culture, the value system, mediates the cognition, emotion, and behavior of people. Efforts have been made to describe the value system with a few dimensions or indexes that provide anchoring points or

orientations for cross-culture studies. Three models of the value system were discussed previously (Hofstede, 2001; Inglehart, 2006; Schwartz, 2006). These models differ in their theoretical drives and methodology, yet they show similarities in categorizing cultures. For example, differences between Easterners versus Westerners in cognition, emotion, and behavior have been found to be highly correlated with cultural dimensions and orientations, such as individualism versus collectivism, analytic versus holistic, harmony versus mastery, egalitarianism versus hierarchy, etc. However, these cultural models are based on nation-level data, and comparisons between subcultures (e.g., African-Americans and European-Americans) are usually made with descriptions (Terrell & Jackson, 2002).

With increased cultural awareness in North America, and increased understanding of cultural influences on cognition, emotion, and behavior, cross-cultural studies of stuttering are receiving more attention by scholars. Questions that need to be answered include, for example, the role of culture in the development and maintenance of stuttering, the social consequences of stuttering, and the establishment of culture-appropriate therapeutic programs for stuttering.

The current research aimed to examine listener responses to stuttering in European-American, African-American, and Chinese individuals. Eye gaze movement, psychophysiological reactions (e.g., SCR and HR), and attitudes toward PWS, were measured as listener responses. These measures were

selected because, they are highly correlated in nature, they are quite possibly different across cultures, they have been employed in previous studies of listener responses to stuttering, and they have various degrees of sensitivity. Therefore, these measures are capable of delivering a more comprehensive picture of listener responses to stuttering. Participants were chosen from these three cultural groups because these groups are among the most populous racio-ethnic groups in North America. Also, White versus Black, East versus West, are common key words in cross-cultural studies. In addition, cultural distance may be more salient between Eastern and Western societies, although African-American culture shares many commonalities with European-American culture. Therefore, the effect of culture on listener responses to stuttering may be more likely revealed by comparing these populations, and the result may carry more significant social implications.

It was expected that significant differences would be found between groups relative to listener responses toward stuttering at cognitive, physiological, and behavioral levels. Specifically, Chinese and African-American groups were hypothesized to show stronger negative attitudes toward PWS compared to European-Americans. African-Americans were hypothesized to show lower fluctuations in SCR and HR to stuttering speech relative to fluent speech compared to Chinese and European-American groups. African-Americans and Chinese groups were speculated to demonstrate fewer gaze fixations on speaker's eyes when listening to stuttering speech relative to fluent speech;

Chinese individuals might focus more on the facial center, and their gaze fixation might be much shorter compared to European-Americans.

The results of this study may help to improve cultural sensitivity of SLPs who treat stuttering clients and help to develop culture-appropriate stuttering treatment protocols. Also, the results may help social workers, public educators, stuttering help groups, and charity organizations to realize the difficulty in ameliorating negative listener responses to stuttering, develop better strategies to raise social awareness of stuttering, and eliminate negative social stereotypes and discriminations toward PWS.

CHAPTER IV

EXPERIMENT I

Introduction

Perceptions toward PWS have been extensively examined using paper-and-pencil studies. One of the first and most used format is the 25-item semantic differential bipolar scale, originally devised by Woods and Williams (1976). The 25 pairs of descriptive words were derived from their earlier work which had speech clinicians describe the characteristics of PWS (Yairi & Williams, 1970). Woods and Williams (1976) used this scale to ask groups of people with different degrees of exposure to stuttering to rate four hypothetical persons: a typical male PWS, a typical male CWS, a typical adult male, and a typical boy. They found that negative stereotypical perceptions toward PWS existed in all participant groups with similar strength, suggesting that these perceptions are independent of exposure to actual PWS.

The Woods and Williams' (1976) bipolar scale has been found to be a robust tool to measure perceptions and attitudes toward PWS. For example, Fowlie and Cooper (1978) compared 34 mothers of normally fluent children and 34 mothers of CWS relative to their ratings of their own children. They found that CWS were perceived more negatively compared to normally fluent children. Turnbaugh et al. (1979) applied this scale to 36 SLPs and found that these clinicians' professional experience in treating PWS did not change their negative stereotypical perceptions toward PWS. Horsley and Fitzgibbon (1987) used the

scale with speech clinicians, student clinicians, and teachers, and reported the existence of stereotypes toward CWS in all these groups. Doody et al. (1993) sent out 200 questionnaire surveys to residents in three small, rural communities in Newfoundland, Canada, and verified the negative stereotypical perceptions toward PWS.

Although Woods and Williams (1976) failed to find support to their hypothesis that listeners' stereotypical perceptions toward PWS are rooted in their exposure to stuttering, other researchers have found the questionnaire a convenient tool to test their hypotheses. White and Collins (1984) gave two groups of 40 students the 25-item scale with different instructions, one describing a normal PWS and the other a normally fluent speaker who experienced normal dysfluencies. Their results suggested that the stereotypes toward PWS originated from the negative emotional consequences of the naturally occurring stutter-like dysfluencies in normally fluent people. MacKinnon et al. (2007) asked a group of students to rate a hypothetical male PWS and a normally fluent speaker who experienced normal dysfluencies, and another group to rate a normally fluent speaker. Their results corroborated White and Collins' (1984) account, adding that these perceptions are based on listeners' rapid heuristic judgment of the speakers, and are adjusted constantly at a minuscule scale, usually toward the positive direction.

Other questionnaires have been tailor-made to fit researchers' specific aim or target group. Usually, these questionnaires contain attitudinal statements,

rather than bipolar descriptive adjectives about PWS' personality traits. For example, Hurst and Cooper (1983a) investigated vocational rehabilitation counselors' knowledge about stuttering and attitudes toward PWS with a questionnaire containing 15 attitudinal statements on a 5-point scale. Hurst and Cooper (1983b) designed a questionnaire with 7 statements on a 5-point scale to examine employers' perceptions toward PWS. Yeakle and Cooper (1986) devised The Teacher's Perception of Stuttering Inventory which contains 10 attitudinal statements on a 5-point scale.

Other questionnaires have been designed to provide more comprehensive pictures of listeners' perceptions toward PWS. Crowe and Walton (1981) formulated the Teacher Attitude Toward Stuttering Inventory with 36 statements on 5 different strengths of agreement. A significant effort from Cooper and colleagues was seen in their longitudinal studies of clinicians' attitude toward stuttering using the 50-item Clinicians' Attitudes Toward Stuttering scale (CATS; Cooper & Cooper, 1985, 1996). This scale also was used in their cross-cultural study between the United States and Great Britain (Cooper & Rustin, 1985). The CATS has been employed by other researchers in large-scale questionnaire surveys (St. Louis & Lass, 1981) and experimental studies to modify perceptions toward stuttering (Snyder, 2001). Recently, an ambitious project has been initiated to measure world-wide attitudes toward stuttering using the Public Opinion Survey of Human Attributes (St. Louis, Reichel, Yaruss, & Lubker, 2009).

Other than bipolar descriptions and attitudinal statements that usually ask participants to choose strength of agreement on a Likert scale, open-ended questions have been incorporated in questionnaires. Yairi and Williams (1970) and Lass et al. (1989) asked SLPs, and Ruscello, Lass, Schmitt, and Pannbacker (1994) asked special educators, to list descriptions of PWS. Ham (1990) had students randomly phone-call 563 persons in Florida, and ask "how would you describe stuttering?" All of these studies reported general negative descriptions toward stuttering and PWS.

In cross-cultural studies of attitudes toward stuttering, questionnaire surveys have provided valuable information. Bebout and Arthur (1992) examined attitudes toward four speech disorders (e.g., cleft palate, stuttering, speech of hearing impaired, and misarticulation) in 166 college students using a scale originally developed for the study. In post hoc analysis, they divided these students into major ethnic groups such as English, Japanese, Spanish, Chinese, Vietnamese, etc. They reported that participants born outside North America, especially Asians, were more likely to believe that people with speech disorders are emotionally disturbed, and that people with disordered speech could improve if they "tried hard." In a follow-up study using the same questionnaire translated into Chinese, Bebout and Arthur (1997) probed the attitudes of Cantonese-speaking Americans toward the four communication disorders. They reported similar findings. Mayo et al. (2004) devised a questionnaire with 16 items, mostly open-ended, to examine people's familiarity with PWS, knowledge about

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stuttering, and medical advice to PWS. Two hundred African-Americans and 200 Caucasian Americans, with an equal number of males and females in each group, were surveyed. Gender was not found to have a significant effect on participants' knowledge and attitudes toward PWS. However, African-Americans were found more likely to report that PWS close their eyes when stutter, that prayers help PWS, and that stuttering can be controlled by PWS, or by medication/drugs, or by applying ointment to the throat.

Summary and rationale. Based on these studies, it can be summarized that paper-and-pencil test is a robust tool in probing listener perceptions toward stuttering. By modifying instructions/descriptions of hypothetical individuals, the 25-item semantic differential bipolar scale is able to measure small changes/differences in attitudes toward PWS (MacKinnon, et al., 2007). Cultural differences in attitudes and perceptions can be appropriately assessed using questionnaire surveys (Cooper & Rustin, 1985). Open-ended questions mostly have been used to generate a pool of statements and/or adjectives for further studies (Lass, et al., 1989; Yairi & Williams, 1970); attitudinal statements are more frequently seen in studies targeted on specific groups (e.g., clinicians, special educators, university professors, employers, etc.) but not in comparative studies across groups, probably because of the different cultural context and the distortion of meanings in the translation. Therefore, the semantic differential bipolar scale seems to be the most valid form of cross-cultural study in examining listener perceptions toward PWS.

Cross-cultural studies on people's attitudes and perceptions toward PWS may provide valuable insight in regard to the social consequences stuttering brings to PWS, the formation and remediation of the stereotypical perceptions toward PWS, thus resulting in better approaches to educate the public about stuttering, and configuring better therapeutic programs for stuttering. This line of research has not been adequately explored, and some previous studies contained methodological flaws. For example, Bebout and Arthur (1992) did not have a priori criteria to control the sample size for each cultural group, and they did not control the possible difficulties their foreign-born participants have in understanding English descriptions of the speech disorders.

The current study aimed to investigate people's attitudes toward PWS as a function of their cultural background using the 25-item semantic differential bipolar scale (Woods & Williams, 1976). Specifically, participants were recruited from 3 different ratio-ethnic backgrounds: African-Americans, Chinese, and European-Americans. The following research questions were raised: 1) Do listeners show significantly more negative perceptions toward the hypothetical PWS compared to the hypothetical normally fluent speaker? 2) Do exposure to stuttering significantly change listeners' perceptions toward the hypothetical PWS? 3) Is culture a significant factor of participants' perceptions toward stuttering? It was expected that negative stereotypical perceptions toward PWS existed in each group; these perceptions are not expected to change significantly with

exposure to stuttering; and significant across-group differences are expected in some of the 25-item personality trait descriptions.

Method

Participants

One hundred and twenty participants completed the questionnaire survey. These participants were recruited via word of mouth from the faculty, staff, and students of East Carolina University, and local residents of Greenville, NC. Two participants were excluded from analysis because their answers were not comprehensible. Among the 118 participants included in analysis were 39 African-Americans (18 females and 21 males; age range = 18-53, *M* = 26.54, *SD* = 9.46), 41 European-Americans (30 females and 11 males; age range = 19-54, *M* = 27.12, *SD* = 8.48), and 38 Chinese (22 females and 16 males; age range = 22-57, *M* = 29.39, *SD* = 7.32). Their educational background and knowledge of stuttering are displayed at Table 2.

Participants self-reported not having a history of diagnosed speech, language, hearing, or cognition disorders, or any formal training in fields related to fluency disorder. All of the Chinese participants came to the United States after 18 years of age.

After being briefed about the aim and procedure of the experiments, participants signed an informed consent form (see Appendix A) approved by the University Medical Center Institutional Review Board, East Carolina University (see Appendix B). Participants were asked to complete the first questionnaire

before and the other after exposure to stuttering (e.g., watching video recordings

of stuttering and fluent speech samples).

Apparatus and procedure

Two questionnaires (see Appendix C) were formed, with the same

instruction asking participants to rate a hypothetical, typical "adult male who

stutters" and a "normal male adult speaker" with 25 pairs of antonymic adjectives

(Woods & Williams, 1976) on a 7-point scale. The two questionnaires differed in

the order of the 25 items. In the first questionnaire, the word pairs were listed in

the original order of Woods and Williams (1976); in the other, these items were

pseudo-randomized. European-American and African-American participants

received the questionnaires in English. Chinese participants received the

questionnaires in English with Chinese translation of the adjectives in brackets

(see Appendix D). The translation was completed by the author of the

dissertation and verified by a university faculty member. Both were fluent in

Chinese and English.

Table 2. *Familiarity with PWS and Educational Background of Participants in Experiment I*

	Cultural group		
	African-American	European-American	Chinese
Number of PWS they know			
None	7	13	16
1-2	20	21	18
3-5	9	5	3
Above 5	3	2	1
Educational Background			
Some school	1	0	0
High school graduate	5	0	0
Some college	8	7	1
2 year college	6	5	0
4 year college	8	8	3
postgraduate	11	21	34

Results

Descriptive analysis

Participants' ratings were scored 1-7 according to the scale. The means and standard errors of their ratings to the two hypothetical individuals prior to exposure to stuttering are listed in Table 3 for African-American participants, Table 4 for European-American participants, and Table 5 for Chinese participants. Mean scores in rating a hypothetical normally fluent speaker and a hypothetical stuttering speaker before and after exposure to stuttering are displayed in Figure 4 for African-American participants, Figure 5 for European-American participants, and Figure 6 for Chinese participants. For better readability, the order of the 25 pairs of antonymic adjectives was rearranged based on the European-American participants' ratings before exposure to stuttering. Generally, for the word pairs on the top of the figures, listeners agreed more strongly to the use of the first word of the pair to describe the PWS; for the items on the bottom, listeners agreed more strongly to the use of the second word of the pair to describe the PWS; in the middle, listeners showed little differences in their perceptions toward the two hypothetical individuals with different fluency levels.

Negative perceptions toward PWS

To answer the first research question, whether listeners show negative perceptions toward PWS, paired *t*-tests were conducted using PASW (Version 17, SPSS Inc., Chicago, IL) for each cultural group on the data of participants' perceptions toward the two hypothetical speakers prior to exposure to stuttering.

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The significance level was set at α = 0.002 (0.05 / 25). Results are displayed in Tables 3, 4, and 5.

For the African-American group, significant results were seen for 12 out of 25 items, indicating that African-American participants judged the hypothetical adult male who stutters as guarded, nervous, shy, self-conscious, anxious, withdrawn, quiet, reticent, avoiding, afraid, introverted, and insecure, as compared to the hypothetical normally fluent individual. The ratings of European-American participants to the two hypothetical individuals showed the most items with significant differences (19 out of 25). European-American participants showed similar negative perceptions toward PWS as those of African-Americans; in addition, European-American participants considered the hypothetical PWS as tense, sensitive, fearful, passive, hesitant, perfectionistic, and self-derogatory, relative to a normally fluent individual. Chinese participants demonstrated significant results for 15 out of 25 items, which overlapped with those of African-American and European-American participants. For the Chinese participants, a hypothetical PWS had personality traits of being nervous, shy, self-conscious, tense, sensitive, anxious, withdrawn, dull, reticent, avoiding, fearful, passive, afraid, introverted, and hesitant, compared to a normally fluent individual.

The effects of culture and exposure

Repeated measures ANOVAs were conducted with PASW (Version 17) on the 25 item data to examine the effect of culture (e.g., group) and exposure to stuttering (e.g., before and after watching the videos of stuttering and fluent

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speech samples) on participants' perceptions toward PWS relative to those toward normally fluent speakers. The significance level was set at $\alpha = 0.01$. Post hoc analyses were conducted with Bonferonni adjustment to further examine the differences among cultures.

Significant results are displayed in Table 6. Culture showed a significant effect on listeners' perceptions toward PWS in 6 personality traits. Pairwise comparisons indicated that relative to European-Americans, Chinese participants considered PWS to be significantly less guarded, less quiet, less insecure, less perfectionistic, but duller and more inflexible. African-American participants showed similar results as European-American participants in all except one item, perfectionistic-careless; that is, African-Americans considered PWS to be less perfectionistic compared to European-Americans. In contrast to African-Americans, Chinese participants considered PWS as less quiet, less insecure, but duller.

The main effect of exposure was not significant for each item. However, marginal significance ($p < 0.05$) existed in a few items, indicating that after watching the videos of fluent and stuttering speech samples, participants rated the PWS as being more unpleasant ($p = 0.018$, $\eta^2 = 0.05$, $\phi = 0.66$), more hesitant ($p = 0.029$, $\eta^2 = 0.04$ $\phi = 0.10$), and less perfectionistic ($p = 0.36$, $\eta^2 = 0.04$, $\phi = 0.56$).

The interaction effect of culture by exposure was significant on only one pair, bragging versus self-derogatory ($p < 0.001$, $\eta^2 = 0.13$ $\phi = 0.96$). Prior to

exposure to stuttering, all participant groups judged the hypothetical PWS as more self-derogatory than the normally fluent individual; after exposure to stuttering, the negative perception toward PWS was strengthened in African-American participants, but remained basically unchanged in Chinese participants and became weaker in European-American participants.

Table 3. *Mean Ratings toward A Hypothetical PWS and A Hypothetical Normally Fluent Speaker by African-American Participants Before Exposure to Stuttering*

Bipolar	2-tails paired α = 0.002	Fluent Mean	SE	PWS Mean	SE
Open-guarded	0.0000*	2.6923	0.2753	4.5385	0.2460
Nervous-calm	0.0004*	4.6923	0.2299	3.3077	0.3055
Cooperative-uncooperative	0.2243	3.4872	0.2349	3.0769	0.2447
Shy-bold	0.0000*	4.6154	0.2481	2.9231	0.2420
Friendly-unfriendly	0.4242	3.1538	0.2281	2.9231	0.2582
Self-conscious-self-assured	0.0001*	4.4359	0.2403	2.7179	0.3180
Tense-relaxed	0.0023	4.3333	0.2606	3.1026	0.2669
Sensitive-insensitive	0.0027	4.1026	0.2198	3.1538	0.2127
Anxious-composed	0.0002*	4.2821	0.2293	2.8205	0.2290
Pleasant-unpleasant	0.2870	3.5385	0.2199	3.2308	0.2125
Withdrawn-outgoing	0.0001*	4.8974	0.2566	3.3846	0.2283
Quiet-loud	0.0000*	4.5385	0.2696	2.7436	0.2742
Intelligent-dull	0.3236	3.4359	0.1902	3.2051	0.2386
Talkative-reticent	0.0000*	3.0769	0.2276	5.1538	0.2762
Avoiding-approaching	0.0000*	4.8718	0.2240	3.3846	0.2715
Fearful-fearless	0.0045	4.6923	0.2115	3.7692	0.2394
Aggressive-passive	0.0107	3.7692	0.2785	4.6667	0.2023
Afraid-confident	0.0001*	5.0513	0.2263	3.5897	0.2286
Introverted-extroverted	0.0000*	4.7692	0.1854	3.2308	0.1994
Daring-hesitant	0.0321	3.5641	0.2459	4.3077	0.2576
Secure-insecure	0.0020*	3.1026	0.2592	4.3590	0.2761
Emotional-bland	0.8674	3.6923	0.2299	3.7436	0.2101
Perfectionistic-careless	0.5897	4.0256	0.2126	3.8974	0.1593
Bragging-self-derogatory	0.1027	3.5641	0.2719	4.1026	0.2136
Inflexible-flexible	0.2790	4.5385	0.1939	4.2308	0.1779

Note. "*" = significant at α = 0.002. "SE" = Standard error.

Table 4. *Mean Ratings toward A Hypothetical PWS and A Hypothetical Normal Speaker by European-American Participants Before Exposure to Stuttering*

Bipolar	2-tails paired α = 0.002	Fluent		PWS	
		Mean	SE	Mean	SE
Open-guarded	0.0000*	3.0976	0.1841	4.7805	0.1897
Nervous-calm	0.0000*	5.1707	0.1597	2.8049	0.2187
Cooperative-uncooperative	0.0021	3.3171	0.1761	2.6341	0.1999
Shy-bold	0.0000*	4.7073	0.1755	2.8293	0.1777
Friendly-unfriendly	0.4923	2.8537	0.1993	2.7073	0.2188
Self-conscious-self-assured	0.0000*	4.8780	0.1753	2.3171	0.1927
Tense-relaxed	0.0000*	5.1220	0.1682	3.0000	0.1881
Sensitive-insensitive	0.0003*	4.1463	0.1545	3.1951	0.1888
Anxious-composed	0.0000*	5.0244	0.1728	2.9756	0.1797
Pleasant-unpleasant	0.1766	2.9268	0.1652	2.6829	0.2049
Withdrawn-outgoing	0.0000*	4.9756	0.1619	3.3415	0.1963
Quiet-loud	0.0000*	4.7805	0.1419	3.0976	0.1668
Intelligent-dull	0.7147	3.2683	0.1639	3.1951	0.1822
Talkative-reticent	0.0000*	2.8293	0.1811	4.8780	0.1887
Avoiding-approaching	0.0000*	5.1707	0.1558	3.4390	0.1442
Fearful-fearless	0.0000*	5.0488	0.1673	3.5122	0.1527
Aggressive-passive	0.0000*	3.4878	0.1445	4.5854	0.1481
Afraid-confident	0.0000*	5.3171	0.1280	3.5366	0.1714
Introverted-extroverted	0.0000*	4.7317	0.1676	3.0976	0.1704
Daring-hesitant	0.0000*	3.1220	0.1645	4.7073	0.1407
Secure-insecure	0.0000*	2.7317	0.1308	4.7073	0.2044
Emotional-bland	0.0033	4.1220	0.1448	3.5854	0.1103
Perfectionistic-careless	0.0005*	4.3171	0.1181	3.4878	0.1785
Bragging-self-derogatory	0.0000*	3.0244	0.1581	4.5122	0.1165
Inflexible-flexible	0.0657	4.2683	0.1781	4.6585	0.1423

Note. "*" = significant at α = 0.002. "SE" = Standard error.

Table 5. *Mean Ratings toward A Hypothetical PWS and A Hypothetical Normal Speaker by Chinese Participants Before Exposure to Stuttering*

Bipolar	2-tails paired α = 0.002	Fluent Mean	SE	PWS Mean	SE
Open-guarded	0.4558	3.6316	0.1825	3.8947	0.2607
Nervous-calm	0.0000*	4.4737	0.1676	3.3158	0.2643
Cooperative-uncooperative	0.6684	3.2632	0.1756	3.1579	0.2049
Shy-bold	0.0000*	4.1053	0.0630	2.6316	0.1662
Friendly-unfriendly	0.0946	3.1053	0.1720	2.7368	0.1874
Self-conscious-self-assured	0.0000*	5.0789	0.1660	2.9737	0.2247
Tense-relaxed	0.0000*	5.0263	0.1707	2.7895	0.2105
Sensitive-insensitive	0.0013*	3.7105	0.1456	2.9737	0.1941
Anxious-composed	0.0000*	4.8158	0.1681	3.5789	0.2220
Pleasant-unpleasant	0.2015	3.0789	0.1572	3.4474	0.2222
Withdrawn-outgoing	0.0000*	5.1053	0.1635	3.8158	0.1842
Quiet-loud	0.0553	4.0000	0.1307	3.4737	0.2091
Intelligent-dull	0.0015*	3.3158	0.1649	4.1316	0.1776
Talkative-reticent	0.0000*	3.1579	0.1709	4.5789	0.2283
Avoiding-approaching	0.0000*	4.9474	0.1807	3.7895	0.1735
Fearful-fearless	0.0001*	4.7632	0.1786	3.5000	0.2022
Aggressive-passive	0.0018*	3.0000	0.1809	3.9474	0.1958
Afraid-confident	0.0000*	5.1579	0.1750	3.5789	0.2283
Introverted-extroverted	0.0000*	4.8947	0.1678	3.4737	0.2125
Daring-hesitant	0.0002*	3.1842	0.1763	4.2368	0.1902
Secure-insecure	0.6340	3.5000	0.1676	3.3947	0.1750
Emotional-bland	0.1660	3.6316	0.1662	3.3158	0.1890
Perfectionistic-careless	0.6607	3.6316	0.1704	3.5526	0.1716
Bragging-self-derogatory	0.0033	3.6053	0.1224	4.3158	0.1773
Inflexible-flexible	0.0033	4.3684	0.1619	3.5263	0.2022

Note. "*" = significant at *p* = 0.002. "SE" = Standard error.

Figure 4. Mean Ratings toward The Hypothetical Speakers by African-American Participants Before and After Exposure to Stuttering.
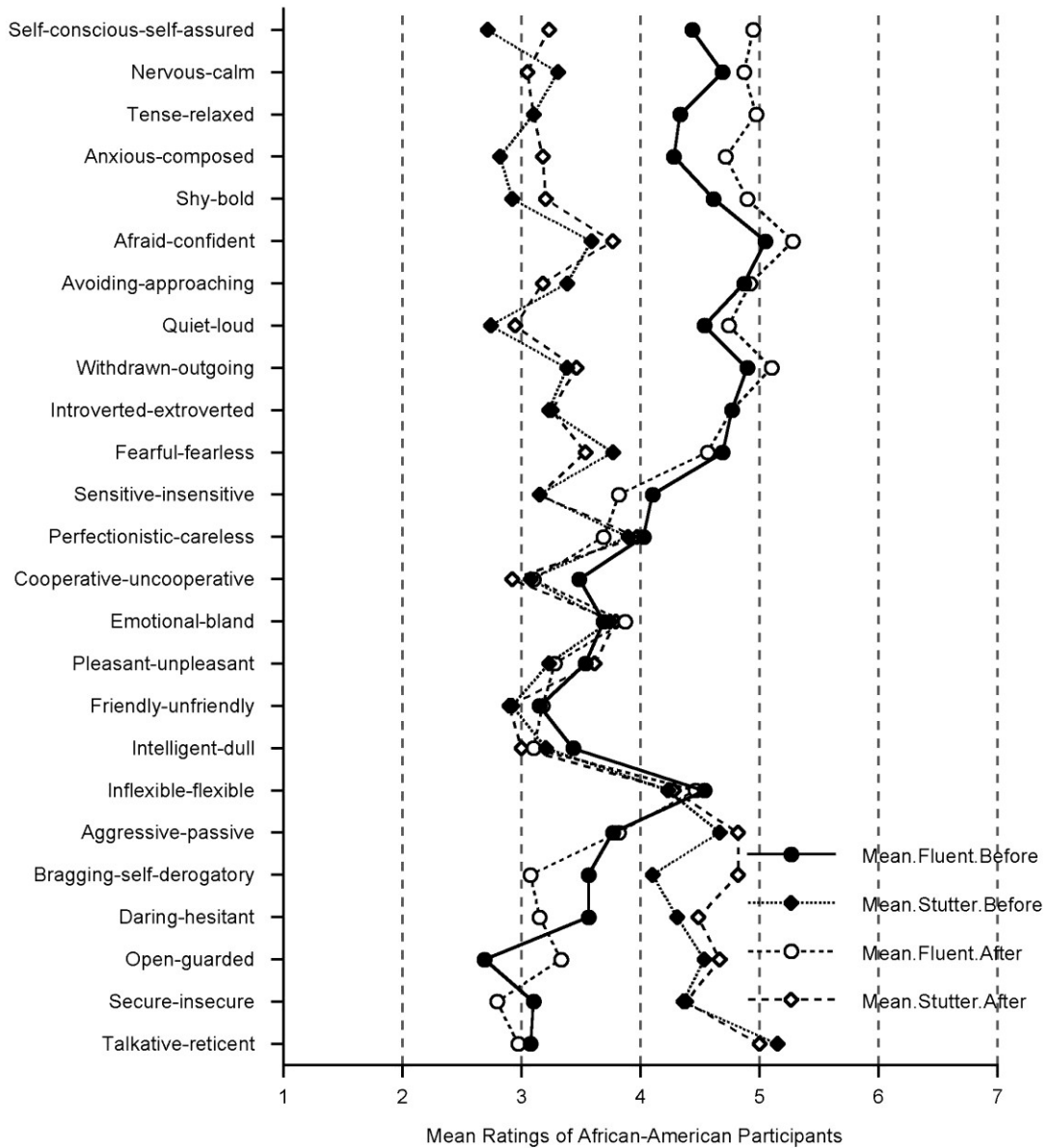
Figure 5. Mean Ratings toward The Hypothetical Speakers by European-American Participants Before and After Exposure to Stuttering.
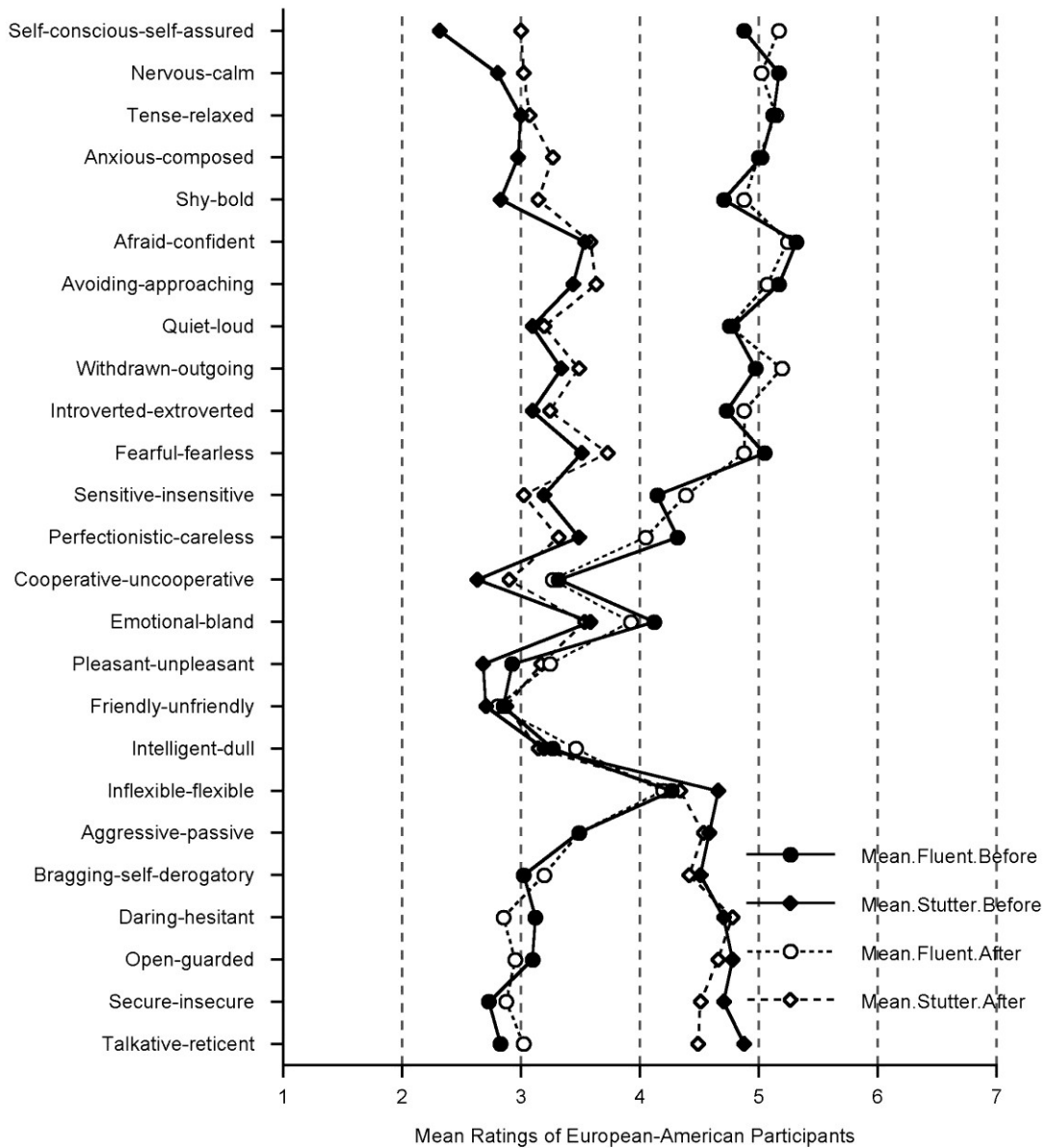
Figure 6. Mean Ratings toward The Hypothetical Speakers by Chinese Participants Before and After Exposure to Stuttering.
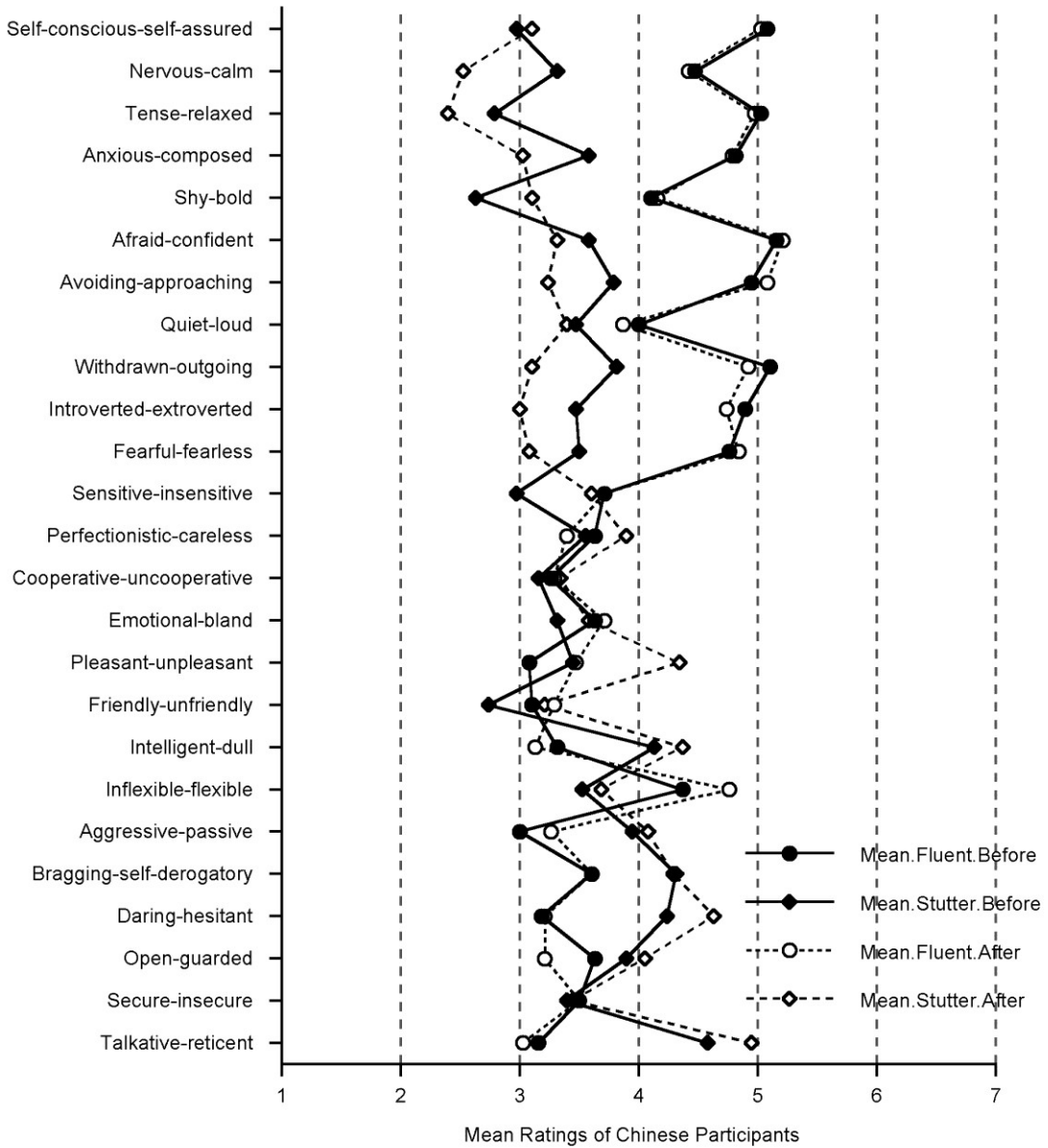
Table 6. *Significant Effects on Perceived Personality Traits of Speakers*

Item	df	F	p	η^2	ϕ	Post hoc *p*-value
Culture						
Open-guarded	(2, 115)	5.735	0.004	0.09	0.86	CN vs. EA 0.007* CN vs. AA 0.019 AA vs. EA 1.000
Quiet-loud	(2, 115)	9.328	< 0.001	0.14	0.98	CN vs. EA 0.002* CN vs. AA <0.001* AA vs. EA 1.000
Intelligent-dull	(2, 115)	11.050	< 0.001	0.16	0.99	CN vs. EA <0.001* CN vs. AA <0.001* AA vs. EA 1.000
Secure-insecure	(2, 115)	7.750	< 0.001	0.24	1.00	CN vs. EA <0.001* CN vs. AA <0.001* AA vs. EA 0.748
Perfectionistic-careless	(2, 115)	9.502	< 0.001	0.14	0.98	CN vs. EA <0.001* CN vs. AA 1.000 AA vs. EA 0.002*
Inflexible-flexible	(2, 115)	9.914	< 0.001	0.15	0.98	CN vs. EA <0.001* CN vs. AA 0.035 AA vs. EA 0.195
Culture × Exposure						
Bragging-self-derogatory	(2, 115)	8.197	< 0.001	0.13	0.96	

Note. CN = Chinese, EA = European-American, AA = African-American. α = 0.01.

Post hoc analysis was Bonferonni adjusted with significance set at 0.017 (0.05 /

3). Significant items were marked with a "*."

Discussion

This experiment examined listeners' attitudinal and perceptional responses toward speakers as a function of speaker's fluency, listener's cultural background, and exposure to stuttering. This was the first study that investigated the change in listener perceptions toward PWS brought about by exposure to stuttering in culturally diverse settings. Groups of African-American, Chinese, and European-American participants reported their perceptions of a hypothetical PWS and a hypothetical normally fluent speaker on a 25-item semantic differential bipolar scale (Woods & Williams, 1976), before and after watching video recordings of stuttering and fluent speech samples from three male Caucasian speakers. Comparisons were made with multiple paired *t*-tests between their perceptions toward the two hypothetical individuals prior to exposure to stuttering, and examination of their perceptions was employed with multiple repeated measures ANOVA as a function of fluency, exposure, and culture.

The main findings of this study were as follows. First, all cultural groups showed negative stereotypical perceptions toward PWS. Secondly, cultural difference was evident in listener responses toward PWS, especially between Chinese and Americans. Thirdly, exposure to stuttering did not change listener responses toward PWS. Lastly, after exposure to stuttering, listeners from different cultural backgrounds showed differential changes in their perceptions regarding the PWS' personality trait of bragging versus self-derogatory.

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The first important finding was that negative stereotypical perceptions toward PWS existed in all participant groups. In the 25 semantic differential bipolar scale, a majority of the items (12 out of 25 for African-Americans, 19 out of 25 for European-Americans, and 15 out of 25 for Chinese participants) were found significantly different between listener perceptions of a typical PWS and a typical normally fluent speaker. Unanimously, in all these items with significant differences, the hypothetical PWS was tagged with negative descriptions. This finding resonates with previous results relative to negative stereotypes of PWS (Doody, et al., 1993; White & Collins, 1984; Woods & Williams, 1976) and highlights the omnipresence of the negative perceptions toward PWS.

The second important finding was that culture made a difference in listener perceptions toward PWS. Repeated measures ANOVAs with each item revealed that culture had a significant impact on 6 out of 25 items. Further analysis indicated that the cultural differences were mainly between Chinese and American groups. Compared to European-Americans, Chinese participants considered the PWS as less guarded, less quiet, less insecure, less perfectionistic, but duller, and more inflexible; compared to African-Americans, Chinese participants thought the PWS as less quiet, less insecure, but duller. European-American and African-American participants had similar perceptions, except that African-American participants considered the PWS as less perfectionistic. The similarity in the American groups and the differences between Chinese and American groups were not surprising, considering that cross-

cultural studies have reported great differences between Eastern and Western societies, and African-American culture is usually incorporated into the American, and therefore, Western culture.

It is interesting to see that unlike European-Americans, Chinese and African-Americans considered the PWS as less perfectionistic. This observation is possibly due to the different interpretations of struggling behaviors and different connotations of perfectionism among these ethno-racio groups. Whereas European-Americans might see struggling stuttering behaviors as a manifestation of an innate drive to complete speech output, therefore denoting perfectionism, African-American and Chinese individuals might consider perfectionism as speaking fluently and flawlessly, and therefore, stuttering behaviors could be more aptly considered as reflecting the speaker's carelessness. This possible difference may be related to cultural differences in the orientations of individualism versus collectivism, and harmony versus mastery. In Schwartz's (2006) cultural map, China and a number of African societies are located closely on the end of high embeddedness and low mastery, whereas the United States sits on a point of high mastery and relatively high autonomy. African-American culture can be considered as sharing similarities with African cultures in embeddedness, or collectivism, considering the importance of the church, school, and family in their community (Billingsley & Caldwell, 1991). In a collectivism culture, the personality traits of perfectionistic may mean trying one's best to behave like others, and stuttering behaviors,

because of their aberrancy, cannot be considered as carrying the merit of perfectionism. In a culture with a high mastery score, individual effort to accomplish is highly admired, and therefore, struggling behaviors, such as stuttering, could be seen as evidence of perfectionism.

Chinese participants considered the PWS as less quiet and less insecure compared to both American groups, and less guarded and less flexible compared to European-Americans. The cultural orientation of hierarchy versus autonomy might help to provide an interpretation for these differences. Specifically, China is a highly hierarchical society, and struggling behaviors, because of their negative emotion expression, are usually seen as challenges to authorities (Kitayama, et al., 2000). The video samples of stuttering speech used in this experiment had numerous depictions of struggling behaviors. These overt, aberrant stuttering behaviors might be seen as offending and threatening by Chinese listeners, who later judged the hypothetical PWS as less quiet, less insecure, less guarded, and less flexible. With the cultural preference to inhibit the expression of emotion, especially negative emotion (Kitayama, Markus, & Kurokawa, 2000), Chinese listeners may have a stronger tendency to believe that a PWS should inhibit, or hide, his or her overt stuttering behaviors, compared to American listeners.

Strikingly, unlike Americans listeners, Chinese participants rated the hypothetical PWS as much duller relative to the hypothetical normally fluent speaker. This result suggests a lack of knowledge about stuttering in the Chinese participants because research has established that as a group, PWS are not

different in intelligence (Bloodstein & Bernstein-Ratner, 2008). Considering that almost all of the Chinese participants were either graduate students in an American university, or held graduate degrees, representing an intellectually elite group of Chinese, it could be inferred that the general public in China has a great lack of knowledge about stuttering.

Another finding of this study was that exposure to stuttering did not have a beneficial effect on listener perceptions toward PWS. In general, listener perceptions toward the hypothetical PWS relative to the hypothetical normally fluent speaker remained unchanged after observing stuttering speech. However, marginal significance ($p < 0.05$) was found for a few items, suggesting that listeners judged the personality traits of PWS as more unpleasant, more hesitant, and less perfectionistic, after exposure to stuttering. The results illustrated the persistence and robustness of listeners' negative stereotypical perceptions toward stuttering, which corroborate previous observations (McGee, et al., 1996; Snyder, 2001; Woods & Williams, 1976). Interestingly, in Guntupalli et al. (2007), when normally fluent listeners were presented with video recordings of stuttering and fluent speech samples, they self-reported to feel more unhappy, aroused, nervous, uncomfortable, sad, tense, unpleasant, avoiding, embarrassed, and annoyed while witnessing stuttering speech relative to fluent speech. Therefore, it is possible that listeners' perceptions of the PWS were projections of what they felt: they judged the hypothetical PWS as more "unpleasant" after seeing

stuttering manifestation because stuttering behaviors made them feel "unpleasant" (Guntupalli, et al., 2007).

Exposure to stuttering did have a differential impact on listeners from various cultures with one word pair, bragging versus self-derogatory. Every cultural group judged the hypothetical PWS as having the personality of self-derogatory before exposure to stuttering; however, after observing stuttering, this judgment became weakened in European-Americans, remained unchanged in Chinese participants, and was strengthened in African-Americans. This observation is probably related to African-American culture's emphasis on expressive communication and oral tradition (Daniels, Hagstrom, & Gabel, 2006). Specifically, decreased ability to effectively communicate expressively adversely affects one's status in the community and therefore is self-derogatory.

In their judgments of the two hypothetical individuals prior to exposure to stuttering, European-American participants showed the most items with significant changes (19 out of 25) whereas African-American and Chinese participants had much fewer significant items (12 and 15 out of 25, respectively). However, this result might not be because European-Americans had the more negative perceptions toward the PWS than African-American and Chinese individuals. An alternative explanation might be related to participants' education level as well as validity of the scale. A majority of African-American participants were undergraduate students, whereas the majority of European-American and Chinese participants were graduate students or had graduate degrees. Although

Chinese participants had on average the highest education level, the semantic differential bipolar scale (translated into Chinese) was originally based on American individuals' descriptions of PWS (Woods & Williams, 1976), and therefore, may not be the best measurement for Chinese individuals' perceptions.

Certain limitations in the research design and participant recruitment should be carefully weighted before extrapolating the current findings to other areas. First of all, the participants were conveniently selected from university students and local residents in the southeastern coast of North America; therefore, they might not be representative of people from other areas. Secondly, all but three of Chinese participants in this study were either graduate students at East Carolina University or held graduate degrees from an American or Chinese institution of higher education. They had, on average, a much higher education than typical Chinese individuals on mainland China, and also they had lived in the United States for a period spanning from a few days to almost 10 years, with the majority between 1 to 3 years. With better education and contact with the Western culture, these Chinese participants might have less negative stereotypes toward disorders compared to typical Chinese individuals. Therefore, the negative stereotypical perceptions toward PWS in the Chinese culture might be underestimated. Thirdly, the speech samples for the current experiment were from three speakers, each of whom produced stuttering and fluent speech. Originally this was to control some nuance variables, such as voice quality and facial features; however, it caused confusion in some participants who

considered these speakers to be "faking" stuttering. This may have impacted their opinions of the hypothetical speaker. Fourthly, the three speakers were all male Caucasians, and the questionnaire instructed the participants to rate a typical adult "male" PWS or fluent speaker. It remains unknown whether listener responses might change if they observed stuttering from speakers with the same ethno-racial and linguistic background, or a hypothetical "female" PWS.

Future studies may target at profiling negative perceptions toward PWS in various other cultures. Parents, children, and adolescents' perceptions toward PWS should be examined with priority because of their pertinent impact on the development of stuttering and therapeutic efficacy. In addition to exposure to stuttering, other forms, such as educational lectures, documentary films, etc., might be studied in other cultures relative to their possible influence on listener responses toward PWS. Culture-appropriate questionnaires should be developed to establish more sensitive measures of listener responses from non-English speaking societies.

These findings are of social and clinical importance. The findings provide out detailed descriptions of negative stereotypical perceptions toward PWS in three cultural groups. These profiles could aid stuttering help groups in devising better strategies to eliminate the negative stereotypes of PWS. For example, to educate the general public, it may be more effective to depict a PWS or CWS as "open," "bold," and "outgoing" rather than "friendly" in American society. In China, one public misconception needs to be propelled and replaced with the notion that

PWS are as intelligent as others. Combined with surveys and self-reports from PWS regarding social discriminations they receive in various life aspects, this line of study may provide a comprehensive understanding of social punishment to stuttering, and may assist the stuttering help groups in improving quality of life for PWS.

CHAPTER V

EXPERIMENT II

Introduction

The basics of electrodermal activity. Psychophysiological study focuses on the relation between physiological measures (e.g., skin conductance, heart rate, and blood flow, etc.) and mind (e.g., emotion, memory, and planning, etc.; Porges, 1997; Rolls, 2005). One of the most widely used physiological measures is electrodermal activity (EDA), usage of which dates back to the 19th century (Boucsein, 1992). In the human body, EDA is produced by the activity of the eccrine sweat glands. An eccrine gland is a single tubular structure consisting of a secretory portion at the subcutaneous tissue (i.e., hypodermis), and a dermal duct that opens a small pore at the surface of the epidermis (Saga, 2002). When the sweat goes up from the secretory portion via the dermal duct to the skin surface, the electrical property of the skin is changed. The eccrine glands are distributed almost all over the body surface, with the greatest density in the palms of the hands and the soles of the feet (e.g., about 600-700 glands per cm² on the palm), followed by the forehead and forearm (Morris, Dische, & Mott, 1992). The number of eccrine glands is genetically determined and varies significantly among individuals, usually between 2-5 millions in total (Boucsein, 1992; Saga, 2002).

The eccrine glands receive abundant neural innervations from the sympathetic nerve system via acetylcholine (Andreassi, 2000; Sequeira, Hot,

Silvert, & Delplanque, 2009). Distally, the eccrine gland activity is regulated by a complex, large-scale distribution of various cortical and subcortical brain areas, including the premotor cortex, sensorimotor cortex, limbic area, and the reticular formation (Andreassi, 2000). Boucsein (1992) suggested that EDA is controlled by three systems related to arousal, emotion, and locomotion. The reticular formation controls the arousal through gradual changes (Mesulam, 2000). The motor cortex, along with some parts of the basal ganglia, regulates locomotion. The limbic area (e.g., hypothalamus, cingulate gyrus, and hippocampus) is mostly noted for its emotional regulation of EDA (Critchley, Elliott, Mathias, & Dolan, 2000; Fredrikson et al., 1998; Mangina & Beuzeron-Mangina, 1996; Sequeira, et al., 2009).

EDA is usually measured by skin conductance and skin potential, both of which are dependent on the amount of sweat secreted by the eccrine glands. In psychophysiological studies, skin conductance measure is preferred over skin potential measure (Fowles et al., 1981). This is because skin potential measure is biphasic and thus difficult to interpret, whereas skin conductance shows a positive relation with arousal level, making it easier to understand. Additionally, skin potential measure is more likely to be influenced by hydration. Skin conductance is the reciprocal of skin resistance, but skin conductance is more favored by researchers because its data fit better into a normal distribution model (Andreassi, 2000). Skin conductance can be differentiated as the tonic change (skin conductance level [SCL]) and the phasic change (skin conductance

response [SCR]). SCL is the skin conductance change over a period of time; SCR, previously referred to as Galvanic skin response, is the contingent reaction to a stimulus.

The basics of heart rate. The heart and its activity have been thought to be involved with emotional and cognitive changes (Porges, 1997; Rolls, 2005). Psychophysiologists mainly focus on the correlation of heart activity and emotion.

The heart is a muscular organ responsible for pumping blood to other body organs via arteries; the blood then flows back to the heart via veins. The heart contains four chambers: the right and left atria on the top, and the right and left ventricles on the bottom. The right atrium receives blood from all body organs except the lungs. The blood then flows from the right atrium to the right ventricle and from there to the lungs. The lung removes carbon dioxide and adds oxygen to the blood, which then returns to the left atrium and later left ventricle, which propels the blood to the rest of the body (Levy & Pappano, 2007). During its circulation, the blood delivers nutrients and oxygen to other body organs, takes away wastes, and transmits hormones and other messengers (Katz, 2001).

The heart achieves this function by its spontaneous, rhythmic contractions (Levy & Pappano, 2007). The muscular cells with the ability to generate cardiac rhythmic contraction reside mainly in the nodal tissues or specialized fibers of the heart: namely, the sinoatrial (SA) node, the atrioventricular (AV) node, and the Purkinje fibers. The sinoatrial node, located on the rear wall of the right atrium and joining with the superior vena cava, is the natural pacemaker of the heart

(Katz, 2001). This is where the heart beat begins. The neural impulse of contraction spreads out to both right and left atria, and reaches a relay point, the AV node, located on the right side of the wall between the right atrium and the right ventricle. The AV node sends out the neural signals to both right and left ventricles via AV bundles (also called bundle of His) and finally, the Purkinje fibers that innervate the myocardiac cells (Katz, 2001). The SA node contracts at 120 beats per minute (BPM); the AV node and the Purkinje cells contract at about 30-40 BPM and they may serve as a safety mechanism when the SA node malfunctions (Levy & Pappano, 2007).

Normal adults have an average heart rate (HR) of about 70 BPM at rest. This rate is much lower than the SA node's natural pace of 120 BPM, because of the influence of the autonomic nervous system. For example, the parasympathetic nervous system slows down the HR by inhibiting the SA and AV node activities via the vagus nerve with the neurotransmitter acetylcholine (Andreassi, 2000), and the sympathetic nervous system increases the HR with the neurotransmitter norepinephrine. Evidently, the parasympathetic system plays a greater role than the sympathetic system and the combined effect is to decrease the HR to about 70 BPM for adults.

In psychophysiological studies of the heart activity, two parameters usually are considered: the average of HR and the variability of HR. HR is the reciprocal of heart period (HP), which measures the time the heart takes for a complete beat. On an electrocardiograph, HP is the temporal distance between two

adjacent R waves, or, the R-R interval (Jennings et al., 1981). The R wave is the most prominent component of a cycle of heart activity on the electrocardiograph. Therefore, HP also is called interbeat interval. In psychophysiological research, HR measurement is more frequently used than HP, although in some contexts HP measurement is preferred. For example, Andreassi (2000) recommended using HP instead of HR when the response in heart activity can be detected within a cycle of heart contraction. Berntson et al. (1997) recommended using HP measurement when a study examines the parasympathetic regulation of heart activity, because HP and the frequency of vagal regulation have a relatively linear relation.

Emotion and autonomic responses. Psychologists have proposed a number of emotion models. One of the most influential is the James-Lang theory (Ellsworth, 1994; James, 1994; Lang, 1994). This theory proposes that emotion is the product of visceral responses to external stimuli. When stimulated, the body reacts first, and then the brain detects the bodily change and interprets it as a certain emotion. This theory predicts that, by measuring visceral changes, one's emotional status can be inferred. Cannon (1927) criticized the James-Lang theory, indicating that the visceral responses are not adequately differentiated, and their response speed is too slow to be the center of emotion. Instead, he offered an alternative theory which claims that emotion is based on the cognitive appraisal of stimuli. However, development in neuroscience, neuropsychology, and psychophysiology has provided mounted evidence of discrete visceral

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responses to various emotional stimuli, which is against Cannon's prediction (Critchley, 2005). Schachter and Singer (1962) proposed a theory in which emotion is considered as a function of physiological arousal and cognition. The body reacts to the stimuli first, and cognition helps to distinguish and label the emotional response.

Recent studies have proposed a deeper integration of behaviors and emotions. The somatic marker hypothesis, presented by Damasio (Bechara & Damasio, 2005; Damasio, 1994; Damasio, Everitt, & Bishop, 1996), suggests that behaviors, especially decision-making, are influenced by previous emotional experiences, or the somatic marker. The somatic marker was proposed to locate mainly at the ventromedial prefrontal cortex, and produced by physiological responses. Also, the James-Lange theory became favored again by researchers (Critchley, 2009), with the finding of the mirror neural system (MNS), which reacts to action execution and action observation in a similar way, and is involved in emotional understanding by mirroring the behaviors and visceral changes of others . Furthermore, behaviors are proposed not only to elicit emotions, but to be facilitated by emotions (Baumeister, Vohs, Nathan DeWall, & Liqing, 2007).

To test the James-Lange theory, it is necessary to categorize emotions and physiological reactions. Putting descriptions or labels to various emotion statuses is neither subjective nor mutually exclusive. A widely accepted categorization was proposed by Russell and associates (Barrett, 2006; Panayiotou, 2008; Russell, 1983, 2003; Russell & Barrett, 1999; Russell &

Carroll, 1999). Based on factor analysis and multidimensional scaling analysis of emotion lexicons and emotion judgments from various cultures, they suggested that emotion changes on two affect axes: arousal (activated/deactivated) and valence (pleasant/unpleasant). The change along each axis is continuous, but the perception of emotional status is categorical.

Arousal is the most consistent correlate of autonomic discharge. It measures emotion intensity: high arousal indicates one is activated, excited, alert, ready to fight or flight, and low arousal appears when one is relaxed, calm, inattentive, not motivated, etc. Heightened arousal level usually means increased sympathetic activity and decreased parasympathetic activity (Critchley, 2005). The mostly used measure of arousal, SCR, is regulated by the sympathetic nervous system only (Andreassi, 2000). SCR has been found to have a linear correlation with stimulus intensity, with strong intensity stimuli producing high SCR and low intensity stimuli tied to low SCR. SCR is probably independent of stimulus valence (Lang, et al., 1993); pleasant and unpleasant stimuli can produce the same level of SCR if their intensity mirrors each other. However, a few researchers have reported that SCR may have an affective component. For example, Öhman and Dimberg (1978) and Dimberg and Öhman (1983) demonstrated that compared to happy or neural faces, faces with negative emotional expressions elicited SCR that was resistant to extinction.

Valence measures degree of pleasantness/unpleasantness, and also is frequently employed in studies of emotion. The valence dimension is extremely

salient and arises in every major conceptual proposition of emotion structure (Davidson, Jackson, & Kalin, 2000). However, debates exist as to whether valence is unipolar or bipolar in nature. Russell and Carroll (1999) claimed that bipolarity is a parsimonious description of the affect value. This notion is supported by many observations that reported greater cardiac deceleration when participants were viewing unpleasant stimuli than pleasant or neutral ones (Bradley, 2009; Britton et al., 2006; Britton, Taylor, Berridge, Mikels, & Liberzon, 2006; Gomez, Zimmermann, Guttormsen-Schar, & Danuser, 2005; Lang, et al., 1993; Palomba, et al., 1997; Palomba, Sarlo, Angrilli, Mini, & Stegagno, 2000; Tsai, Levenson, & Carstensen, 2000). Levenson, Ekman, and Friesen (1990) observed that, when participants posed emotions such as anger, fear, and sadness, their HR responses were greater than when posing happiness, surprise, and disgust.

The bipolarity of HR is not accepted unanimously, and some critics have argued that the above-mentioned experiments were confounded by different affect value of the pleasant and unpleasant visual stimuli. For example, Codispoti, Surcinelli, and Baldaro (2008) demonstrated that, by controlling the intensity of pleasantness/unpleasantness of film clips, participants presented similar HR responses (e.g., HR decrease) upon witnessing pleasant or unpleasant film clips in the first minute, both greater than when viewing neutral stimuli. However, in their experiment, the cardiac deceleration was greater for unpleasant stimuli within the second minute, whereas the pleasant and neural stimuli did not elicit

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differentiated HR responses. Therefore, an alternative explanation might be that the cardiac decrease in the first minute denoted increased orienting and attention processing (Andreassi, 2000; Porges, 1997), especially when the stimuli contained film clips instead of static pictures. Furthermore, the HR response pattern was different from SCR (e.g., a unipolar measurement), which was greater for both pleasant and unpleasant film clips than neutral film clips in both the first and second minute. In conclusion, it seems that the bipolar hypothesis of valence has more validity than the unipolar hypothesis.

Both SCR and HR are among the most frequently used psychophysiological measures. SCR is directly related to arousal, with little involvement of valence (Lang, et al., 1993). SCR is positively correlated with stimulus intensity. HR measurement is involved in both arousal and valence, with valence probably having a larger impact on HR activity (Palomba, et al., 2000).

It is necessary to probe into the central and peripheral nervous systems to further our understanding of visceral regulation and its relation with emotion. Visceral activity is controlled by both sympathetic and parasympathetic nervous systems, which originate from hypothalamus, pons, and medulla (Saper, 2002). The sympathetic system prepares the body for motor action (e.g., HR increases, blood pressure goes up, and palms sweat more, etc.), whereas the parasympathetic system relaxes the body (e.g., HR decreases, blood pressure goes down, and palms get less sweaty; Critchley, 2002, 2005; Critchley, et al., 2000). The preganglionic neurons of the sympathetic system locate at the spinal

segments T1 to L2, whereas the preganglionic neurons of the parasympathetic system locate at the brainstem in the motor nuclei of cranial nerves III, VII, IX, and X, and also spinal segments S2 to S4 (Naftel & Hardy, 1996).

Many cortical and subcortical areas may be involved in the integration of emotion and visceral activities. Critchley (2005) named such areas as those implicated in attention, motivation, decision-making, episodic memory, representation of aversive emotion, initiation of control of limb movement, and representation of internal sensory, somatic, and endocrine states. Animal studies, lesion studies, and functional brain-imaging techniques have provided an abundance of evidence for the involvement of these areas. For example, Mangina and Beuzeron-Mangina (1996) demonstrated descending influences from prefrontal and limbic areas and amygdala on autonomic regulation. Fredrikson et al. (1998) found positive correlations between EDA and activities in cingulate and motor cortices, and negative correlations between EDA and insula, inferior parietal cortex, and the secondary visual cortex. Critchley and colleagues (Critchley, 2002, 2005; Critchley et al., 2000) examined the role of anterior cingulate gyrus in initiating autonomic changes, and insula and orbitofrontal cortices in mapping the autonomic responses. In addition, the ventromedial prefrontal cortex is proposed to be implicated in anticipatory EDA responses, whereas amygdala is involved in the memory of autonomic responses.

Orientation, attention, and emotion have been found to be closed involved in autonomic activity. For example, EDA has been used in examining motivation,

orienting, attention, and emotional responses at an unconscious, pre-attentive level (Andreassi, 2000; Öhman, 1988). Cardiac activity is found to be associated with orienting and attention (Andreassi, 2000). Löw, Lang, Smith, and Bradley (2008) showed that tasks demanding high levels of attention result in parasympathetic activation and decrease in HR. Abercrombie, Chambers, Greischar, and Monticelli (2008) provided evidence that phasic deceleration and tonic elevation of HR denote greater orienting to external stimuli and enhanced memory. Bradley (2009) proposed that orienting, attention, and emotion serve the same evolutional purpose: to protect and sustain life by enabling the individual to select the appropriate behavior to deal with external or internal changes. Initial cardiac deceleration indicates increased orienting to enhance perceptual processing, and increased EDA denotes neural preparation for action.

Autonomic responses to stuttering. Previous studies have focused on the autonomic responses of PWS during moments of stuttering. Such effort can be seen as a part of searching for an invariant in the stuttering symptom. Bloodstein and Bernstein-Ratner (2008) reviewed early studies on cardiovascular changes, and reported that, when comparing PWS to normally fluent speakers, whether before, during, or after speech, there is no significantly different reaction. It also seems that no significant changes in EDA could be related to moments of stuttering in PWS. To date, two of the most thorough studies examining autonomic responses in PWS are Peters and Hulstijn (1984) and Weber and Smith (1990). In these studies, a series of physiological data, including HR and

SCR, were acquired from PWS and fluent controls in a variety of speech-related and non-speech-related tasks. Neither found a significant effect between PWS and fluent speakers. However, it might be interesting to mention that these studies did reveal that prior to spontaneous speech, PWS showed greater HR deceleration, or less HR acceleration, compared to fluent controls, although the change was not significant. Alm (2004) linked this cardiac deceleration to the "freezing response," which is the response mammals demonstrate when facing an inevitable threat, e.g., playing possum, suggesting that to PWS, stuttering is an uncontrollable, frustrating event.

Recently, a line of research has been initiated to investigate listeners' automatic responses to stuttering. The first of such studies was Guntupalli et al. (2006), followed by Guntupalli et al. (2007) and Zhang et al. (2009a). These studies showed that when witnessing stuttering, listeners tended to respond with sustained HR decrease and fast-attenuating SCR increase. This physiological response pattern is considered as the root of listeners' emotional and cognitive reactions to stuttering.

Cultural differences in autonomic response. Race might be a factor that influences skin property. For example, greater SCR has been observed in Caucasians compared to Blacks (Davis & Cowles, 1989; Fredrikson, 1986). Johnson and Landon (1965) suggested that the difference is not because of the number of eccrine sweat glands, but probably the chemical property of the sweat. Their presupposition was supported by a recent study (Wesley & Maibach, 2003)

which found that Black skin has the greatest transepidermis water loss and decreased skin surface pH. Johnson and Landon (1965) suggested that Asians might have different EDR patterns compared to Caucasians; Wesley and Maibach (2003) reported that Asians differ with Caucasians in their skin properties in a complicated way.

The racial factor in cardiac activity is probably more inconsistent and more complicated than SCR. Fredrikson (1986) indicated that, although resting HR was similar between Caucasians and Blacks, Blacks showed less increase in HR to stimuli. Davis and Cowles (1989) did not find differences in cardiovascular activity between Caucasians and Blacks. Liao et al. (1995) suggested that Caucasians and African-Americans differ in HR variability in a complicated way. When comparing cardiac responses in Caucasians and Blacks across gender, Saab et al. (1997) found that whereas Caucasians showed similar cardiac responses among males and females, Black males showed decreased blood pressure and/or decreased HR in response to a challenging task compared to Black females. Shen, Stroud, and Niaura (2004) reported a trend in Asian Americans toward lower HR response to a series of laboratory stressors compared to Caucasians. However, in a recent study (Roberts, Levenson, & Gross, 2008), no significant effect was found across Caucasians, African-Americans, and Chinese Americans in participants' cardiovascular activities when watching a disgust-eliciting film.

Summary and Rationale. Emotion may be inferred from measures on two affect dimensions, arousal and valence. SCR has been substantiated as a solid index of arousal in that SCR is linearly correspondent to stimulus' intensity: stimulus with strong intensity evokes high SCR. HR measurement reflects both valence and arousal, but probably is influenced more by valence. Compared to pleasant and neutral stimuli, unpleasant stimuli are usually correlated with greater HR decrease.

Racio-ethnic differences in SCR and HR have been recorded. A relatively consistent finding is that Blacks have lower SCR than Caucasians. Blacks might also show less HR fluctuation than Caucasians. Asians may show different patterns of SCR and HR, but the difference may be complicated and ambiguous.

Previous research of listeners' physiological responses to stuttering has demonstrated that listeners tend to react to stuttering speech with elevated SCR and decreased HR. This pattern of responses may denote unpleasant arousal, which is suggested as the root of negative emotional responses to stuttering, and may involve in formation of negative stereotypical perceptions toward PWS.

The current experiment aimed to examine listeners' physiological responses to stuttering speech as a function of culture. The following research questions were raised: 1) Do participants show significant differences in their SCR and HR responses to stuttering and normally fluent speech? 2) Is culture a significant factor in participants' physiological responses toward stuttering? It was expected that lowered HR and heightened SCR would be observed in responses

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to stuttering speech relative to fluent speech. African-American participants were expected to demonstrate smaller changes in SCR and HR compared to European-Americans. Chinese participants were expected to show some differences in their SCR and HR responses compared to European-Americans, but the differences might not be consistent or significant.

Methods

Participants

Totally, fifty-six normally fluent adult volunteers were recruited from the faculty, students, and staff of East Carolina University and local residents of Greenville, NC. These participants also were included in Experiment I. Data from 2 participants were excluded from analysis because of excessive movement artifact or difficulty in calculating HR, respectively. The analysis included 54 participants. Among them were 18 African-Americans (4 females and 14 males; age range = 18-53, M = 22.33, SD = 8.12), 18 European-Americans (12 females and 6 males; age range = 19-45, M = 29.50, SD = 7.64), and 18 Chinese (10 females and 8 males; age range = 22-57, M = 29.28, SD = 8.30). Participants' educational background and their familiarity with stuttering (e.g., how many PWS they know in reality) are displayed in Table 7.

Participants self-disclosed not having previous diagnoses of any speech, language, hearing, or cognitive disorders, nor any formal training in fields related to these disorders. Participants self-reported normal hearing and normal or

corrected vision. The Chinese participants came to the United States after they reached adulthood.

Stimuli

Each of three adult male Caucasian PWS, after signing the informed consent form (see Appendix A), produced one stuttering and one fluent speech samples. The stuttering speech samples contained moderate-severe stuttering behaviors (e.g., sound prolongation and syllabic repetition), and secondary behaviors (e.g., eyes blinking, lip tremor, and tongue protrusion, etc.). However, these speakers were instructed to limit their head movement during stuttering. Through repeated practice, or by using a Delayed Auditory Feedback device, these PWS produced three fluent speech samples, in which they showed minimal head movement with their gaze directed ahead. One trained rater counted the stuttered syllables in the speech samples. Detailed description of the speech samples is displayed in Table 8.

The videos were recorded at the Multimedia Technology Center of East Carolina University. They were then digitized using Final Cut (Version 9.2, Apple Inc., Cupertino, CA) on a Macintosh computer. From each of the 6 recorded videos, a clip of 60 s length was selected. The 6 video clips were arranged in a counterbalanced order with the digram-balanced Latin-Square design (Wagenaar, 1969) and burned into 6 DVDs (e.g., each DVD contained a different presentation order of the 6 videos).

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Apparatus and procedures

Participants were briefed about the study and signed an informed consent form (see Appendix A) approved by the University Medical Center Institutional Review Board, East Carolina University (see Appendix B). Participants then completed a questionnaire survey regarding 25 personality traits of a hypothetical PWS and a hypothetical normally fluent speaker (Experiment I). Afterwards, participants were seated in a comfortable chair, with a Sony Glasstron personal LCD monitor (Model PLM-A35) worn on their head, and a pair of E-A-R 3A insert earphones inserted in both ears. Participants were asked to remain seated quietly, and avoid body movements during the entire procedure. The stimuli were played via a DVD player (Panasonic DVD recorder, model DMR-E30). The video signals were displayed to the participant on the Glasstron personal monitor and simultaneously to the experimenter on a monitor. The audio signal were routed through a Mackie mixer (Model 1202-VLZ pro) and then transferred to the participant via earphones.

The second phalange area of the second and third fingers of participants' left hand was cleaned with alcohol pad. Two electrodermal electrodes were applied on the palmar surface of these fingers (Fowles, et al., 1981). These electrodes sent electrical signals to a Biopac GSR100C skin conductance amplifier (sampling rate = 100 Hz, gain = 5 µmho/V, low pass filter = 1 Hz). Another pair of electrodes was placed on participants' left and right wrists to measure heart activity; data were sent to a Biopac ECG100C amplifier (sampling

rate = 250 Hz, high pass filter = 0.5 Hz, and low pass filter = 35 Hz). The two amplifiers were connected to an Apple desktop computer where data were recorded with Acknowledge software (Version 3.9.1 for Mac, Biopac Systems, Inc., Goleta, CA). The software converted the electrocardiogram (ECG) data to HR data online by detecting peak-to-peak time and calculating BPM.

The recording of SCR and ECG signals started after about 5 minutes of rest. To control the expectation effect of SCR signal, the inter-stimuli intervals were pseudo-randomly set at either 1.5 or 2 minutes. During the interval, a black screen was displayed. After the recording, participants were asked to complete another set of questionnaire survey regarding their perceptions toward two hypothetical individuals, one stuttering and one normally fluent (Experiment I).

Data acquisition and analyses

Data were acquired with a 30 s window applied to each of the 6 conditions, including 15 s before stimuli presentation (baseline) and 15 s during presentation (response). The selection of this temporal window was consistent with Zhang et al. (2009a).The two dependent variables (e.g., changes in SCR and HR) were measured by subtracting baseline mean from corresponding response mean. Repeated measures ANOVAs with PASW (Version 17) were applied to SCR and HR data sets with two within-subjects variables (i.e., the fluency status and presentation order of the speech stimuli) and a between-subjects variable (i.e., group). The significance level was set at α = 0.05. When the sphericity assumption was not met, Greenhouse-Geisser adjustment was used.

Results

The means and standard errors of the SCR and HR changes for each participant group as functions of the speech sample's fluency status and presentation order are displayed in Figure 7 and 8, respectively.

Results of repeated measures ANOVAs for the SCR and HR data are displayed in Table 9. For SCR, repeated measures ANOVA revealed a significant main effect of fluency [$F_{(1, 102)} = 4.591$, $p = 0.037$, $\eta^2 = 0.08$, $\phi = 0.56$] and presentation order [$F_{(2, 102)} = 4.913$, Greenhouse-Geisser $p = 0.015$, $\eta^2 = 0.09$, $\phi = 0.72$]. The group factor was found not significant, $F_{(2, 51)} = 1.055$, $p = 0.356$, $\eta^2 = 0.04$, $\phi = 0.23$.

To further investigate the effect of presentation order, a series of single contrasts were conducted. Results indicated that, for SCR, significant differences existed between the first and second order of presentation [$F_{(1, 53)} = 9.603$, $p = 0.003$, $\eta^2 = 0.15$, $\phi = 0.86$], the second and third order of presentation [$F_{(1, 53)} = 4.740$, $p = 0.034$, $\eta^2 = 0.08$, $\phi = 0.57$], and the first presentation of stuttering and fluent stimuli [$F_{(1, 53)} = 5.066$, $p = 0.029$, $\eta^2 = 0.09$, $\phi = 0.60$]. For the African-American group, the only significance finding was observed when comparing their SCR to the first and second order of stimuli presentation, $F_{(1, 17)} = 5.011$, $p = 0.039$, $\eta^2 = 0.23$, $\phi = 0.56$. For the Chinese group, the only significant finding was observed when comparing their SCR to the first and second order of stimuli presentation [$F_{(1, 17)} = 4.975$, $p = 0.039$, $\eta^2 = 0.23$, $\phi = 0.56$]; however, the

difference in SCR to the first presentation of fluent and stuttered stimuli was marginally significant [F (1, 17) = 3.658, p = 0.073, η^2 = 0.18, ϕ = 0.44]. For European-Americans, no significant difference was found in these contrasts.

For HR, a significant effect of fluency was found, F (1, 102) = 21.249, p < 0.001, η^2 = 0.29, ϕ = 0.995. The presentation sequence did not show a significant effect, F (2, 102) = 1.769, p = 0.176, η^2 = 0.03, ϕ = 0.36. The group factor was found not significant, F (2, 51) = 1.067, p = 0.352, η^2 = 0.04, ϕ = 0.23.

Table 7. *Familiarity with PWS and Educational Background of Participants in Experiment II*

	Cultural group		
	African-American	European-American	Chinese
Number of PWS they know			
None	3	7	9
1-2	9	8	9
3-5	4	2	0
Above 5	2	1	0
Educational Background			
Some school	0	0	0
High school graduate	4	0	0
Some college	5	1	1
2 year college	6	1	0
4 year college	1	4	2
postgraduate	2	12	15

Table 8. *Behavioral Characteristics of Fluent and Stuttering Speech Samples*

Speaker	Fluency	Number of Syllables	% SS	Longest block (s)	Number of blinks	Main behaviors
1	Stutter	117	13.7	4	2	Prolongations and repetitions
2	Stutter	73	19.2	7	23	Prolongations
3	Stutter	170	11.2	2	15	Silent blocks and prolongations
1	Fluent	265	NA	NA	NA	NA
2	Fluent	215	NA	NA	NA	NA
3	Fluent	283	NA	NA	NA	NA

Note. % SS = Percentage of stuttered syllables.

Table 9. *Results of Repeated Measures ANOVAs for SCR and HR data*

Factor	df	F	p	η^2	ϕ
SCR					
Fluency	(1, 102)	4.591	0.037	0.083	0.557
Fluency × Group	(2, 102)	2.329	0.108	0.084	0.451
Order	(2, 102)	4.913	0.015 *	0.088	0.722
Order × Group	(4, 102)	0.655	0.624	0.025	0.207
Fluency × Order	(2, 102)	1.015	0.366	0.020	0.223
Fluency × Order × Group	(4, 102)	0.311	0.870	0.012	0.117
Group	(2, 51)	1.055	0.356	0.040	0.225
HR					
Fluency	(1, 102)	21.249	< 0.001	0.294	0.995
Fluency × Group	(2, 102)	1.828	0.171	0.067	0.364
Order	(2, 102)	1.769	0.176	0.034	0.363
Order × Group	(4, 102)	1.004	0.409	0.038	0.307
Fluency × Order	(2, 102)	1.015	0.362 *	0.020	0.216
Fluency × Order × Group	(4, 102)	0.687	0.603	0.026	0.216
Group	(2, 51)	1.067	0.352	0.040	0.227

Note. α = 0.05. * Greenhouse-Geisser adjusted.

Figure 7. Mean Skin Conductance Response in Listeners as A Function of Group,

Fluency Status and Presentation Order of The Speech Stimuli.
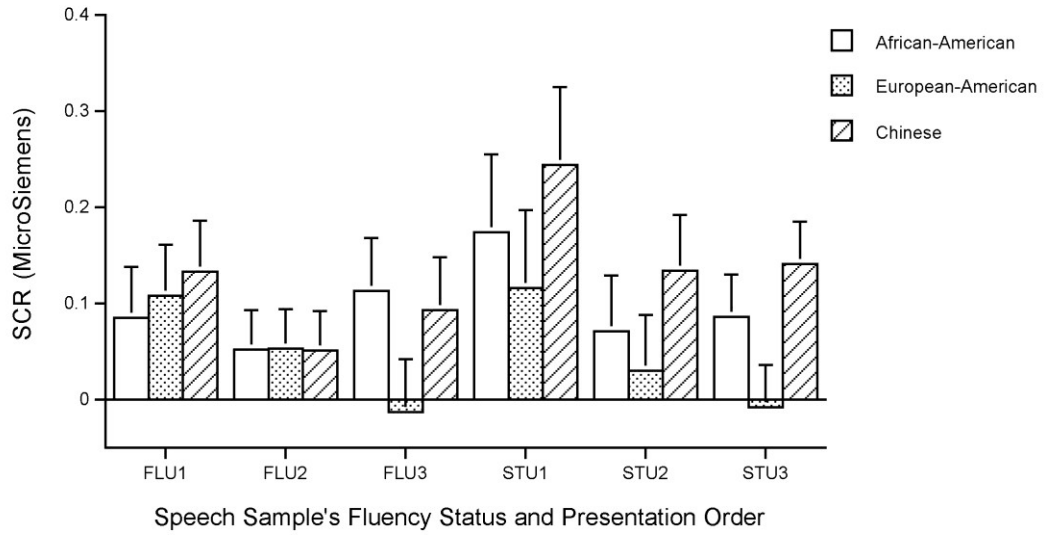
Note. FLU1, FLU2, FLU3 – first, second, and third fluent speech sample

presented. STU1, STU2, STU3 - first, second, and third stuttering speech sample

presented.

Figure 8. Mean Heart Rate Change in Listeners as A Function of Group, Fluency

Status and Presentation Order of The Speech Stimuli.
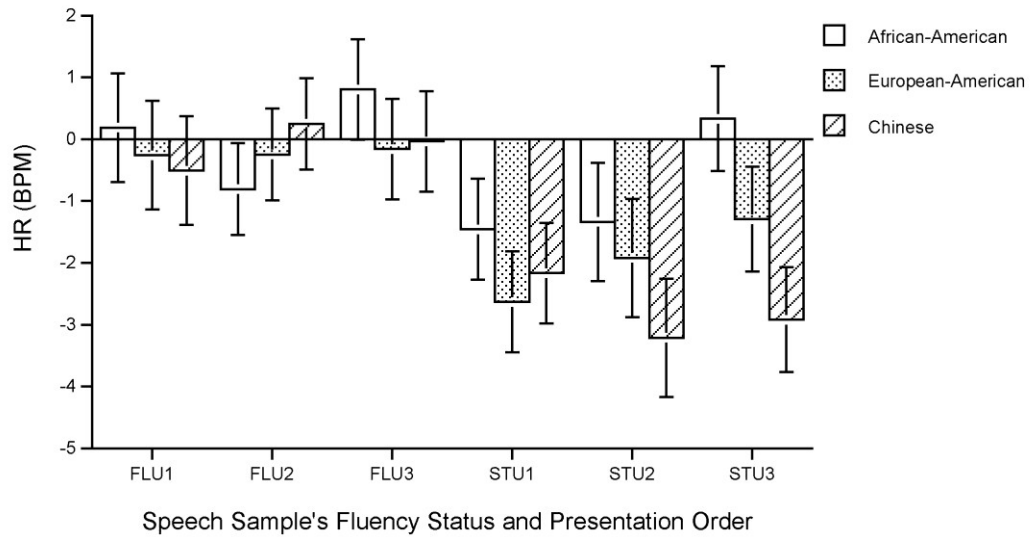
Note. FLU1, FLU2, FLU3 – first, second, and third fluent speech sample

presented. STU1, STU2, STU3 - first, second, and third stuttering speech sample

presented.

Discussion

This experiment was the first that investigated autonomic responses to stuttering in culturally different listener groups. The main findings of this study were threefold. Firstly, upon witnessing stuttering speech, listeners showed significantly increased SCR and significantly decreased HR compared to observing fluent speech. Secondly, whereas SCR showed quick adaptation over repeated stimuli presentation, HR was consistently inhibited when listeners witnessed stuttering speech. Thirdly, neither SCR nor HR measures showed significant differences across cultural groups.

The first and second findings were congruent with previous studies in listeners' autonomic response to stuttering (Guntupalli, et al., 2007; Guntupalli, et al., 2006; Zhang, et al., 2009a). Conclusions from previous studies include, first, that listeners show increased SCR and decreased HR in responses to the confrontation with stuttering events. Secondly, whereas SCR shows a quick adaptation, HR is persistently inhibited when listeners observe stuttering. Thirdly, the pattern of visceral changes is closely related to listeners' emotional change (e.g., it denotes unpleasant arousal in listeners). Furthermore, listeners showed similar responses to both fluent and stuttered samples. Data from this experiment support the irrefutable notion that moderate-to-severe stuttering behaviors contain such intense and negative emotional content that they are capable to automatically engage with listeners and elicits negative emotional arousal in them. It should be noted that other factors, such as changes in orientation and

attention, may also contribute to such pattern of changes in SCR and HR (Andreassi, 2000; Bradley, 2009).

The medium to connect the stuttering speaker and the listener may be the MNS, which automatically "mirrors" the observed actions and emotion expression. This is possibly due to MNS activity that listeners can easily sense the inevitable, uncontrollable fluency breakdown in the speakers, register their negative emotions, such as frustration, anxiety, helplessness, that accompany with their moments of stuttering, and project what they feel to the personality traits of the speaker. In the current experiment, although listeners did not self-report their emotional responses as in Guntupalli et al. (2007), in Experiment I, listeners showed the tendency to judge the hypothetical PWS as being more unpleasant after viewing stuttering and fluent speech samples. This tendency coincides with listeners' report of feeling more unpleasant and having stronger other negative emotions in themselves after viewing stuttering speech relative to fluent speech (Guntupalli et al., 2007).

The third finding, that culture did not reveal itself as a differentiating factor in listeners' physiological responses to stuttering, was not expected. A significant group effect was not found in either SCR or HR measures. Results of single contrasts indicated that, differences in SCR in reaction to stuttering and fluent speech samples were more evident in Chinese and African-American participants, rather than European-Americans (see Figure 7). It is possible that results from the European-American group were confounded by the sampling

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bias. Although participants from all groups did not receive formal training related in speech, hearing, language, and cognitive disorders, the majority of European-American participants was from health-related training programs and might have desensitized to scenes of deviances. Therefore, upon witnessing stuttering speech, they did not feel aroused as laypersons, and did not show elevated SCR. The sample selection bias may also contribute to the possible expectation effect in SCR, which could be seen in the Chinese and African-American groups but not the European-American group (see Figure 7).

The most important finding of the current experiment was that culture showed little effect on listeners' autonomic responses to stuttering. This observation may be the result of the fact that stuttering is able to elicit salient changes in autonomic signals. Cultural influence on the physiological responses is subtle and complicated, and thus evades detection with SCR and HR measurements. In the future, more advanced techniques may be employed to further examine cultural differences in listeners' physiological responses to stuttering and other disordered speech.

The current experiment was limited in a few aspects. As discussed above, the sampling bias may have yielded a European-American group not representative of the population. Another limitation was that each speaker produced stuttering and fluent speech samples, therefore possibly confusing some participants. Also, all of the speech samples were in English, which may

have been a problem for Chinese participants because of their limited English knowledge.

Future research projects may examine listeners' physiological responses to stuttering in other main cultures. It is needed to decide whether matching the race and language of the stuttering speaker with the listener has an effect on listeners' autonomic responses. Parents from different cultures merit more attention in such studies because of their great influence on the child's development of stuttering and psychological and emotional well-being. Also, other measurements, such as skin temperature, other indexes of blood circulation, bodily chemical levels, could be incorporated into physiological measurements so as to provide a better, more comprehensive description of listeners' responses.

CHAPTER VI

EXPERIMENT III

Introduction

The basics of eye movement. Known as the "window of the soul," the eyes, along with their surrounding areas, are capable of delivering a wealth of socially meaningful information, such as emotion, attention, belief, and desire. On the perceptual side, normally functional people are able to "read the mind" in others' eyes (Baron-Cohen, Jolliffe, Mortimore, & Robertson, 1997b; Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001).

How the eyes function as a faithful social message courier is still not clearly understood. Not counting the muscular activities of their surrounding areas, the eyes are limited to two forms of movement, the pupillary response and the eye movement (Andreassi, 2000). The pupillary response is, actually, not the movement of the pupils, which are simply holes to receive light, but the muscle activities of the iris that surrounds the pupils. The iris contains two types of smooth muscles, the sphincter pupillae and the dilator pupillae. The sphincter pupillae are circular fibers surrounding the pupil; when they contract, the pupil size becomes small. Their neural innervation comes from the Edinger-Westphal nucleus within the midbrain and is parasympathetic in nature (Naftel & Hardy, 1996). The dilator pupillae are radiating fibers; when they contract, the pupil size is increased. Their neural innervation comes from the spinal cord and is sympathetic in nature (Naftel & Hardy, 1996).

The change in pupil size can be reflexive to changes in light (e.g., the pupil size decreases when one steps out from a dim-lit room to the bright outside), and may also have social connotation. In his review of the role of pupil size, Andreassi (2000) concluded that generally, positive stimulus increases receiver's pupil size, and negative information decreases pupil size, with an exception of a "shocking" negative stimulus that causes the pupil to dilate. Also, people with large pupil size are more likely to be perceived as sexually attractive and happy, whereas people with small pupil size are more likely related to the opposite characteristics.

Researchers have been interested in eye movement as related to reading, spoken language processing, attention, and scene perception (van Gompel, et al., 2007). The eyes process visual information only when they are fixated on a target (i.e., gaze). Therefore, voluntary eye movements are necessary for the eyes to catch the sharpest image of a target (e.g., when the image of an object falls on the foveal region of the eye). The small jerky movement of the eyes from one fixation to another is referred to as saccade. Fixations generally last for 0.25 to 1 s, and saccades for 0.02 to 0.1 s (Andreassi, 2000). Smooth pursuit is another voluntary eye movement that occurs when the eyes are following moving objects. Nystagmus is an involuntary form of eye movement, which is characterized by smooth pursuit on one side and saccade to the other side. Rapid eye movements during sleeping and eye blinks also are of interest to

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psychophysiologists (Andreassi, 2000). However, the current study only considered fixation and voluntary eye movement.

The proximate control of eye movement is well documented. Eye movement is controlled by 3 pairs of extraocular muscles (superior and inferior rectus, lateral and medial rectus, and superior and inferior oblique), and intrinsic ocular muscles. The intrinsic eye muscles include the sphincter pupillae and the radiator pupillae. They control the pupil size with neural innervations from the autonomic system, as previously mentioned. The superior oblique is innervated by CN IV, the trochlear; the lateral rectus by CN VI, the abducens; and the other four by CN III, the oculomotor. Based on pathological studies of eye movement, Pierrot-Deseilligny (2004) suggested that lateral eye movement is regulated at the pons, and vertical eye movement at the midbrain.

The higher level neural regulation of eye movement involves mainly the occipital and frontal cortices. Pierrot-Deseilligny, Milea, and Muri (2004) provided a detailed description of the cerebral control of eye movement and visuo-spatial information processing. In their model, superior colliculus and reticular formation are centers of direct execution of eye movement. The superior colliculus receives excitatory discharges mainly from posterior eye field (within the posterior half of the intraparietal sulcus) and frontal eye field. The posterior eye field is involved in reflexive saccade movement, and the frontal eye field is involved in intentional saccade movement. Also, the superior colliculus receives inhibitory information from the dorsolateral prefrontal cortex, which is the decision center of eye

movement and stores short-term spatial memory. The posterior eye field, frontal eye field, and dorsolateral prefrontal cortex have massive connections between each other. In addition, the intraparietal areas, and probably superior parietal lobule and supramarginal gyrus, are involved with visuo-spatial integration. Cingulate gyrus is involved with motivation, with the cingulate eye field in the frontal lobe involved with intentional motivation, and the posterior cingulate cortex probably involved with attention motivation. The motor programming and motor learning of eye movement are involved with supplementary eye field and the adjacent areas. Visuo-spatial memories are stored in the dorsolateral prefrontal cortex (short-term), and probably parahippocampal areas (medium-term) and hippocampus (long-term).

The above mentioned brain areas are involved in at least two large-scale distributed networks proposed by Mesulam (2000). The network for spatial orientation is established around 3 epicenters, the intraparietal sulcus, the frontal eye fields, and the cingulate gyrus. The intrapatietal sulcus specializes in perceptual representation, the frontal eye fields in orienting, and the cingulate gyrus in distribution of effort and motivation. The network for memory and emotion is involved with epicenters of hippocampal formation and amygdala (Mesulam, 2000). Whereas the hippocampus is specialized for memory and learning, the amygdala is specialized for drive, emotion, and visceral tone. These epicenters overlap with the storage centers of visuo-spatial memory, the parahippocampal areas and hippocampus (Pierrot-Deseilligny, et al., 2004).

Therefore, visuo-spatial memory, emotion, and visceral status are probably interconnected.

    Gaze perception. Perception of others' eye gaze is of social importance (Frischen, Bayliss, & Tipper, 2007; Grumet, 1983). For example, gaze perception has been confirmed as an inseparable part of joint attention (Baron-Cohen, Baldwin, & Crowson, 1997a; Ricciardelli, Betta, Pruner, & Turatto, 2009). Allison, Puce, and McCarthy (2000) reasoned that the evolutionary function of eye gaze perception is to provide rapid and accurate assessment of others' action and intention. For this goal, humans probably have developed unique facial and eye properties that facilitate eye perceptions (Andreassi, 2000). McKelvie (1976) illustrated that eyes are of more importance in face recognition than the mouth. In his experiment, participants had much more difficulty remembering a face with eyes masked than a face with the mouth masked. Some researchers suggested that eye perception is faster than face perception (Taylor, Edmonds, McCarthy, & Allison, 2001), which underlines the importance of eye gaze in social interaction, and implies that it is hard-wired in the human brains to take advantage of eye gaze for their survival and interaction. Haxby, Hoffman, and Gobbini (2000) and Hoffman and Haxby (2000) proposed a large-scale distributed model of face recognition that clearly distinguishes perceptions of changeable and invariant facial features. The invariant facial features facilitate person identification, and involve mainly the fusiform gyrus; the changeable properties, such as eye gaze and lip movement, are mediated mainly by the superior temporal sulcus (STS).

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Researchers are interested in the social function and neural mechanism of gaze perception. Many have connected gaze perception with Theory of Mind (ToM), which refers to an individual's ability to understand others' mental status, e.g., desire, knowledge, belief, intention, etc. (Baron-Cohen, et al., 1997b; Baron-Cohen, et al., 2001; Brüne & Brüne-Cohrs, 2006; Itier & Batty, 2009). A number of studies on children with autism spectrum disorder (ASD) indicate that these children, who supposedly have less developed ToM, have below-average abilities to "read the mind's eyes" (Baron-Cohen, et al., 1997b; Baron-Cohen, et al., 2001). Calder et al. (2002) reasoned that the connection between ToM and gaze perception is based on their physical overlap in the posterior STS and medial prefrontal cortex. Senju, Yaguchi, Tojo, and Hasegawa (2003) observed that, whereas normally developing children showed a preference for direct gaze perception over averted gaze perception, children with ASD did not show such an inclination. Grice et al. (2005) suggested that children with ASD have the same, yet developmentally delayed, ability of gaze perception as that of normally developing children. Riby and Doherty (2009) suggested that differences in gaze perception for children with ASD lie in their subtly different pattern of gaze fixation; also, children with ASD are more inaccurate in targeting items.

The social and emotional function of gaze perception is also explored in normal adults. Macrae, Hood, Milne, Rowe, and Mason (2002) demonstrated that compared to averted eye gaze, direct eye gaze facilities gender categorization. Adams and Kleck (2003) found that perceptions of emotions involved with

approach motivation (e.g., anger and joy) are facilitated by direct eye gaze, whereas avoidance-motivated emotions (e.g., fear and sadness) are identified faster with averted gaze. Bayliss, Frischen, Fenske, and Tipper (2007) showed that gaze direction and facial expression have a significant effect on observers' emotional responses. Participants were presented with images of a female face and a household item. The face showed either a moderately happy, a moderately disgusting, or neutral expression, with leftward, direct, or rightward gaze. When the object was not looked at by the face, participants showed no difference in their likeness to the object. When the object was looked at by a happy face, the object was more liked by participants relative to the object looked at with a disgusting expression.

The STS and amygdala have been suggested as primary brain areas related to gaze perception (Hooker et al., 2003). The STS is more related to socially meaningful spatial information, and the amygdala is more focused on the emotional content of the gaze. Hoffman and Haxby (2000) indicated that gaze perception is more attended to by STS. Wicker, Perrett, Baron-Cohen, and Decety (2000) compared cerebral responses to video clips with direct gaze and averted gaze, and found that the anterior STS also is involved in emotional processing of gaze direction. Allison et al. (2000) suggested that STS plays a role in the initial analysis of social cues coming from both the ventral "what" and the dorsal "where" visual pathways. Adolphs et al. (2005) put an eye-tracking

device on an amygdala-damaged patient, and found that the patient's difficulty in fear recognition was related to her failure to look normally at the eyes.

Eye contact. Eye contact, or mutual gaze, occurs when two people are looking at each other's eyes. Infants as early as four-months old show cortical responses to eye contact (Grossmann et al., 2008). Eye contact is able to facilitate interpersonal communication (Grumet, 1983). For example, eye contact helps to organize verbal communication by turn-taking. Krantz, George, and Hursh (1983a) found that, in preschoolers during conversation, when the speaker gazed at the listener, the listener was more likely to show contingent gaze response. Also, compared to utterances not related to gaze, gaze-related utterances were longer, and more likely to produce verbal responses and less likely to produce non-response in listeners. Similar findings were reported by Vertegaal, Slagter, van der Veer, and Nijholt (2001) in adults.

Eye contact is involved in social distance. Bailenson, Blascovich, Beall, and Loomis (2003) confirmed that mutual gaze and interpersonal distance are probably compensatory in maintaining appropriate interpersonal immediacy. Using a virtual environment system, they demonstrated that participants maintained greater distance to a virtual agent when they approached it with mutual gaze than without eye contact, and greater distance when approaching the front than the back of the virtual agent.

Eye contact delivers emotional information. Kampe, Frith, Dolan, and Frith (2001) reported that making eye contact increases one's attractiveness,

regardless of gender. Goldstein, Kilroy, and Van de Voort (1976) validated the casual observation of many that lovers spend more time gazing at each other. Their experiment confirmed that the stronger their love, the longer they gaze at each other. Cordell and McGahan (2004) indicated that mutual gaze can serve as an index of male-female intimacy: the more eye contacts a male and a female make, the longer conversation they have. Schrammel, Pannasch, Graupner, Mojzisch, and Velichkovsky (2009) demonstrated that when interacting with virtual figures with moderately angry, moderately happy, and neutral faces, participants showed differential patterns of rapid facial reactions (e.g., involuntary facial mimicry that happened within 1 s after presentation of emotional faces, probably involving the activity of MNS; Dimberg & Thunberg, 1998) to angry and happy faces only when the virtual eyes looked directly at them, not away from them.

Eye movement responses to stuttering. Kamhi (2003) noted that averting eye contact is among the most common responses in listeners. However, probably because of the technological difficulty, there are only a few studies of eye movement as responses to stuttering. Rosenberg and Curtiss (1954) examined college students' eye contact, hand movement, and other body movement during conversation with an actor who pretended to stutter with repetition and minimal body movement, and another actor who spoke fluently. Observers noted reduced eye contact, inhibited hand movement, and depressed body movements when participants conversed with the stuttering speaker as

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compared to when interacting with the fluent speaker. Recently, Bowers et al. (2009) used an infra-red eye-tracking device to compare listeners' gaze fixation on facial features (e.g., eyes, nose, and mouth) of one male speaker when he stuttered and spoke fluently. Their results indicated that listeners demonstrated significantly less eye contact during observation of stuttering speech compared to fluent speech.

Cultural influences on eye contact. Culture has been found to influence both visual processing and eye contact. Many experimental studies focused on contrasting Easterners to Westerners in their visual processing patterns and contributed the difference to cultural dimensions such as holistic versus analytic, individualism versus collectivism, etc. For example, Segall, Campbell, and Herskovits (1966) found that Westerners, compared to Easterners, had greater susceptibility to visual illusions. More recent evidence (Hedden, et al., 2008; Kitayama, Duffy, Kawamura, & Larsen, 2003) illustrated that Easterners are more accurate in drawing a line according to its relative length, whereas Westerners are more accurate in drawing the absolute length of a line.

In previous literature review of cultural impact on human behavior, emotion, and cognition, a few cross-cultural studies of visual processing were addressed (Blais, et al., 2008; Boduroglu, et al., 2009; Chua, et al., 2005; van Gompel, et al., 2007). All of these studies pointed out that the cultural dimension of individualism versus collectivism may have a fundamental impact on individuals' visual processing. Specifically, these studies suggested that Asians

tend to have a holistic visual perception, and Westerners tend to have an analytical perception.

An interesting experimental design to observe gaze patterns during motor activities was reported by Wu and Keysar (2007). They had Chinese and American participants follow instructions from a director to move everyday objects in a grid, which was partially transparent and partially occluded to both the director and the participant. They found that Americans spent more time on the occluded objects whereas this was not observed for the Chinese participants. Also, Chinese participants showed significantly shorter latency of the last fixation before approaching to move the object.

Differences across cultures in eye contact have been noticed for a long time. It is frequently observed that in cultures such as Africa and Eastern Asia, direct eye contact denotes disrespect to the superior, or challenge to authority (Terrell & Jackson, 2002). This observation is probably related to the cultural dimension of hierarchy: In a highly hierarchical society people tend to avoid direct eye gaze more frequently. However, these reports typically are not based on laboratory work. A recent effort of scientific examination of the cultural component of eye gaze is seen in McCarthy, Lee, Itakura, and Muir (2008). The authors reported that Canadian participants looked down during thinking when they knew they could be seen, and looked up when they were aware that they were observed; however, Japanese participants looked down when thinking in both of these circumstances.

Summary and Rationale. An important component of interpersonal communication is eye contact, or mutual gaze, which, in its simplest yet most frequently observed form, happens between the speaker and the listener. Eye contact is known to reflect cultural differences. People under influence of East Asian culture may show less direct eye contact, and spend more time on peripheral information, compared to people from Western culture. African-Americans also may show less direct eye contact.

Gaze behaviors in both speakers and listeners are of necessity in establishing eye contacts. Generally, listeners perceive the speaker's gaze behaviors, observe the social and emotional content of the gaze behaviors, and respond by changing their gaze behaviors (e.g., changing eye contact); the changes in listeners gaze behaviors, reciprocally, alter the speaker's eye gaze. Listeners' gaze pattern may reflect their culture-specific pattern of visual processing (e.g., Asians may spend more time on the background information); also, they may be influenced by their social norms of emotional expression and face-to-face communication.

This experiment aimed to examine listeners' eye gaze responses to stuttering speech relative to fluent speech. Specifically, listeners' gaze fixations (e.g., time, number, and duration of gaze fixations) on the eyes, mouth, nose, and other facial areas of the speaker and background were compared across various cultural backgrounds. Previous exploratory studies suggest that listeners spend less time fixated on the eyes of the stuttering speaker (Bowers, et al.,

2009). However, there is no empirical data in regard to listeners' gaze response to stuttering speech as a function of culture. Results from this study may provide an approximate description of the gaze interactions in real-life face-to-face communication which involves a PWS, and has implications on the form and severity of the social punishment to a PWS in different cultural settings.

The following research questions were examined: 1) Is listeners' eye gaze response to stuttering speech significantly different than that to normally fluent speech? 2) Are there significant cross-group differences in listeners' eye gaze responses toward stuttering? It was expected that, regardless of listeners' cultural background, participants showed fewer direct gaze on the stuttering speaker's eyes compared to the fluent speaker's eyes. Culture was expected to exert a significant impact on listeners' eye gaze response. Chinese and African-Americans were expected to show fewer fixations and shorter fixation times on the stuttering speakers' eyes compared to European-Americans.

Methods

Participants

Sixty-four participants, including 21 African-Americans, 23 European-Americans, and 20 Chinese, were recruited via word of mouth from students, faculty, and staff of East Carolina University, and local residents of Greenville, NC. These individuals also participated in Experiment I, but not Experiment II. Participants self-reported to have normal hearing, normal or corrected vision, and no previous diagnosis of speech, language, hearing, or cognitive difficulty. They

also were not formally trained in areas related to fluency disorders. All the Chinese participants came to the United States after 18 years of age. Ten participants were excluded from analysis because of software glitch (2 Chinese), excessive eye closure (2 African-Americans and 2 European-American), poor signal quality (1 African-Americans and 2 European-American), and operation mistakes (1 European-Americans). Therefore, the sample for statistical analysis included 18 African-Americans (12 females and 6 males; age range = 20-50, M = 29.28, SD = 8.30), 18 European-Americans (14 females and 4 males; age range = 19-54, M = 26.61, SD = 9.55), and 18 Chinese (11 females and 7 males; age range = 22-45, M = 29.22, SD = 6.27). Participants' familiarity with stuttering (i.e., how many PWS they know in reality) and educational background are listed in Table 10.

Stimuli and apparatus

The stimuli included 6 recorded video clips with each lasting 60 s. These clips also were used in Experiment II. Three of them were samples of stuttering speech and 3 others fluent speech. They were presented to the participants in a counter-balanced manner with a digram-balanced Latin-Square design (Wagenaar, 1969) .An eye-tracking device, ASL model D6 (Applied Science Laboratories, Bedford, MA), was connected with two IBM-compatible personal computers (Dell model GX280). ASL model D6 is a desktop mounted eye-tracking device consisting of mainly a remote camera with video head tracker and the EyeTrac 6 control unit. This device uses the "bright pupil" technology to

capture listeners' eye gaze. The camera projects infrared light to participant's eye, receives the light reflection, calculates the centers of the pupil and corneal reflection, and determines the gaze point. The two computers were used respectively for the control of the gaze-tracking device and stimuli presentation. Computer #1 ran GazeTracker 8.0 (Eye Responses Technologies Inc., Charlottesville, VA), which played the stimuli on a 19' LCD display of 1024 × 768 pixels (Dell model 1905FP; display #1). Computer #1 also delivered the audio signals to a pair of Harman-Kardon multimedia speakers located at each side of display #1. Computer #2 ran EyeTrac 6 software (Applied Science Laboratories) for the experimenter to control the ASL model D6. The camera of ASL model D6 was placed under the bottom of display #1, and acquired data from participant's left eye at a sampling rate of 60 Hz. The data were then transmitted to the EyeTrac 6 control unit, which, by comparing the vectors of the centers of pupil and cornea reflection, calculated the gaze point. The gaze point data were later sent to computer #1 and overlaid as a set of cross hairs on the stimuli for offline analysis with GazeTracker.

Procedure

Participants were briefed about the study and signed an informed consent form (see Appendix A) approved by the University Medical Center Institutional Review Board, East Carolina University (see Appendix B). Participants then completed a questionnaire survey regarding their attitudes toward a hypothetical PWS and a hypothetical fluent speaker (Experiment I). Afterwards, they were

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seated in front of display #1 at a distance of about 24 inches (i.e., 60 cm). Participants' position was adjusted so the eyes were approximately level with the center of display #1. Participants were instructed to watch the presented stimuli while keeping their head stable. The video head tracker of the ASL model D6 was activated to compensate for head movement. Prior to data collection, a 9-point calibration routine was performed with participants' left eye.

Analysis

The raw data, sent from the EyeTrac 6 control unit to computer #1where GazeTracker was running, were 3-dimensional coordinates of gaze points on display #1. Gaze fixation was defined with the GazeTracker software by three criteria: 1) a minimum of 3 gaze points; 2) a minimum of 0.2 second; and 3) the diameter of the circle surrounding gaze points, in pixels, not exceeding 40.

Three mutually exclusive, non-moving rectangular look zones were manually defined with the GazeTracker software pertaining to each speaker's eyes, nose, and mouse (see Table 11 and Figure 10). For the same speaker, the look zones were of the same shape and area when he was producing a stuttered or a fluent speech sample. Therefore, four regions of interest (ROIs) were marked: namely, the eyes, nose, mouth, and outside (areas other than the eyes, nose, and mouth, including the background, neck, ears, hair, etc.).

Listeners' eye gaze responses during the presentation of each stimulus (i.e., 60 s) were included in analysis. Three measures were selected as dependent variables: percent of time spent in the ROI (PT), fixation count on the

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ROI (FC), and average fixation duration on the ROI (AFD). Data were organized

for statistical analysis with PASW for windows (Version 17). Listeners' responses

were averaged across the three fluent speech samples or the three stuttering

speech samples, and then examined using a series of repeated measures

analyses for the four ROIs with PT, FC, and AFD data, respectively. Culture (e.g.,

group) was considered as the between-subjects factor, fluency of the speaker

(e.g., fluent or stuttering) the within-subjects factor, and the responses for the

four ROIs (e.g., the eyes, mouth, nose, and outside) the dependent variables.

Results

Before inferential analysis was conducted on the data, arcsine

transformation was applied to the PT data, and square root transformation to the

FC and AFD data. Means and standard errors of the transformed PT, FC, and

AFD results for each ROI are displayed in Figure 11, 12, and 13, respectively, as

functions of culture and fluency.

Percent of time spent in the ROI

Repeated measures ANOVAs indicated that fluency had a significant

effect on the ROIs of mouth and outside: for the mouth, $F_{(1, 51)} = 4.716$, $p =$

0.035, $\eta^2 = 0.09$, $\phi = 0.57$; for outside, $F_{(1, 51)} = 5.733$, $p = 0.020$, $\eta^2 = 0.10$, ϕ

$= 0.65$. The results indicated that compared to fluent speech samples, stuttering

speech samples attracted significantly more gaze time on the speaker's mouth,

and significantly reduced listeners' gaze time spent on the outside (the

background and facial parts other than the eyes, mouth, and nose).

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Group was found to be a significant effect relative to the nose, $F_{(2, 51)} =$ 7.566, $p = 0.001$, $\eta^2 = 0.23$, $\phi = 0.93$. The group differences in the PT on the eyes and outside were marginally significant: for the eyes, $F_{(2, 51)} = 2.485$, $p = 0.093$, $\eta^2 = 0.09$, $\phi = 0.48$; for outside, $F_{(2, 51)} = 2.693$, $p = 0.077$, $\eta^2 = 0.10$, $\phi = 0.51$. Post hoc pairwise comparisons with least-significant-difference (LSD) adjustment indicated that, compared to European-Americans, Chinese participants spent significantly less time on the eyes ($p = 0.039$) and nose ($p < 0.001$), but more time outside these structures ($p = 0.031$); African-American participants spent significantly less time on the nose ($p = 0.011$) compared to European-American participants..

The interaction of fluency by group was found significant relative to the mouth, $F_{(2, 51)} = 4.867$, $p = 0.012$, $\eta^2 = 0.16$, $\phi = 0.78$. Whereas the African-American and European-American participants increased their time spent on the mouth when the speaker stuttered, Chinese participants reduced their time spent on the speaker's mouth.

Average fixation duration

Repeated measures ANOVAs indicated that fluency had a significant effect on AFD for the eyes, $F_{(1, 51)} = 4.570$, $p = 0.037$, $\eta^2 = 0.08$, $\phi = 0.56$. Generally, listeners' fixations on the speaker's eyes were significantly shortened when the speaker stuttered.

Group was found to be a significant factor on AFD for the eyes, nose, and outside: for the eyes, $F_{(2, 51)} = 3.394$, $p = 0.041$, $\eta^2 = 0.12$, $\phi = 0.61$; for the

nose, F (2, 51) = 3.382, p = 0.042, η^2 = 0.12, ϕ = 0.61; for the outside, F (2, 51) =

3.187, p = 0.050, η^2 = 0.11, ϕ = 0.58. Post hoc pairwise comparisons with LSD

adjustment demonstrated that, compared to European-Americans, Chinese

participants showed significantly shorter AFD for the eyes (p = 0.016) and nose

(p = 0.017); compared to African-Americans, Chinese participants showed

shorter AFD with marginally significance for the eyes (p = 0.062) and nose (p =

0.055), but significantly longer AFD outside the structures (p = 0.021). Compared

to European-Americans, African-American participants showed shorter AFD with

marginal significance outside (p = 0.059).

The interaction of group by fluency was not found to be significant.

Fixation count

No significant effect was found for fluency or the interaction of fluency by

group. However, marginally significant effects were found for fluency outside [F

(1, 51) = 3.659, p = 0.061, η^2 = 0.07, ϕ = 0.47], for group on the mouth [F (2, 51)

= 2.484, p = 0.093, η^2 = 0.09, ϕ = 0.47], and for the interaction of fluency by

group on the mouth [F (2, 51) = 2.845, p = 0.067, η^2 = 0.10, ϕ = 0.53]. These

results indicated that when observing stuttering, listeners reduced their gaze

fixations outside, and whereas African-American and European-American

participants increased their gaze fixations on the speaker's mouth, Chinese

participants reduced their fixations on the mouth.

Post hoc Pairwise comparisons with LSD adjustment indicated that,

Chinese participants showed significantly more fixations on the mouth (p = 0.037)

than African-Americans, fewer fixations on the nose with marginal significance (p = 0.056) than European-Americans, and more fixations on the outside with marginal significance than African-Americans (p = 0.080) and European-Americans (p = 0.069).

Table 10. *Familiarity with PWS and Educational Background of Participants in Experiment III*

	Cultural group		
	African-American	European-American	Chinese
Number of PWS they know			
None	4	5	6
1-2	9	10	8
3-5	4	3	3
Above 5	1	0	1
Educational Background			
Some school	1	0	0
High school graduate	1	0	0
Some college	1	4	0
2 year college	0	2	0
4 year college	7	3	1
postgraduate	8	9	17

Table 11. *Details of the Look Zones Defined for Each Speaker*

Unit: pixel.

Speaker	Eyes			Nose			Mouth		
	Width	Height	Area	Width	Height	Area	Width	Height	Area
1	260	90	23,400	150	100	15,000	150	60	9,000
2	240	85	20,400	160	90	14,400	160	60	9,600
3	250	90	22,500	160	90	14,400	160	60	9,600

Note. The above information is based on a 1024 × 768 pixels display. For each speaker, the look zones of the eyes, mouth, and nose were of the same shape and area, whenever the speaker was speaking fluently or stuttered.

Figure 9. Illustration of Look Zone Configuration.
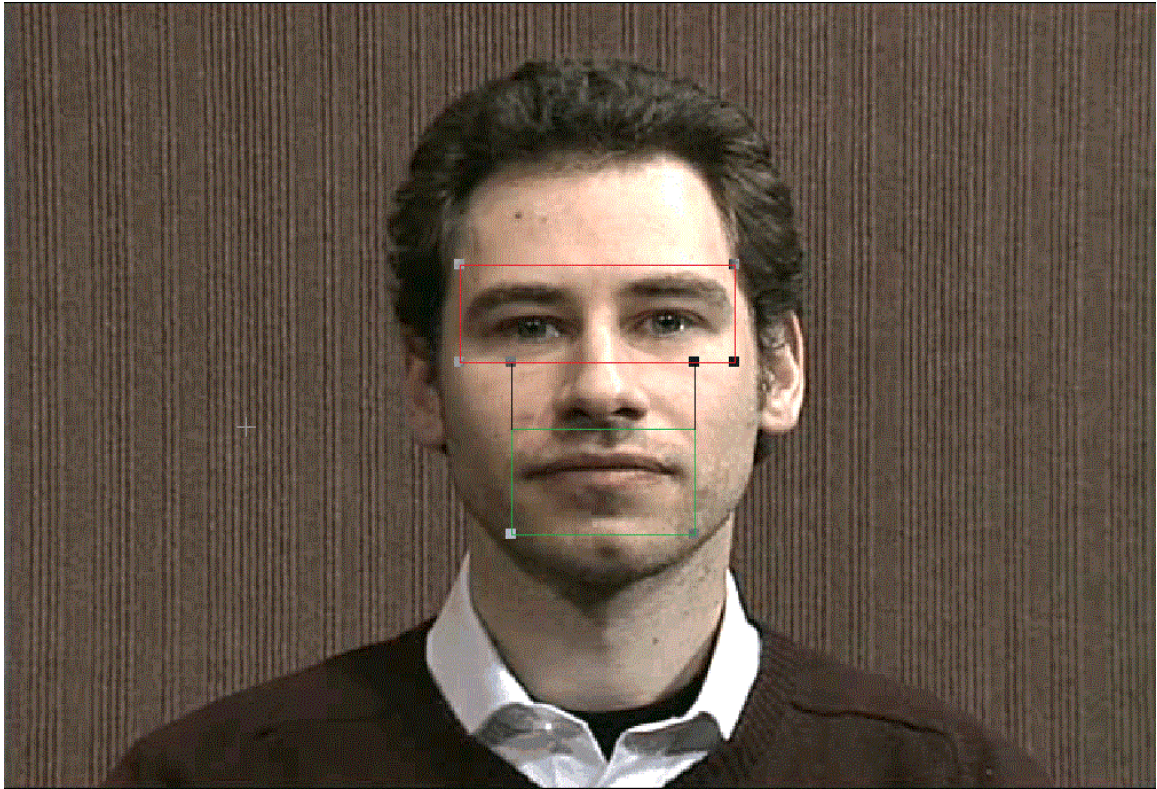
Note. In the above image, the squares represent the look zones of the eyes,

nose, and mouth, respectively. Other parts of the image, including other facial

features, shoulders, and background, are categorized into the ROI of outside.

Figure 10. Percent of time spent on Each Region of Interest as A Function of

Culture and Speaker's Fluency.
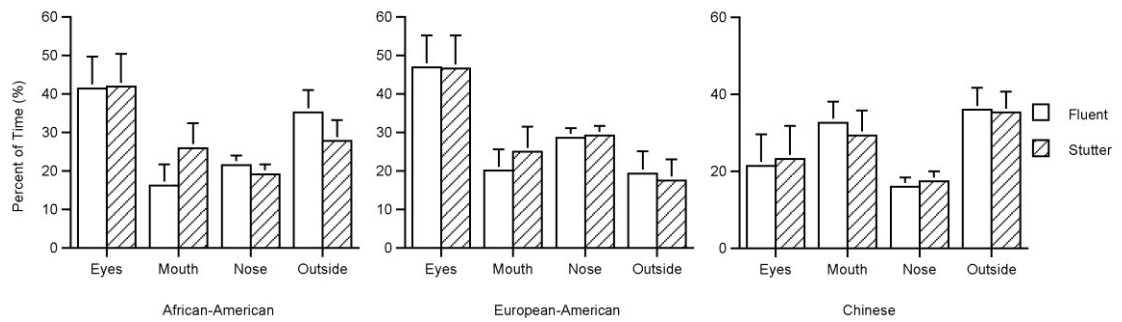
Note. Data were transformed with arcsine transformation.

Figure 11. Average Fixation Time on Each Region of Interest as A Function of Culture and Speaker's Fluency.
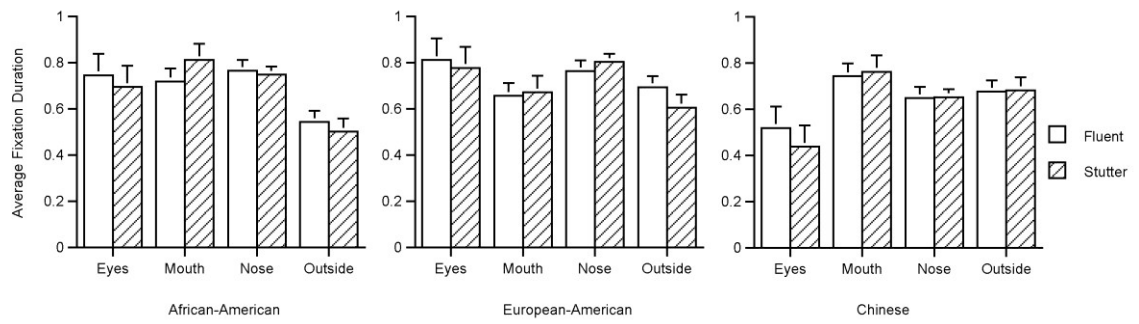
Note. Data were transformed with square root transformation.

Figure 12. Number of fixation on Each Region of Interest as A Function of

Culture and Speaker's Fluency.
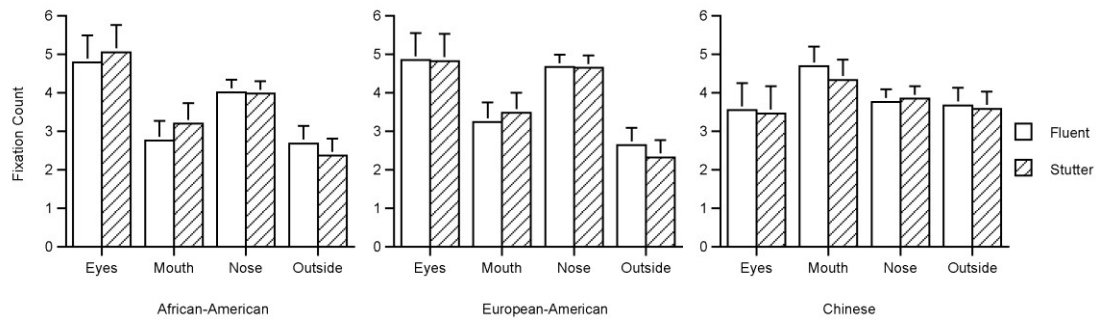
Note. Data were transformed with square root transformation.

Discussion

The current experiment appears to be the first study investigating listeners' eye gaze responses to stuttering speech relative to fluent speech in culturally different groups. Significant effects were found for listeners' gaze behaviors regarding speakers' fluency status, listeners' cultural backgrounds, and the interaction of speaker's fluency status according to listeners' cultural background.

The most important finding of this study was that fluency made a difference in listeners' gaze responses. The first research question, that is, whether listeners show different gaze responses to stuttering and fluent speech samples, was evident. The differences were twofold: first, listeners had shorter fixation duration on the eyes of the stuttering speaker relative to the fluent speaker; and secondly, listeners reduced the total time and number of gaze fixations on the background, and increased their time on the speaker's mouth, when the speaker stuttered. These results addressed how a typical listener interacts with a PWS relative to a normally fluent speaker. Regardless of the speaker's fluency status, listeners showed the same amount of gaze fixations on the speaker's eyes, suggesting that listeners might have tried to maintain their normal pattern of gaze response on the eyes when observing stuttering speech. This observation is consistent with DePaulo and Friedman (1998) who indicated that listeners consciously self-regulate their nonverbal responses to meet with their communication norms. Listeners' reduction of their gaze fixation durations on the stuttering speaker's eyes might support the notion that these stuttering

episodes are emotionally or cognitively overloaded for the perceivers (Kamhi, 2003). Listeners' reduction of fixation time and number on the background and increase in their time on the speaker's mouth seemed to indicate a change in the focus of attention: when the speaker stuttered, listeners were attracted to the locus of the stuttering behaviors, the mouth. Stuttering events are so conspicuous and aberrant that they cannot be avoided from the observers' focus; consequently, observers paid more time, either by increasing the number of fixations or extending fixation duration or both, on the stuttering speaker's mouth at the cost of the time exploring the background. Another possibility is related to the degraded speech production when the speaker stuttered. Vatikiotis-Bateson, Eigsti, Yano, and Munhall (1998) reported that observers increased their gaze fixations on the speaker's mouth when the speech was coupled with masking noise. The authors suggested that this is because the listeners need to counteract the signal degradation (e.g., McGurk effect; McGurk & MacDonald, 1976). Because stuttering speech inevitably reduces the speech signal quality, listeners tend to spend more time looking at the speaker's mouth to seek compensation.

Unlike Bowers et al. (2009), the study did not identify a significant change in listeners' fixation number in response to stuttering (e.g., more fixations on the speaker's nose and fewer on the eyes when the speaker stuttered). A possible explanation may lie in the different definitions of the ROIs of eyes, nose, and

mouth, which were manually defined in both studies and differed in shapes and sizes of corresponding ROIs.

Another important finding of this study was that when confronted with stuttering behaviors, listeners from different cultural backgrounds responded in different manners. Rather than the expected gaze fixation differences around the speaker's eyes, the observed difference was most evident in the gaze time spent on the speaker's mouth. When the speaker stuttered, both European-American and African-American listeners increased their gaze time on his mouth, but Chinese listeners reduced their time looking at the mouth. The reduction of gaze time on the speaker's mouth for Chinese participants was probably because of a reduction of their fixation number, which dominated over their increase in fixation duration. The reduction of fixation number in Chinese participants cannot be explained by their holistic visual processing. Chinese individuals' eye gaze fixations may be more broadly scattered compared to Americans (Boduroglu, et al., 2009), and probably this contrast becomes more vivid with the increased prominence of the focal features (e.g., the mouth) when the speaker stutters, resulting in larger discrepancies between gaze fixation numbers for stuttering and fluent speech. However, in that case, the tension-filled, struggling mouth movement still should attract more fixations in the Chinese sample, which was not observed in the experiment. Therefore, it was suspected that whereas Chinese listeners' slightly extended fixation duration on the stuttering speaker's mouth indicating increased attention, their reduced fixation number on the

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speaker's mouth might be related to the negative emotional content delivered by trembling and stuttering of the mouth.

Compared to Chinese and European-American groups, African-Americans showed the greatest increase in their gaze fixation time on the mouth in reactions to stuttering, contributed by increases in both fixation number and fixation duration. This is probably correlated with African-American culture's oral tradition, which gives high appraisal to abilities to produce a continuous verbal utterance and to remain emotionally controllable. Overt stuttering manifestations deviate with probably the greatest distance from African-American cultural preferences and therefore, deserve more attention from African-American listeners.

The third important finding was that, cultural differences in gaze responses were more evident between Chinese and Americans, rather than within the Americans (e.g., European-Americans and African-Americans). Specifically, relative to European-Americans, Chinese listeners spent more time on the speaker's background and less on the eyes and nose, had shorter fixations on the speaker's eyes and nose, and fewer fixations on the nose but more on the background. Compared to African-Americans, Chinese listeners had shorter fixations on the eyes and nose, but longer fixations on the background, and more fixations on the mouth and background. The only significant difference between European-Americans and African-Americans was that African-Americans spent less time on the speaker's nose.

These findings were generally consistent with previous studies comparing visual processing in Easterners and Westerners in which African-Americans were oftentimes included as Westerners (e.g., Nisbett, 2003). Specifically, results from the current experiment validated findings from Chua et al. (2005) and Boduroglu et al. (2009) that Chinese individuals showed a much broader visual attention, whereas Americans focused on focal features (e.g., eyes, mouth) of the image. Chinese individuals showed more fixations and shorter fixation duration in face perception compared to Westerners (Rayner, Li, Williams, Cave, & Well, 2007); now, the results were repeated in this experiment: Chinese individuals showed shorter fixations on the speaker's eyes and nose, and more fixations on the background.

However, differences with previous studies existed. Contrary to Blais et al. (2008), Chinese participants did not look more at the speaker's nose. This might be caused by differences in stimuli. Rather than static images of faces and scenes (Blais et al., 2008), the current experiment used dynamic audiovisual presentations of speech production. When the speaker stuttered, the salient distortions of the facial features, e.g., trembling lips, protruded tongue, blinking eyes, etc., probably had a significant impact on listeners' attention, and thus was reflected in listeners' gaze behaviors. In addition, the audiovisual signals could faithfully deliver information regarding the stuttering speaker's emotional status and the overt and covert struggling behaviors. Perceptions of the speaker's

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emotional and behavioral changes might also have an impact on listeners' eye gaze responses.

It should be noted that listeners showed great individual variations in their gaze responses when witnessing stuttering. It seems that listeners might be roughly categorized into two groups according to their gaze responses to stuttering: those who show significant gaze diversion from the speaker's eyes to the mouth and those maintained their gaze on the eyes. With the data of listeners' percent of time spent on the speakers' eyes relative to the mouth (with arcsine transformation), before and after exposure to stuttering, listeners' gaze change elicited by stuttering was computed. For African-Americans, 13 out of 18 (72%) participants increased their gaze fixation time on the speaker's mouth when the speaker stuttered; for Chinese, 11 out of 18 (61%); for European-Americans, 10 out of 18 (56%). These data suggested that, in real-life scenarios of face-to-face communications that involve a PWS, some of the listeners might be "nice" by maintaining their gaze on the stuttering speaker's eyes, whereas some may be "rude" because they divert their gaze from the speaker's eyes to the mouth when the speaker stutters. Encounters with seemingly "rude" listeners may be considered as discouraging, penalizing for a PWS; however, the possibility that a PWS is confronted with such a listener may remain high. It is important to note that in real life, it is probably the median, rather than the mean, of listeners' negative assessment and responses to PWS that matters more to an individual PWS.

Limitations of the current study existed in a few aspects. The stimuli in this study were recorded with instructions so that the speakers showed direct gaze toward the camera with limited head movement. This was intended to control the head and gaze movement of the speakers. However, this effort might have obscured the significance of listeners' differential responses toward stuttering and fluent speech. Firstly, the stuttering speakers, especially the severe ones, might show more frequent, more intense head movement in real-life dyadic communications. That is to say, the head movement is an intrinsic component of stuttering, and controlling these behaviors hurts the "authenticity" of stuttering. Secondly, in reality, a listener does not frequently find a PWS that eagerly establishes eye contact with the listeners. Instead, a PWS usually shows averted gaze, rather than direct gaze, toward the audience (Jensen, Markel, & Beverung, 1986). It is known that the speaker and listener show reciprocal responses to the other's gaze behaviors. Therefore, when a PWS speaker averts eye gaze to the listeners, listeners would tend to increase gaze aversion. In the current experiment, the predicted reduction of eye contact in listeners when observing stuttering speech was found with the average fixation duration, but not with the fixation number; this could be at least partially explained by the direct gaze the speakers maintained even when stuttering (e.g., listeners did not change their fixation number to stuttering and fluent speech samples because the speakers maintained direct eye gaze to the listeners; however, the negative emotional connotation in the stuttering speech reduced listeners' average fixation duration).

Another possible confound of this study related to the stimuli was that, each speaker produced a fluent and a stuttering speech sample. This was intended for the control of nuance variants such as facial feature, voice quality, etc. However, Gaze behaviors are known to have implications in orientation and attention (Pierrot-Deseilligny, et al., 2004). Therefore, when a listener saw that a speaker, who stuttered severely in one speech sample, suddenly became able to speak with normal fluency, or vice versa, one must have felt confused and attributed more attention in listening. With the counter-balanced design of the experiment, it seemed that the presentation order of the stuttering and fluent speech (e.g., which one precedes the other for the same speaker) might not have an effect on the direction, but might have reduced the magnitude, of the difference in listener responses toward the stuttering and fluent speech samples.

Limitations also existed on the side of listeners. Firstly, listeners were requested to sit down and passively observe the speech presentations. This hardly happens in real-life dyadic communications, when both speakers and listeners move, gesture, smile, and interact. Simply put, listener response as acquired in laboratory settings should be interpreted with cautions when applying to more complicated real-life communications. Secondly, unlike the two American groups, the Chinese group consisted mostly of individuals with a high educational background (e.g., with postgraduate degree or undertaking postgraduate study). Although there is no empiric evidence regarding the role of education on listeners' gaze responses, anecdotal observations suggest that, individuals with higher

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education, especially Chinese, tend to look at the eyes of the other party of communication. Therefore, it is possible that a typical Chinese listener may show more gaze aversions to stuttering speakers relative to fluent speakers.

Future studies may compare gaze responses in listeners from other major cultural backgrounds (e.g., Japanese, Mexicans, Africans, etc.). Of special interest will be the gaze responses in normally developing children relative to adult listeners, parents of CWS relative to parents of normally fluent children, and listeners who stutter relative to normally fluent listeners. A number of permutations also may be achieved with controls of the speaker's stuttering severity, nonverbal stuttering behaviors, and presentation channels (e.g., video only and video and auditory).

CHAPTER VII

GENERAL DISCUSSION

Stuttering is a universal phenomenon. It spares not a single ethnic or cultural group, inflicts about 5 percent of children and 1 percent of adults (Bloodstein & Bernstein-Ratner, 2008). For those afflicted with stuttering, especially those with persistent symptoms, stuttering not only impairs their communication efficiency and efficacy, but has far-reaching and long-lasting results in their emotional and psychological wellbeing (Bricker-Katz, et al., 2009). Numerous studies, mostly with samples from European and American populations, converged on the point that stuttering profoundly lowers a PWS' quality of life. Vocation and romance, the most important elements for one's quality of life, are the most severely hit for PWS (Zhang, et al., 2009b).

Listener responses are quintessential relative to the social consequences of stuttering. As a group, PWS present no abnormality in the physical appearance, body chemicals, psychological status, and mental abilities, etc., when they are not stuttering (Bloodstein & Bernstein-Ratner, 2008). When they stutter (usually with an audience), they expose to their conspecifics the loss of control of their speech organs, the struggles to regain the fluency, and their anxiety and fear of these inevitable and uncontrollable moments of failure (Craig, 1990). The moments of stuttering, though usually manifested in only a fraction of the total length of speech and lasting for a few seconds, are so salient and abnormal that they cannot evade from even a mindless listener. Previous studies

indicate that in response to stuttering speech, listeners showed increased eye aversion from the speaker's eyes (Bowers, et al., 2009), increased SCR level and decreased HR (Guntupalli, et al., 2007; Guntupalli, et al., 2006; Zhang, et al., 2009a), and negative emotional feelings (Guntupalli, et al., 2007). These behavioral, physiological, and emotional responses to stuttering suggest unpleasant arousals that stuttering events elicit in listeners, and they at least partially explain that the negative stereotypical perceptions toward PWS are resistant to exposure. It seems that repeated exposure to stuttering intensifies and solidifies listeners' negative perceptions toward stuttering, and contributes significantly to the societal negative stereotypical perceptions of PWS (McGee, et al., 1996; Snyder, 2001).

It was the task of the current study to probe the possible influences of culture in listeners' behavioral, physiological, and attitudinal responses toward stuttering. Culture is known to have profound impact on one's perceptions, behaviors, and emotions (Chiu & Hong, 2006). The possibility of cultural differences in listener responses to stuttering was supported, mostly, by cross-cultural studies in other research areas, along with a few studies that examined African-Americans and Asians' knowledge and perceptions toward stuttering. To date, this is still a less-cultivated area compared to other research fields of stuttering; however, the society's cultural diversity calls for such line of study.

For this aim, a series of empirical studies were designed and launched. Participants were recruited from African-Americans, European-Americans, and

Chinese populations in a Southeastern city in the United States. In Experiment I, each participant rated the personality traits of a hypothetical male adult PWS and a hypothetical normally fluent male adult speaker on a semantic differential bipolar scale, before and after watching and listening to stuttering and fluent speech samples. For some participants, their SCR and HR changes were recorded when observing the speech samples (i.e., Experiment II); for the other participants, their eye gaze responses were recorded when observing the speech samples (i.e., Experiment III). The participant groups for Experiment II and Experiment III were mutually exclusive.

The first conclusion based on experimental results was that, fluency makes a significant difference in listener responses at behavioral, physiological, and perceptual levels. The eye gaze experiment suggested that listeners looked more at the speaker's mouth when the speaker stuttered relative to when the speaker spoke fluently. Listeners also reduced their gaze fixation duration on the speaker's eyes when observing stuttered speech. However, it seemed that listeners maintained the same amount of gaze fixations on the speaker's eyes, suggesting an effort to abide by the social norm. The physiological studies indicated that stuttering speech elicited in listeners significantly increased SCR and significantly decreased HR. The results were consistent with previous studies (Guntupalli, et al., 2007; Guntupalli, et al., 2006; Zhang, et al., 2009a). Together, these physiological studies suggested that stuttering evokes unpleasant arousal in listeners. Results from the perceptual experiment indicated

a sharp contrast in participants' ratings of PWS' personality traits relative to those of a fluent speaker; also, common perceptual changes were observed to appear with exposure to stuttering. Interestingly, after seeing stuttering speech, listeners tended to judge the PWS as being more "unpleasant." It is possible that listeners projected their negative emotional arousal, as revealed by the physiological studies, to the personality traits of PWS. Therefore, it appears that listeners' visceral, unconscious responses to stuttering determine their emotional feelings toward stuttering (e.g., James-Lang theory of emotion; Lang, 1994), and also affect their perceptions toward PWS' personality traits.

The second conclusion was that, listener responses to stuttering are highly influenced by their cultural backgrounds. Whereas the differences between African-American and European-American could be said to be ambiguous and inconsistent, the difference between Chinese and American cultures (which include African-American and European-American) were evident. Results from the eye gaze experiment supported previous studies of visual processing in Easterners and Westerners (Boduroglu, et al., 2009; Chua, et al., 2005; Nisbett, 2003). Compared to American participants, Chinese individuals showed a holistic pattern of visual perception, and looked at the background more than the foreground. In rating personality traits of a hypothetical fluent speaker and a hypothetical stuttering speaker before exposure to stuttering, the two American groups showed great similarity (e.g., European-Americans showed significance in 19 out of 25 items for judgment, which included all of the 12 significant items

for African-Americans), and the Chinese group differed from either group in their judgments (e.g., Chinese participants rated 15 out of 25 items with significant differences. These items overlapped with both American groups, but could not be assimilated, or assimilate, into another group). Cultural variations in listeners' physiological responses to stuttering were not reported, probably because of the overwhelming power of stuttering in evoking SCR and HR responses toward the same direction and with similar magnitude. In other words, cultural variances in listeners' physiological responses might have been veiled by the influence of stuttering on listeners. More advanced technology, improved experimental design, bigger sample size, and more sensitive statistical analysis, may help to unveil it.

The third conclusive statement was that culture interacts with speaker's fluency status (e.g., fluent or stuttering) in changing listener responses. The interaction of culture and speaker's fluency is more evident in listeners' eye gazes and perceptions than their physiological changes. Whereas African-Americans and European-Americans significantly increased their gaze fixations on the speaker's mouth when the speaker stuttered, Chinese listeners reduced their fixations on the speaker's mouth. Another difference existed in listeners' judgment of the speaker's personality trait of bragging versus self-derogatory. All groups believed that compared to a normally fluent speaker, a PWS tends to be self-derogatory. After being exposed to stuttering, African-Americans showed stronger negativity in their perceptions regarding this trait, whereas Chinese participants remained basically unchanged, and European-American showed

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less strength in their negativity toward PWS. In the physiological measurements, no significant effect of fluency by culture was found. These findings indicated that stuttering influences listeners' reactions in a generally similar way across different cultural groups, and only a few measures reveal a significant difference between groups.

In summary, this series of experiments indicated that, when listening to and viewing stuttering speech, listeners tend to show physiological response changes and reduced gaze fixation duration on the speaker's eyes and increased fixation time on the mouth. Listeners generally perceived the stuttering speaker as having negative personality traits compared to the fluent speaker. Cultural effect was mainly observed in eye gaze responses and perceptions toward PWS, but not in listeners' physiological responses. The interaction of culture by fluency was found to exert limited influence on listener responses to stuttering. These results indicated that stuttering behaviors are filled with negative emotional content in that they generally evoke negative emotional arousals in listeners and cause listeners to shorten their fixations on the speaker's eyes. In addition, stuttering behaviors probably receive more attention from listeners, and listeners tend to shift their visual attention from the speaker's eyes to the mouth. Furthermore, exposure to stuttering usually does not have a beneficiary effect on listeners' negative, stereotypical perceptions toward PWS.

The Neural Bases for Listener Responses

It has been suggested that the mirror neural system (MNS) plays a significant role in the connection between the sender and receiver of information. The MNS has the unique property of firing both when executing an action and when observing the action from others, and is involved in the understanding of action, goal and intention, and emotion. The MNS, initially found in the Macaque monkey's F5 area, has been proved to exist in various brain areas of humans (Rizzolatti & Craighero, 2004). Iacoboni and Dapretto (2006) concluded that in the human brain, neurons with mirror property exists mainly in three centers: an anterior center (the inferior frontal cortex, encompassing the posterior inferior frontal gyrus and adjacent ventral premotor cortex), a posterior center (the rostral inferior parietal lobule), and the main visual input (the posterior superior temporal sulcus).

With the MNS, action understanding is not purely a process of inferential reasoning, but is directly mapped onto the observer's motor representation of the observed action, and therefore can be processed with ease and efficiency. With its massive connections with emotion centers in the brain (e.g., amygdala, insula, cingulate), the MNS is crucial in the development of empathy and emotional understanding (Gallese, Keysers, & Rizzolatti, 2004). The MNS is activated not only by the visually perceived motor movement, but also the sound of action (Lahav, Saltzman, & Schlaug, 2007), and therefore may have been an essential player in the human language evolution from gestural communication to speech

(Rizzolatti & Arbib, 1998). MNS activity is found to be regulated by the observer's experience with a motor movement (Cross, Hamilton, & Grafton, 2006). Generally, the more familiar an observer is with a specific set of motor movements, the stronger one's MNS activity will be when observing such movement.

MNS activity is important for interpersonal communication. It is vital for development of imitation (Lee, Josephs, Dolan, & Critchley, 2006; Molenberghs, Cunnington, & Mattingley, 2009), theory of mind and empathy (Schulte-Ruther, Markowitsch, Fink, & Piefke, 2007), and is also involved in gaze following (Triesch, Jasso, & Deak, 2007) and gaze perception (Adams & Kleck, 2003).

Most recently, a group led by Michael Platt found another brain system that exists in the parietal lobe and acts like the MNS, but is devoted for attention, rather than action (Klein, Shepherd, & Platt, 2009; Shepherd, Klein, Deaner, & Platt, 2009). The finding of this set of neurons highlighted the importance of gaze in social communication for primates.

A PWS stutters more frequently with listeners than when partaking in monologues. When the PWS stutters or expects moments of stuttering, he or she becomes more anxious, fearful, and struggles to avoid such a fluency breakdown with every possible means. However, efforts to avoid stuttering usually fail and present themselves to listeners as tense, threatening, struggling behaviors. "These stuttering moments can be the most conspicuous, salient, and visceral behaviors in the communicative interaction" (Kalinowski & Saltuklaroglu, 2006, p.

47), and can easily capture listeners' attentions. With these neural mechanisms at work, listeners are able to view the distorted face and hear the broken words, and also perceive the PWS' struggles, their effort to force out the sound, and their anxiety and fear of fluency breakdown.

Results from the current study suggested that listener responses seem to be related to attention. When listeners view and listen to stuttering speech, they inevitably pay more attention to the abnormal speech production, they focus their eye gaze more on the locus of the stuttering behaviors (e.g., the mouth), and they reduce their eye gaze to the background. Listener responses to stuttering also indicate their negative emotional feeling to stuttering. A repeatedly observed phenomenon is their significant increase in SCR and significant decrease in HR. These autonomic responses are similar to those when watching a film depicting blood-spilled surgery (Gomez, Zimmermann, Guttormsen-Schär, & Danuser, 2005) and imply a strong negative arousal. Also, the shorter fixation duration on the stuttering speaker's eyes relative to the normally fluent speaker's eyes may indicate listeners' emotional feelings of discomfort, embarrassment, and dislike when observing stuttering. Probably because of the concerted effort of the unconscious and conscious physiological, behavioral, and emotional responses, listeners form negative stereotypical perceptions toward PWS and these stereotypes are persistent to exposure to stuttering. In other words, these negative perceptions toward PWS may reflect the negative emotional responses stuttering evokes in listeners. Every time a listener perceives stuttering, these

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negative feelings arise, and the negative perceptions toward PWS become more distinctive, though the change might be minuscule.

Social and Clinical Implications of Listener Responses

In each culture, listeners form strongly negative responses toward stuttering. These responses may be contingent on the moment of stuttering, e.g., listeners feel unpleasant emotional arousal, reduce their eye gaze fixation on the speaker's eyes, and look more at the speaker's mouth, etc. Listeners also show persistent, robust negative stereotypical perceptions toward stuttering and PWS.

It is important to see that, in reality, listeners' negative responses toward PWS have great impact on both the face-to-face communication that involves at least a PWS and the quality of life for PWS. During face-to-face communication, a "vicious" circle can be easily formed between the PWS as the speaker and the listener with spiraling negativity in their responses toward each other. First, the speaker stutters and shows intense, struggling behaviors in the speech organs and other body parts; also, the speaker feels anxious and fearful for the involuntary fluency breakdown. Secondly, the listener automatically engages with behavioral and emotional changes in the speaker, interprets the unconsciously happened changes in the autonomic system as negative emotional arousals, and manifests his or her changes in orientation, attention, or emotional feeling in their eye gaze behaviors. Finally, the speaker detects the behavioral changes in the listener and interprets them as unfriendly, discouraging, and responds with increased levels of anxiety, fear, and anger, and worsened speech fluency, which,

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in turn, entices stronger negative responses from the listener. In this way, negativity between the stuttering speaker and the listener becomes escalated during their face-to-face communication. The unpleasant experiences in both the speaker and the listener may influence their perceptions in the next encounter because of the somatic marker (Bechara & Damasio, 2005; Damasio, 1994; Damasio, et al., 1996).

The negative listener responses and its impact on PWS may appear in its raw, less inhibited, and more evident form in children, because children have not acquired competent emotion regulation skills (Izard, 2009). Previous studies indicate that awareness of stuttering can be observed in more than half of 2-year old children, and the percentage progressively grows with age till at 7, almost all children are aware of stuttering (Boey, et al., 2009; Ezrati-Vinacour, et al., 2001). This pattern of awareness development coincides with the behaviorally negative responses to stuttering in children which exist in preschoolers (Langevin, et al., 2009). The behavioral responses of negativity toward PWS may become prevalent in elementary schools, in which many PWS registered their first memory of stuttering (Crichton-Smith, 2002). The early experience with stuttering can cause long-term emotional effect for PWS (Bricker-Katz, et al., 2009).

Listener responses also have impact on PWS' motivation for therapy and therapeutic success. For CWS, their parents' knowledge and attitudes toward stuttering and therapy are the deciding factors for therapy success (Wright & Sherrard, 1994a, 1994b). For adults who stutter, previous stuttering treatment

programs focus on enhancing the PWS' fluency and/or responses to stuttering (Van Riper, 1982). Recently, Plexico and colleagues (Plexico, et al., 2009a, 2009b) emphasized both attitudinal changes in PWS toward stuttering and listener responses to stuttering as important for therapy success.

Cultural influence on listener responses can be observed mainly in listeners' emotion expression toward stuttering and attitudinal perceptions toward PWS. Results from the current study, along with others' findings, indicate that, although PWS in the Western societies receive severe social penalties to stuttering during their daily interactions with listeners, and in various life aspects, PWS in other cultures, such as China and African-American communities, might suffer even more. The social penalties to PWS may occur because of the lack of knowledge in a society (e.g., Chinese individuals more probably correlate stuttering with lower intelligibility), or the society's culture-specific behavioral norms and value orientations (e.g., Chinese individuals have more spread visual processing and African-Americans have an admiration for fluent oral communication skills).

For the aim of improving therapy efficacy and general quality of life for PWS, it is necessary to look at PWS' difficulties in real life interactions with others. It is not infrequently observed that PWS show marked improvement in their fluency when receiving therapies at clinic, but relapse not long after they complete the treatment program (Kalinowski & Saltuklaroglu, 2006). In the clinic, clinicians are professionals in listening and providing positive feedback to PWS,

although they also carry the negative stereotypical perceptions toward PWS (Kalinowski, et al., 1993; Turnbaugh, et al., 1979); outside clinic, a large percentage of listeners may not try to hide, or cannot hide successfully, their negative perceptions toward PWS and negative emotional arousals elicited by PWS. It is true that clinicians need to work with the stuttering clients on their fluency and emotion and cognition related to stuttering, but clinicians also may need to work on listener responses and attitudes, at least with those that constitute the most important relation with the PWS, e.g., parents, siblings, spouse, and close friends, etc. One current therapy program for CWS focuses on the parents' communicative behaviors to the child (The Australian Stuttering Research Centre, 2006), and its claimed high success rate, if true, at least partially illustrates the effect of positive listener responses to stuttering. For adolescents and adults who stutter, it is probably much more difficult for clinicians to work with listeners in their client's immediate surroundings. For adolescents, peer pressure may be a crucial factor in their decisions to choose treatment and maintain fluency. For adults, listener responses have more relevance with their jobs and romance. Therefore, it seems that stuttering therapy success is not only based on the skills and passions of the clinicians, and the determination and perseverance of the PWS, but also the collective response from parents, peers, friends, bosses, and partners, etc. It needs the concerted effect from stuttering help groups, clinicians, and PWS themselves, etc., to

increase social awareness of stuttering and reduce negative responses from listeners to PWS.

The current study presented a real-life interaction for PWS in three cultural settings with listeners. An interesting research area may be cultural influences on listener responses to various fluency techniques. For a Chinese PWS, which therapeutic program would garner more favorable listener responses? For an African-American PWS, which manner of speaking can be better accepted by listeners? Using the 25-item bipolar scale, Manning and colleagues (Manning, Burlison, & Thaxton, 1999) investigated American listeners' responses to stuttering modification techniques. He reported that listeners tend to think more positively, or less negatively, when PWS speak in their natural, stuttering way, rather than stuttering with fluency techniques (e.g., cancellation or pull-out) utilized by the stuttering modification treatment programs. Whether this is unique in American listeners, or it is the same in listeners from other cultures, and whether listeners' perceptual negativity can be correlated with their visceral responses and emotional changes, and reflected behaviorally during conversation, may be future avenues of research.

Summary

Stuttering is notorious for its social punishment. Social punishment to stuttering can be in the form of negative stereotypical perceptions toward PWS, limitations in job employment and romantic relationships for PWS, and listeners' verbal and nonverbal responses to the stuttering speech. These punitive

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responses from others, especially parents and peers, are of importance for PWS in the development of stuttering, therapy efficacy, and quality of life.

The current study illustrated that listener responses to stuttering can be analyzed at multiple levels. At the core are probably the physiological responses (i.e., HR and SCR), which reflect unconscious emotional fluctuations elicited by stuttering behaviors. Listeners generally demonstrated significantly increased SCR with quick attenuation, and significantly and persistently decreased HR. This visceral response pattern is usually related to negative emotional arousal (Guntupalli et al., 2007). The effect of culture was inconspicuous at this level, indicating that those listeners' physiological responses to stuttering are probably generic and are regulated at a deep level. In other words, these are probably naturally-evolved responses to threatening behaviors, such as the tension-filled, struggling facial expressions in the PWS (Dijker & Koomen, 2007).

At the attentional level are the eye gaze responses. The results indicated that listeners are generally attracted to the mouth when the speaker stuttered, and listeners could not maintain the same duration of gaze fixations on the stuttering speaker's eyes. Cultural influences were evident, especially between Chinese and the American groups. Therefore, these responses have not only attentional components, but also emotional and cultural ones.

Listeners' perceptions toward PWS are probably the crystallized product of the physiological, emotional, and attentional responses to stuttering. Generally, PWS were perceived to have negative personality traits compared to normally

fluent speakers (e.g., PWS are perceived as being nervous, shy, self-conscious, reticent, avoiding, afraid, introverted, etc.). At this level, sharp contrasts were observed in three cultural groups, suggesting that societal punishment to stuttering may differ in width and degree in these cultural settings.

It is proposed that the behavioral and physiological responses toward stuttering have a neurobiological basis (i.e., MNS activity). This interpretation implies that listener responses to stuttering are innately negative, or seemingly to be so, because of the tension-filled, struggling stuttering behaviors and the negative emotions PWS feel during moments of stuttering. In other words, listeners unconsciously imitate the behaviors and emotions present in the stuttering speakers, and thus both the speaker and listeners feel negatively about these behaviors. The negative emotional experience may later influence listeners' judgment of the personality traits of PWS (e.g., the Somatic Marker hypothesis; Damasio et al., 1996) and further impact issues regarding vacations, romantic relationships, etc., for PWS.

These findings have important clinical and social implications. It is suggested that in treating stuttering, clinicians should take into consideration of the cultural background of the patient, modify the fluency techniques to be more acceptable by listeners, and provide culture-appropriate coping strategies for PWS to maintain their fluency outside clinic. It is also suggested that stuttering help groups, whereas promoting social awareness and fight against social punishment to stuttering internationally or nationally, should also focus on

culture-specific issues to achieve better efficiency and effect. Also, these findings

provide a perspective for PWS, clinicians, and all others who intend to help PWS

to realize the nature and expressions of listener responses to stuttering, become

more tolerant and acceptant to different listener responses and stuttering

manifestations, and improve the quality of life for PWS.

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APPENDIX A: INFORMED CONSENT DOCUMENTS

CONSENT DOCUMENT

Title of Research Study: Cultural Influence on Lister Responses to Stuttering
Principal Investigator: Jianliang Zhang
Institution: Department of Communication Sciences and Disorders, College of Allied Health, East Carolina University
Address: Room 2310R, Health Sciences Building, Greenville, 27834
Telephone #: (252)744-6123

PURPOSE AND PROCEDURES

The purpose of this research study is to examine attitudinal, physiological, and behavioral responses in listeners toward normal and disordered speech samples.
In participating in this research, you will be tested in a lab at East Carolina University. The total testing time will not exceed 90 minutes, which will be scheduled at your convenience.
You will be requested to complete two tasks. The first task (experiment I) will be to complete 2 questionnaire forms before and after the second task in paper-and-pencil form. The second task will be either experiment II or experiment III, in which you will view and listen to different speech samples, while your physiological responses, or eye gaze responses, will be measured.
Specifically, in experiment II, you will wear a goggle of personal LCD monitor to see the videos, and earphones will be inserted into your ears to listen to the audio signals. Electrodes will be attached to your fingers and wrists to measure the skin conductance responses and heart rate changes. In experiment III, you will be asked to sit in front of a computer monitor and watch and listen to the speech samples.

POTENTIAL RISKS AND DISCOMFORTS

You may find the following risks or discomforts from participating in this study:
Some fatigue, and probably some boredom, due to watching and listening to the speech samples with intervals;
Some hurting feelings when the electrode paste is removed from the skin around wrists and fingers in experiment II. However, these physical sensors are applied to the surface of the body and do not involve input of significant amounts of energy into the subject or an invasion of the subject's privacy.

POTENTIAL BENEFITS

There may be no personal benefit from your participation but the knowledge received may be of value to humanity.

SUBJECT PRIVACY AND CONFIDENTIALITY OF RECORDS

Your privacy and confidentiality will be maintained by the principle investigator. All records related to the study will remain confidential. Participants' names will not be used

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to identify information or results in scientific presentations or publications. Participants' data will be encoded to conceal their identity.

COSTS OF PARTICIPATION & COMPENSATION

You will not receive any monetary compensation for your participation in this study.

VOLUNTARY PARTICIPATION

Participating in this study is voluntary. If you decide not to be in this study after it has already started, you may stop at any time without losing benefits that you should normally receive. You may stop at any time you choose without penalty.

PERSONS TO CONTACT WITH QUESTIONS

The investigator will be available to answer any questions concerning this research, now or in the future. You may contact the investigator, Jianliang Zhang at phone numbers (252)744-6123 (days) or (252)412-5304 (nights and weekends). If you have questions about your rights as a research subject, you may call the Chair of the University and Medical Center Institutional Review Board at phone number 252-744-2914 (days). If you would like to report objections to this research study, you may call the ECU Director of Research Compliance at phone number 252-328-9473 (for research studies conducted through ECU).

CONFLICTS OF INTEREST
This study is not funded. Neither the research site, nor the principle investigator, Jianliang Zhang will receive any financial benefit based on the results of this study.

CONSENT TO PARTICIPATE

Title of research study: Influence on Lister Responses to Stuttering

I have read all of the above information, asked questions and have received satisfactory answers in areas I did not understand. (A copy of this signed and dated consent form will be given to the person signing this form as the participant or as the participant's authorized representative.)

Participant's Name **(PRINT)**   **Signature**   **Date**   **Time**

If applicable:

Guardian's Name **(PRINT)**   **Signature**   **Date**   **Time**

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                                                                  _____
                                                                  Participant's initials

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PERSON ADMINISTERING CONSENT: I have conducted the consent process and orally reviewed the contents of the consent document. I believe the participant understands the research.

_____
Person Obtaining consent **(PRINT)**   **Signature**   **Date**

_____
Principal Investigator's **(PRINT)**   **Signature**   **Date**

CONSENT DOCUMENT

Title of Research Study: Cultural Influence on Listener Responses to Stuttering
Principal Investigator: Jianliang Zhang
Institution: Department of Communication Sciences and Disorders, College of Allied
Health, East Carolina University
Address: Room 2310R, Health Sciences Building, Greenville, 27834
Telephone #: (252)744-6123

PURPOSE AND PROCEDURES

The purpose of this research study is to examine attitudinal, physiological, and behavioral
responses in listeners toward normal and disordered speech samples.
In participating in this research, you will be requested to be video-recorded while reading
aloud in a lab at East Carolina University. The recording of your reading will be used as
part of research stimuli in this study for other participants to watch and listen to. The total
recording time will not exceed 30 minutes, which will be scheduled at your convenience.
The video recording will include your speech, your face, the neck, and probably the
shoulder.
The video recording of your reading aloud will be edited and compiled with other
recordings.

POTENTIAL RISKS AND DISCOMFORTS

The present investigator anticipates no major risks or discomforts will occur in the
present project.

POTENTIAL BENEFITS

There may be no personal benefit from your participation but the knowledge received
may be of value to humanity.

SUBJECT PRIVACY AND CONFIDENTIALITY OF RECORDS

The video recording of the participant, including the speech, face, and probably other
body part, will be shown to other participants in the study. Participants' identities will not
be used to identify information or results in scientific presentations or publications. The
data will be encoded without identity information and confidentiality will be maintained
in a locked facility. Only the investigators will have access to these data.

COSTS OF PARTICIPATION & COMPENSATION

You will not receive any monetary compensation for your participation in this study.

VOLUNTARY PARTICIPATION

Version date: 8/06/09   - 1 -   _____
                                              Participant's initials

Participating in this study is voluntary. If you decide not to be in this study after it has already started, you may stop at any time without losing benefits that you should normally receive. You may stop at any time you choose without penalty.

PERSONS TO CONTACT WITH QUESTIONS

The investigator will be available to answer any questions concerning this research, now or in the future. You may contact the investigator, Jianliang Zhang at phone numbers (252)744-6123 (days) or (252)412-5304 (nights and weekends). If you have questions about your rights as a research subject, you may call the Chair of the University and Medical Center Institutional Review Board at phone number 252-744-2914 (days). If you would like to report objections to this research study, you may call the ECU Director of Research Compliance at phone number 252-328-9473 (for research studies conducted through ECU).

CONFLICTS OF INTEREST
This study is not funded. Neither the research site, nor the principle investigator, Jianliang Zhang will receive any financial benefit based on the results of this study.

CONSENT TO PARTICIPATE

Title of research study: Cultural Influence on Listener Responses to Stuttering

I have read all of the above information, asked questions and have received satisfactory answers in areas I did not understand. (A copy of this signed and dated consent form will be given to the person signing this form as the participant or as the participant's authorized representative.)

_____

Participant's Name **(PRINT)**   Signature   Date   Time

If applicable:

_____

Guardian's Name **(PRINT)**   Signature   Date   Time

PERSON ADMINISTERING CONSENT: I have conducted the consent process and orally reviewed the contents of the consent document. I believe the participant understands the research.

_____

Person Obtaining consent **(PRINT)**   Signature   Date

_____

Principal Investigator's **(PRINT)**   Signature   Date

Version date: 8/06/09   - 2 -   _____
                                                                  Participant's initials

APPENDIX B: INSTITUTIONAL REVIEW BOARD APPROVAL

University and Medical Center Institutional Review Board
East Carolina University • Brody School of Medicine
600 Moye Boulevard • Old Health Sciences Library, Room 1L-09 • Greenville, NC 27834
Office **252-744-2914** • Fax **252-744-2284** • **www.ecu.edu/irb**
Chair and Director of Biomedical IRB: L. Wiley Nifong, MD
Chair and Director of Behavioral and Social Science IRB: Susan L. McCammon, PhD

TO: Jianliang Zhang, Dept. of Communication Sciences and Disorders, LAHN, ECU

FROM: UMCIRB

DATE: August 13, 2009

RE: Expedited Category Research Study

TITLE: "Cultural Influence on Listeners Responses to Stuttering"

UMCIRB #09-0601

This research study has undergone review and approval using expedited review on 8.12.09. This research study is eligible for review under an expedited category because it is a collection of data through noninvasive procedures (not involving general anesthesia or sedation) routinely employed in clinical practice, excluding procedures involving x-rays or microwaves. Where medical devices are employed, they must be cleared/approved for marketing. (Studies intended to evaluate the safety and effectiveness of the medical device are not generally eligible for expedited review, including studies of cleared medical devices for new indications.) Examples: (a) physical sensors that are applied either to the surface of the body or at a distance and do not involve input of significant amounts of energy into the subject or an invasion of the subject's privacy; (b) weighing or testing sensory acuity; (c) magnetic resonance imaging; (d) electrocardiography, electroencephalography, thermography, detection of naturally occurring radioactivity, electroretinography, ultrasound, diagnostic infrared imaging, doppler blood flow, and echocardiography; (e) moderate exercise, muscular strength testing, body composition assessment, and flexibility testing where appropriate given the age, weight, and health of the individual. The Chairperson (or designee) deemed this **unfunded** study **no more than minimal risk** requiring a continuing review in **12 months**. Changes to this approved research may not be initiated without UMCIRB review except when necessary to eliminate an apparent immediate hazard to the participant. All unanticipated problems involving risks to participants and others must be promptly reported to the UMCIRB. The investigator must submit a continuing review/closure application to the UMCIRB prior to the date of study expiration. The investigator must adhere to all reporting requirements for this study.

The above referenced research study has been given approval for the period of **8.12.09** to **8.11.10**. The approval includes the following items:
- Internal Processing Form (rec. 7.29.09)
- Informed Consent (dated 8.6.09)
- Questionnaire- English (dated 2009)
- Questionnaire- Chinese (dated 2009)

The Chairperson (or designee) does not have a potential for conflict of interest on this study.

The UMCIRB applies 45 CFR 46, Subparts A-D, to all research reviewed by the UMCIRB regardless of the funding source. 21 CFR 50 and 21 CFR 56 are applied to all research studies under the Food and Drug Administration regulation. The UMCIRB follows applicable International Conference on Harmonisation Good Clinical Practice guidelines.

IRB00000705 East Carolina U IRB #1 (Biomedical) IORG0000418   UMCIRB #09-0601
IRB00003781 East Carolina U IRB #2 (Behavioral/SS) IORG0000418   Page 1 of 1
IRB00004973 East Carolina U IRB #4 (Behavioral/SS Summer) IORG0000418
Version 3-5-07

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APPENDIX C: QUESTIONNAIRE (ENGLISH)

Questionnaire

Part I:

Please fill in the bracket or circle the right answer.

1. Your age is: (___).

2. Your gender is (male/female).

3. Your race/ethnicity is:
   a. African American.
   b. Caucasian.
   c. Chinese.
   d. Hispanics/Latinos.
   e. Other.

4. Your education level is:
   a. Some school.
   b. High school graduate.
   c. Some college.
   d. 2 year college.
   e. 4 year college.
   f. Postgraduate

5. Your occupation is: (_____).

6. Do you have a history of stuttering: (Yes/No)

7. Do you have any familial members who stutter: (Yes/No). If Yes, how many? (_____)

8. How many people who stutter do you know in real life?
   a) None.
   b) 1-2.
   c) 3-5.
   d) Above 5.

1

Part II:

*Below you will see some rating scales each with seven points. Please evaluate a typical, **ADULT MALE WHO STUTTERS**, someone who has difficulty when trying to speak. On the scales provided below, please circle the number on the scale which identifies what **YOU THINK** the traits of an **ADULT MALE WHO STUTTERS** are.*

1 and 7 = very much, 2 and 6 = quite a bit, 3 and 5 = slightly, 4 = neutral

1	Open	1 – 2 – 3 – 4 – 5 – 6 – 7	Guarded
2	Nervous	1 – 2 – 3 – 4 – 5 – 6 – 7	Calm
3	Cooperative	1 – 2 – 3 – 4 – 5 – 6 – 7	Uncooperative
4	Shy	1 – 2 – 3 – 4 – 5 – 6 – 7	Bold
5	Friendly	1 – 2 – 3 – 4 – 5 – 6 – 7	Unfriendly
6	Self-conscious	1 – 2 – 3 – 4 – 5 – 6 – 7	Self-assured
7	Tense	1 – 2 – 3 – 4 – 5 – 6 – 7	Relaxed
8	Sensitive	1 – 2 – 3 – 4 – 5 – 6 – 7	Insensitive
9	Anxious	1 – 2 – 3 – 4 – 5 – 6 – 7	Composed
10	Pleasant	1 – 2 – 3 – 4 – 5 – 6 – 7	Unpleasant
11	Withdrawn	1 – 2 – 3 – 4 – 5 – 6 – 7	Outgoing
12	Quiet	1 – 2 – 3 – 4 – 5 – 6 – 7	Loud
13	Intelligent	1 – 2 – 3 – 4 – 5 – 6 – 7	Dull
14	Talkative	1 – 2 – 3 – 4 – 5 – 6 – 7	Reticent
15	Avoiding	1 – 2 – 3 – 4 – 5 – 6 – 7	Approaching
16	Fearful	1 – 2 – 3 – 4 – 5 – 6 – 7	Fearless
17	Aggressive	1 – 2 – 3 – 4 – 5 – 6 – 7	Passive
18	Afraid	1 – 2 – 3 – 4 – 5 – 6 – 7	Confident
19	Introverted	1 – 2 – 3 – 4 – 5 – 6 – 7	Extroverted
20	Daring	1 – 2 – 3 – 4 – 5 – 6 – 7	Hesitant
21	Secure	1 – 2 – 3 – 4 – 5 – 6 – 7	Insecure
22	Emotional	1 – 2 – 3 – 4 – 5 – 6 – 7	Bland
23	Perfectionistic	1 – 2 – 3 – 4 – 5 – 6 – 7	Careless
24	Bragging	1 – 2 – 3 – 4 – 5 – 6 – 7	Self-Derogatory
25	Inflexible	1 – 2 – 3 – 4 – 5 – 6 – 7	Flexible

2

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Part III:

*Below you will see some rating scales each with seven points. Please evaluate a typical, **normal adult male speaker**, someone who has normal speaking capacities when talking. On the scales provided below, please circle the number on the scale which identifies what **YOU THINK** the traits of a **NORMAL ADULT MALE SPEAKER** are.*

1 and 7 = very much, 2 and 6 = quite a bit, 3 and 5 = slightly, 4 = neutral

1	Open	1 – 2 – 3 – 4 – 5 – 6 – 7	Guarded
2	Nervous	1 – 2 – 3 – 4 – 5 – 6 – 7	Calm
3	Cooperative	1 – 2 – 3 – 4 – 5 – 6 – 7	Uncooperative
4	Shy	1 – 2 – 3 – 4 – 5 – 6 – 7	Bold
5	Friendly	1 – 2 – 3 – 4 – 5 – 6 – 7	Unfriendly
6	Self-conscious	1 – 2 – 3 – 4 – 5 – 6 – 7	Self-assured
7	Tense	1 – 2 – 3 – 4 – 5 – 6 – 7	Relaxed
8	Sensitive	1 – 2 – 3 – 4 – 5 – 6 – 7	Insensitive
9	Anxious	1 – 2 – 3 – 4 – 5 – 6 – 7	Composed
10	Pleasant	1 – 2 – 3 – 4 – 5 – 6 – 7	Unpleasant
11	Withdrawn	1 – 2 – 3 – 4 – 5 – 6 – 7	Outgoing
12	Quiet	1 – 2 – 3 – 4 – 5 – 6 – 7	Loud
13	Intelligent	1 – 2 – 3 – 4 – 5 – 6 – 7	Dull
14	Talkative	1 – 2 – 3 – 4 – 5 – 6 – 7	Reticent
15	Avoiding	1 – 2 – 3 – 4 – 5 – 6 – 7	Approaching
16	Fearful	1 – 2 – 3 – 4 – 5 – 6 – 7	Fearless
17	Aggressive	1 – 2 – 3 – 4 – 5 – 6 – 7	Passive
18	Afraid	1 – 2 – 3 – 4 – 5 – 6 – 7	Confident
19	Introverted	1 – 2 – 3 – 4 – 5 – 6 – 7	Extroverted
20	Daring	1 – 2 – 3 – 4 – 5 – 6 – 7	Hesitant
21	Secure	1 – 2 – 3 – 4 – 5 – 6 – 7	Insecure
22	Emotional	1 – 2 – 3 – 4 – 5 – 6 – 7	Bland
23	Perfectionistic	1 – 2 – 3 – 4 – 5 – 6 – 7	Careless
24	Bragging	1 – 2 – 3 – 4 – 5 – 6 – 7	Self-Derogatory
25	Inflexible	1 – 2 – 3 – 4 – 5 – 6 – 7	Flexible

3

APPENDIX D: QUESTIONNAIRE (CHINESE)

Questionnaire

Part I:

Please fill in the bracket or circle the right answer.

1. Your age is: (___).

    Your race/ethnicity is:
    a. African American.
    b. Caucasian.
    c. Chinese.
    d. Hispanics/Latinos.
    e. Other.

2. Your gender is (male/female).

    Your education level is:
    f. Some school.
    g. High school graduate.
    h. Some college.
    i. 2 year college.
    j. 4 year college.
    k. Postgraduate

3. Your occupation is: (_____).

4. Do you have a history of stuttering: (Yes/No)

5. Do you have any familial members who stutter: (Yes/No). If Yes, how many? (_____)

6. How many people who stutter do you know in real life?
    a) None.
    b) 1-2.
    c) 3-5.
    d) Above 5.

1

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Part II:

*Below you will see some rating scales each with seven points. Please evaluate a typical, **ADULT MALE WHO STUTTERS (有口吃的成年男性)**, someone who has difficulty when trying to speak. On the scales provided below, please circle the number on the scale which identifies what **YOU THINK (你认为)** the traits of an **ADULT MALE WHO STUTTERS (有口吃的成年男性)** are.*

1 and 7 = very much, 2 and 6 = quite a bit, 3 and 5 = slightly, 4 = neutral

#			
1	Open (坦诚的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Guarded (警戒着的)
2	Nervous (紧张的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Calm (安静的)
3	Cooperative (协力合作的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Uncooperative (不合作的)
4	Shy (害羞的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Bold (鲁莽的)
5	Friendly (友好的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Unfriendly (不友好的)
6	Self-conscious (怕难为情的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Self-assured (自信的)
7	Tense (紧张的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Relaxed (轻松的)
8	Sensitive (敏感的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Insensitive (感觉迟钝的)
9	Anxious (忧虑的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Composed (沉着的)
10	Pleasant (亲切可爱的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Unpleasant (令人不快的)
11	Withdrawn (沉闷的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Outgoing (开朗的)
12	Quiet (恬静的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Loud (吵吵闹闹的)
13	Intelligent (聪明伶俐的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Dull (头脑迟钝的)
14	Talkative (健谈的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Reticent (含蓄的)
15	Avoiding (躲躲闪闪的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Approaching (不躲不闪的)
16	Fearful (胆怯的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Fearless (无畏的)
17	Aggressive (进取的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Passive (消极被动的)
18	Afraid (畏惧的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Confident (自信的)
19	Introverted (内向的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Extroverted (外向的)
20	Daring (大胆的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Hesitant (犹豫不决的)
21	Secure (可靠的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Insecure (不可靠的)
22	Emotional (易动感情的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Bland (无动于衷的)
23	Perfectionistic (追求完美的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Careless (马虎大意的)
24	Bragging (吹牛的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Self-Derogatory (自贬的)
25	Inflexible (顽固执拗的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Flexible (灵活变通的)

2

Part III:

*Below you will see some rating scales each with seven points. Please evaluate a typical, **NORMAL ADULT MALE SPEAKER (说话正常的成年男性)**, someone who has normal speaking capacities when talking. On the scales provided below, please circle the number on the scale which identifies what **YOU THINK (你认为)** the traits of a **NORMAL ADULT MALE SPEAKER (说话正常的成年男性)** are.*

1 and 7 = very much, 2 and 6 = quite a bit, 3 and 5 = slightly, 4 = neutral

1	Open (坦诚的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Guarded (警戒着的)
2	Nervous (紧张的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Calm(安静的)
3	Cooperative (协力合作的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Uncooperative (不合作的)
4	Shy (害羞的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Bold (鲁莽的)
5	Friendly (友好的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Unfriendly(不友好的)
6	Self-conscious (怕难为情的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Self-assured (自信的)
7	Tense (紧张的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Relaxed (轻松的)
8	Sensitive (敏感的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Insensitive (感觉迟钝的)
9	Anxious (忧虑的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Composed (沉着的)
10	Pleasant (亲切可爱的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Unpleasant (令人不快的)
11	Withdrawn (沉闷的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Outgoing (开朗的)
12	Quiet (恬静的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Loud (吵吵闹闹的)
13	Intelligent (聪明伶俐的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Dull (头脑迟钝的)
14	Talkative (健谈的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Reticent (含蓄的)
15	Avoiding (躲躲闪闪的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Approaching (不躲不闪的)
16	Fearful (胆怯的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Fearless (无畏的)
17	Aggressive (进取的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Passive (消极被动的)
18	Afraid (畏惧的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Confident (自信的)
19	Introverted (内向的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Extroverted (外向的)
20	Daring (大胆的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Hesitant (犹豫不决的)
21	Secure (可靠的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Insecure (不可靠的)
22	Emotional (易动感情的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Bland (无动于衷的)
23	Perfectionistic (追求完美的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Careless (马虎大意的)
24	Bragging (吹牛的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Self-Derogatory (自贬的)
25	Inflexible (顽固执拗的)	1 – 2 – 3 – 4 – 5 – 6 – 7	Flexible (灵活变通的)

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APPENDIX E: PERMISSION LETTERS

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> Email: jz1208@ecu.edu

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