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Listener perceptions of stuttering and stuttering modification techniques

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ABSTRACT

Purpose: The purpose of this study was to analyse naïve listener perceptions of speech containing unmodified stuttering, use of the pull-out technique, and use of preparatory-sets.

Method: Participants ($N = 62$) were randomly assigned to listen to one audio sample (unmodified stuttered speech, speech with pull-outs, or speech with preparatory-sets) and completed a survey assessing perceptions of the speaker's speech and personality and the listener's comfort level and willingness to social interact with the speaker.

Results: Survey results revealed low perceptual ratings in all experimental conditions. Unmodified stuttered speech received significantly more positive ratings than the stuttering modification conditions in all measurements except for speech naturalness. Listeners reported being less willing to socially interact with those who use preparatory-sets than unmodified stuttered speech.

Conclusion: The use of stuttering modification techniques did not improve listeners' perceptions or willingness to interact with persons who stutter. Clinicians and those who stutter should be aware that the use of speech techniques will not decrease negative social interactions or stereotypes.

1. Introduction

Stuttering is a complex communication disorder that impacts less than 1 % of the general population (Yairi & Ambrose, 2013) yet numerous interventions approaches have been designed to address it. Interventions differ in therapeutic procedures and goals (Guitar & Peters, 2013), but most share the common factor of direct speech modifications, also known as speech techniques. Stuttering Modification Therapy (Van Riper, 1973) is a widely used intervention that incorporates speech techniques as one of its major therapeutic components. Clinicians, and many people who stutter (PWS), frequently report speech techniques to be essential to the successful management of stuttering (Anderson & Felsenfeld, 2003; De Nardo et al., 2016; Plexico et al., 2005; Quarrington, 1977; Wingate, 1964). However, the literature indicates that the use of speech techniques does not ameliorate the negative perceptions and stereotypes towards PWS (Lee & Manning, 2010; Manning et al., 1999, Von Tilling, 2011). Individuals who stutter appear to be aware of this, as a survey of 152 PWS revealed that 40 % attributed relapse of post-treatment gains to feeling embarrassed about using speech techniques (Craig & Hancock, 1995). One recent treatment program, which excludes speech techniques as a clinical target (see Byrd et al., 2016, 2018, 2021, 2022a,b), suggests that gains in listener perception can be obtained after treatment wherein speakers make no attempt to conceal stuttered speech. The purpose of this investigation, therefore, is to compare listener perceptions of unmodified

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stuttered speech, speech with pull-out techniques, and speech with preparatory-sets.

1.1. Listener perception of PWS

The importance of listener perceptions and attitudes toward PWS is described in the International Classification of Functioning, Disability, and Health, developed by the World Health Organization (WHO-ICF), and adopted by the American Speech-Language-Hearing Association (ASHA). The WHO-ICF framework includes *environmental factors* as a major influence on whether a health condition leads to activity limitations. Environmental factors consist of the social and attitudinal background of the individual's environment that affects communication, including the negative attitudes and stereotypes of individuals or society (World Health Organization, 2013). Although listener perception is a third-party perspective of a speakers' communicative effectiveness that is independent from the speakers' self-evaluation, the WHO-ICF framework suggests that negative listener perception has the potential to impact the day-to-day wellbeing and psychosocial health of PWS.

Listeners make judgements about an individual's personality, intelligence, and ability for self-expression based largely on the perception of their speech (Susca & Healey, 2001, 2002) and perceived communication impairments negatively influence personality judgments (Allard & Williams, 2008; Lass et al., 1992; Williams & Dietrich, 1996). Although there are no differences in self-reported personality characteristics between PWS and normally fluent individuals (Manning & Beck, 2013), PWS are frequently perceived as shy, tense, afraid, insecure, and nervous (Arnold et al., 2015; Dorsey & Guenther, 2000; MacKinnon et al., 2007). PWS are aware of negative stereotypes and, in many cases, agree with these perceptions (Boyle, 2013), leading many PWS to withdraw from social interactions or conceal stuttering to prevent negative social reactions (Blood et al., 2003; Constantino et al., 2017). Evidence suggests that the high levels of social anxiety and communication apprehension reported by PWS are not inherited, but the result of negative social evaluation experienced by those who stutter (i.e., prejudice, discrimination, negative attitudes; Boyle & Blood, 2015; Craig & Tran, 2014). The negative perceptions towards PWS can lead to negative interpersonal relationships (Van Borsel et al., 2011) and contribute to negative academic (Meredith & Packman, 2015; Werle & Byrd, 2021), occupational (McAllister et al., 2012; Bricker-Katz et al., 2013), and economic opportunities (Gerlach et al., 2018).

1.2. Stuttering modification therapy

Stuttering modification therapy is an intervention approach aimed at reducing the avoidances, struggle behaviors, and negative attitudes related to stuttering. Multiple therapeutic approaches are based on the principles of stuttering modification therapy (Manning & DiLollo, 2017; Van Riper, 1973; Yairi & Seery, 2021). Therapy involves teaching and counseling PWS to identify and understand their speaking behaviors, attitudes, and feelings towards stuttering and to learn to *stutter more easily*, that is, with less tension, effort, and abnormality (Van Riper, 1973). Stuttering more easily can be achieved by reducing the rate of speech, reducing articulatory pressure (i.e., light contact), gently vibrating the vocal cords when initiating speech (i.e., easy-onset), and blending sounds together (i.e., stretched speech). These tension reducing techniques can be used individually, or in combination, at various points in stuttering modification treatment. When all the described techniques are used simultaneously it results in the speech technique that resembles prolonged speech (Packman et al., 2000). Unlike its use in fluency shaping therapy, however, prolonged speech in stuttering modification therapy is only used during moments of stuttering as needed, not continuously.

The timing of the application of speech techniques is typically taught in a specific sequence based upon heightening proprioceptive awareness. The conventional sequence of stuttering modification techniques is cancellation, pull-out, and then preparatory-set (Van Riper, 1973). According to Van Riper, PWS advance through these stages sequentially, with those skilled in proprioceptive awareness able to use preparatory-sets exclusively to speak fluently. The definitions of the stages are as follows:

1.2.1. Cancellation

A speech technique is used *after* a moment of stuttering. When the individual stutters, they complete the word, and then repeat it using a technique.

1.2.2. Pull-out

A speech technique is applied *during* a moment of stuttering. Once the person observes themselves stuttering, they immediately use a technique to decrease the tension and complete the word.

1.2.3. Preparatory-set

A speech technique is applied *in anticipation* of a moment of stuttering. PWS can typically anticipate moments of stuttering and, when stuttering is anticipated, the PWS incorporates a technique before the moment of stuttering occurs.

1.3. Therapeutic approaches to improving others' perceptions of PWS

Surprisingly few investigations exist that examine effective methods to improve the public perception and attitudes towards PWS. As reported by Abdalla (2015), attempts have been made with documentaries (Snyder, 2001), personal presentations (Flynn & Louis, 2011), or coursework designed to improve listeners perceptions (Langevin & Prasad, 2012; Leahy, 1994), but results have been mixed. One might argue that the most practical method to improve listener perception and attitudes towards the PWS would be one that can be used by PWS in their daily lives. Of the limited number of studies that focus on PWS-centered techniques to change listener

perception, most focus either on the use of speech techniques, self-disclosure of stuttering, or both.

Manning et al. (1999) explored how listeners perceived individuals who used the stuttering modification techniques of cancellation and pull-out. Three audio-visual monologues were made by a PWS to create (a) a mild stuttering condition, (b) a cancellation condition, and (c) a pull-out condition. All monologues were identical in content and contained 21 moments of stuttered speech. In the cancellation condition, the speaker paused for a second following each moment of stuttering and repeated the word fluently using prolonged speech. In the pull-out condition, the speaker produced the initial portion of the stuttered word but immediately transitioned to prolonged speech to complete the word fluently. The findings revealed that a listener's perception of a PWS becomes more negative with the use of stuttering modification techniques. Participants rated the individual with stuttered speech as significantly less handicapped and were more willing to interact with him than those who used the stuttering modification techniques. Further, participants provided significantly more positive personality ratings for the stuttered speech condition than the pull-out condition.

The influence of speech techniques on listener perception may be mediated by self-disclosure. Self-disclosure of stuttering has long been encouraged to diminish the discomfort or uncertainty felt by listeners (Sheehan, 1975; Van Riper, 1973). Despite mixed results in earlier studies (Collins & Blood, 1990; Healey et al., 2007), recent investigations on this topic have revealed improved listener perceptions of PWS with self-disclosures (Byrd et al., 2017a,b; Croft & Byrd, 2021). To date, only Lee and Manning (2010) have explored listeners' responses to both speech techniques and self-disclosure. In their first experiment, listeners rated four conditions: (1) severely stuttered speech, (2) severely stuttered speech with self-disclosure, (3) speech with speech techniques (i.e., pull-out), and (4) speech with pull-outs and self-disclosure. Results revealed no significant differences in listener perception across these four conditions, indicating that the use of pull-outs, even when participants are made aware of its purpose, does not significantly improve listener perceptions compared to severe stuttering. In a second experiment, however, listeners were provided the opportunity to rate two conditions: stuttered speech with and without disclosure. Disclosure was rated more favorably by listeners than stuttered speech without disclosure. Findings across these two experiments suggest that the presence of pull-outs offsets the favorable listener reaction often elicited by self-disclosure without the use of speech techniques.

Von Tiling (2011) analysed listener's perceptions of nonfluent and stuttering speakers by comparing: (1) severe stuttering, (2) hesitant speech (i.e., speech containing interjections, revisions, and incomplete phrases), (3) stuttered/hesitant speech, and (4) prolonged speech. Von Tiling included the *hesitant speech* condition to portray a PWS who successfully avoids or masks overt stuttering via interjections, revisions, and/or circumlocutions (i.e., a 'covert PWS') as well as a *stuttered/hesitant* condition to portray the speech of a PWS who unsuccessfully attempts to avoid or mask stuttering. The findings revealed no significant differences in the ratings between the stuttered speech and prolonged speech conditions, meaning that the use of this fluency shaping technique did not impact listener perceptions of PWS. However, the stuttered speech and prolonged speech conditions were rated more positively than the hesitant and the hesitant/stuttered speech condition.

1.4. Purpose of current investigation

The available literature indicates that the use of speech techniques, even when used with self-disclosure (Lee & Manning, 2010), does not improve listener perceptions of PWS (Manning et al., 1999; Von Tiling, 2011). Many PWS report embarrassment about using speech techniques post-treatment (Craig & Hancock, 1995; Cream et al., 2003). At the same time, speech techniques are considered by many to be a key component of the successful management of stuttering (Anderson & Felsenfeld, 2003; De Nardo et al., 2016; Plexico et al., 2005; Quarrington, 1977; Wingate, 1964) and clinical education (Hale et al., 2021). Appreciating the importance of speech techniques and of listener perceptions, it seems imperative to explore which speech technique, if any, induces the most favorable listener perceptions beyond unmodified stuttered speech.

Listener perceptions of preparatory-sets – the proposed endpoint of traditional speech modification therapy (Van Riper, 1973) – has not yet been analysed. Additionally, previous investigations have only compared stuttered speech to a single speech technique. This type of research design does not allow for a direct comparison of different techniques. The current investigation addressed both limitations by directly comparing preparatory-sets, pull-outs, and unmodified stuttered speech. The central research question guiding this investigation is: How do listener perceptions differ when listening to unmodified stuttered speech, speech with pull-outs, and speech with preparatory-sets?

2. Methods

The Institutional Review Board at the authors' institutions approved all study procedures.

2.1. Participants

Data from the current study were collected from a total of 62 undergraduate students (43 female, 19 male) who were recruited through a web-based experiment management system from a university campus in the Southern United States of America. To decrease the likelihood of creating biases, participants were only informed that they would be rating audio samples; no information about the audio samples was provided. The participants included in analysis passed a hearing check, reported no history of stuttering, nor having taken a communication disorders course. To avoid biases, this information was collected after data collection and participants who did not meet the criteria were eliminated from analysis. Participants ranged from 18 to 47 years of age ($M = 19.5$) and were ethnically diverse (Caucasian/non-Hispanic [63 %], African-American/non-Hispanic [21 %], Latino or Hispanic [6 %], Asian/Pacific Islander [3 %], Native American [3 %], Other [3 %]).

2.2. Experimental conditions

This study included three experimental conditions: unmodified stuttered speech, speech with the pull-out technique, and speech with preparatory-sets. All samples were produced by the same individual to control for the effect of vocal quality and other speech factors. Stuttering of a moderate severity was used since previous investigation on this topic have only included mild (Lee & Manning, 2010) or severe stuttering (Manning et al., 1999; Von Tiling, 2011). Pull-outs have been compared to unmodified stuttering in previous studies (Manning et al., 1999; Lee & Manning, 2010) enabling cross-comparison. Preparatory-sets, however, represent the proposed endpoint of stuttering modification therapy, and have not yet been studied.

2.2.1. Unmodified stuttered speech

The monologue produced for the current study included 14 % stuttered syllables. in the form of speech blocks, prolongations, and single-syllable repetition with 3–4 iterations. The mean duration of the three longest disfluencies was approximately three seconds, and the speaker produced audible signs of tension (e.g., pitch breaks). The frequency and durations of stuttering would be equivalent to moderate stuttering severity on the Stuttering Severity Instrument - 4th Edition (Riley, 2009). As with previous investigations, the stuttered sample served as a control condition as opposed to a fluent sample because listeners' negative perceptions of stuttered speech compared to fluent speech have been well-documented in previous studies.

2.2.2. Speech with pull-out technique

Pull-outs, also known as in-block modifications, is a technique used in stuttering modification therapy in which the speaker identifies that he is stuttering and immediately reduces muscle tension to complete the word with controlled fluency (Yairi & Seery, 2021). As in previous investigations (Manning et al., 1999; Lee & Manning, 2010) prolonged speech was employed during pull-outs (as described in Section 1.2). The pull-outs produced in the audio sample included moments of stuttering with audible signs of tension that transitioned into prolonged speech. This sample included the same frequency, type, and location of stuttering as in the stuttered speech sample.

2.2.3. Speech with preparatory-set

Preparatory-sets, also known as pre-block modifications, is a stuttering modification technique in which speech modification occurs immediately prior to an anticipated moment of stuttering (Yairi & Seery, 2021). In this condition, prolonged speech was implemented just prior to the anticipated moment of stuttering, on the first syllable of the word. Preparatory-sets were applied to each moment of stuttering included in previous conditions (i.e., 14 % of the sample). This sample was free of stuttering but speech rate reduction, light articulatory contacts, and gentle-onsets that comprised preparatory-sets were audible.

2.3. Stimuli

2.3.1. Speaker

All audio samples were provided by a 35-year-old adult male who spoke standard American English. The speaker was a self-identified PWS who was also a licensed, certified speech-language pathologist with extensive experience in fluency disorders. It was important that the audio samples were portrayed by a PWS as research has shown that even the fluent speech segments produced by PWS are perceived differently than those of non-stuttering individuals (Love & Jeffress, 1971).

2.3.2. Audio samples

The audio samples were designed to be uniform in as many aspects as possible. All were created with the same fictional, 133 syllable script that made no mention that the speaker was a PWS or speech-language pathologist, and made no reference to his speech. The locations of the pull-outs, preparatory-sets, and stuttering events were predetermined and placed on the same syllable of the same word in all stimuli. All speech samples had a lower speech rate than normative data (Venkatagiri, 1999), as would be expected for nonfluent speech samples. (syllables per minute [SPM]; stuttered speech= 72 s/111 SPM; pull-out= 79 s/101 SPM; preparatory-set=65 s/123 SPM). All audio samples were recorded in a professional sound booth and the audio files were edited with version 2.1.2 of Audacity ® recording and editing software.

2.3.3. Validity and reliability of audio samples

Two board certified specialists in fluency disorders evaluated the validity of the pull-out technique and preparatory-set samples. Both *agreed* or *strongly agreed* that all samples were realistic and portrayed the speech modifications accurately. Two independent speech-language pathologists with experience in stuttering treatment and fluency analysis confirmed the level of stuttering in the unmodified stuttered speech sample.

2.4. Rating scales

2.4.1. Bipolar adjective scale

A 21-item bipolar adjective scale was used to analyse how naïve listeners perceive the speaker's personal attributes in each condition. The scale was organized in two columns, with an adjective and its contrasting pair on either side and a seven-point equal-appearing interval in between with the labels 'very much' (0), 'quite a bit' (1), 'slightly' (2), 'neutral' (3), 'slightly' (4), 'quite a bit' (5),

and ‘very much’ (6). The original scale has been utilized to measure listener perceptions of speech in numerous investigations of stuttering and other speech communication disorders (Lee & Manning, 2010; Manning et al., 1999; Turnbaugh et al., 1981; White & Collins, 1984), and has been shown to be reliable (Weisel & Spektor, 1998; Woods & Williams, 1976).

2.4.2. Speech naturalness scale

The speech naturalness scale is a single item nine-point equal-appearing interval scale (1 = *highly natural sounding speech*; 9 = *highly unnatural sounding speech*) developed by Martin et al. (1984). This scale is used to evaluate the speech of those who stutter and has shown to be reliable (Carey et al., 2014; Onslow et al., 1996).

2.4.3. Listener comfort scale

The listener comfort scale uses a nine-point equal-appearing interval scale (1 = *extremely uncomfortable*; 9 = *extremely comfortable*) to measure listener comfort of speech production. To match the other scales in the survey and to streamline its completion, the anchor items were reversed so that 1 = *extremely comfortable* and 9 = *extremely uncomfortable*. The original introductory question of this scale was used, ‘How comfortable would you feel listening to the speaker’s speech in a social situation?’.

2.4.4. Modified handicap scale

The handicap scale has been utilized to assess how much listeners believe a speaker is handicapped by an impairment (Lee & Manning, 2010; Manning et al., 1999). The original scale is a single item five-point equal-appearing interval scale (1 = *slight*; 5 = *severe*). The modified version used in the present investigation included a ‘0 = N/A’ option. This additional option was included so that participants were not forced to assign a handicap if they did not believe there to be one. This scale was introduced with the original question ‘How much do you feel that the speaker is handicapped by his manner of speaking?’.

2.5. Descriptive questions

Four open-ended questions were included to collect descriptive data about the participants’ willingness to socially interact with the speaker and their impression of the speech production:

What was your overall impression of this person’s speech?

If you had a conversation with this speaker at the outset of a party, how likely would you be to talk to this speaker again later in the evening?

Would you be likely to introduce this person to your friends at the party?

How would you describe this person’s manner of speaking?

The first three questions were selected because of their use in previous investigations of similar topics (Manning et al., 1999; Panico et al., 2005).

2.6. Procedures

Participants were provided with written and verbal instructions on the procedure and how to complete the survey components. Participants listened to one randomly assigned experimental condition and completed the electronic survey in a computer laboratory with individual desktop computers placed on carrel desks.

2.7. Data analysis

Four separate one-way ANOVAs were conducted to analyse the total sum of the bipolar adjective scale and the mean scores of the speech naturalness, listener comfort, and handicap scales. Tukey post hoc analysis with a Bonferroni correction ($p < .0167$) was conducted when significant differences were found ($p < .05$).

The first three descriptive questions were analysed quantitatively with Kruskal-Wallis H test with an alpha level of .05 and a post hoc analysis using pairwise comparison with a Bonferroni correction ($p < .0167$). Participant responses were quantified by two judges who independently identified each comment as either positive, negative, or neutral. Applying the same methodology as Manning et al. (1999) and Panico et al. (2005), the responses were identified as being positive if the main descriptive element (adjective, adverb, verb, or noun) used conveyed a positive connotation (e.g., “I would definitely speak with this person again;” “He spoke well”). Responses were identified as negative if the main descriptive element used conveyed a negative connotation (e.g., “It was very choppy and inconsistent;” “I would not talk to him again”). Comments that appeared neutral (e.g., “If he talked about something interesting then yes other than that not really”) or that contained both positive and negative main descriptors (e.g., ‘He had trouble getting words out, but he was easy to understand’) were identified as neutral. These labels were used to transform the responses into ordinal data for descriptive analysis. Intra- and inter-judge reliability was calculated by unit-by-unit agreement index on a random sample of 33 % of the data. Intra-judge reliability was calculated to be 98% and inter-judge reliability was calculated to be 97 %.

The question “How would you describe this person’s manner of speaking?” was analysed using Framework Analysis (Ritchie & Lewis, 2003). Using the description by Gale et al. (2013), two investigators systematically analysed, coded, and categorized the data using this analysis.

3. Results

3.1. Rating scales

Table 1 summarizes the mean scores and standard deviation from all the scales in this section.

3.1.1. Adjective scale

A statistically significant difference among the experimental conditions was found, $F(2,59) = 4.127, p < .05, \eta^2 = 0.12$ (medium effect size). Post hoc testing indicated that listeners rated unmodified stuttered speech with more positive personality attributes than the preparatory-set condition ($p = .016$). No other significant differences were found.

3.1.2. Listener comfort scale

A statistically significant difference among the experimental conditions was found, $F(2,59) = 3.903, p < .05, \eta^2 = 0.12$ (medium effect size). Post hoc testing indicated that listeners rated unmodified stuttered speech as more comfortable to listen to than the pull-out condition ($p = .027$). No other significant differences were found.

3.1.3. Handicap scale scores

A statistically significant difference among the speech conditions was found, $F(2,59) = 4.607, p < .005, \eta^2 = 0.14$ (large effect size). Post hoc testing indicated that unmodified stuttered speech was rated as less handicapping than the pull-out condition ($p = .01$). No other significant differences were found.

3.1.4. Speech naturalness

No statistically significant difference among the experimental conditions was found, $F(2,59) = 0.710, p > .05$.

3.2. Descriptive questions

3.2.1. Speech impression

Fig. 1 summarizes the responses to “What was your overall impression of this person’s speech?” A Kruskal-Wallis H test showed that there was a statistically significant difference between the samples, $H(2) = 6.455, p = .040, \eta^2 = 0.11$ (medium effect size). There was a mean rank score of 37.44 for the stuttered speech condition, 32.52 for the pull-out condition, and 26.13 for the preparatory-set condition. A post-hoc analysis revealed a significant difference between the stuttered speech and preparatory-set condition ($p = .01$). No other significant differences were found.

3.2.2. Conversing with the speaker

Fig. 2 summarizes the percentages of these responses to the question “If you had a conversation with this speaker at the outset of a party, how likely would you be to talk to this speaker again later in the evening?” A Kruskal-Wallis H test revealed a statistically significant difference between the samples, $H(2) = 6.826, p = .033, \eta^2 = 0.11$ (medium effect size). There was a mean rank score of 39.21 for the stuttered speech condition, 29.76 for the pull-out condition, and 26.07 for the preparatory-set condition. A post-hoc analysis revealed a significant difference between the stuttered speech and preparatory-set condition ($p = .01$). No other significant differences were found.

3.2.3. Introducing speaker to friends

Participants were asked if they would introduce the speaker to their friends. A Kruskal-Wallis H test showed that there was a statistically significant difference in the participant’s willingness to introduce the speaker to their friends between the conditions $H(2) = 7.835, p = .02, \eta^2 = 0.13$ (medium effect size). The mean rank scores were 37.06 for the stuttering condition, 34.36 for the pull-out condition, and 24.65 for the preparatory-set condition. A post-hoc analysis revealed a significant difference between the stuttered speech and preparatory-set condition ($p = .01$). No other significant differences were found. Fig. 3 summarizes the percentages of these responses.

Table 1
Mean scores and standard deviation (SD) of bipolar adjective scale, speech naturalness, perceived handicap scale, and listener comfort scale.

| Condition | n | Adjective scale ^a | Speech naturalness ^{b, c} | Perceived handicap ^{b, d} | Listener comfort ^{b, c} |
|------------------|----|------------------------------|------------------------------------|------------------------------------|----------------------------------|
| Stuttered speech | 17 | 2.36 (0.94) | 6.29 (2.2) | 2.64 (1.4) | 5.35 (1.5) |
| Pull-out | 22 | 2.14 (1.3) | 6.95 (2.3) | 3.81 (1.2) | 6.90 (2.1) |
| Preparatory-set | 23 | 1.67 (0.78) | 7.13 (2.2) | 3.34 (1.0) | 6.65 (1.7) |

^a Higher scores indicate more positive personality ratings, scale range (0–6)

^b Lower scores indicate more positive ratings

^c Scale range (1–9)

^d Scale range (0–5)

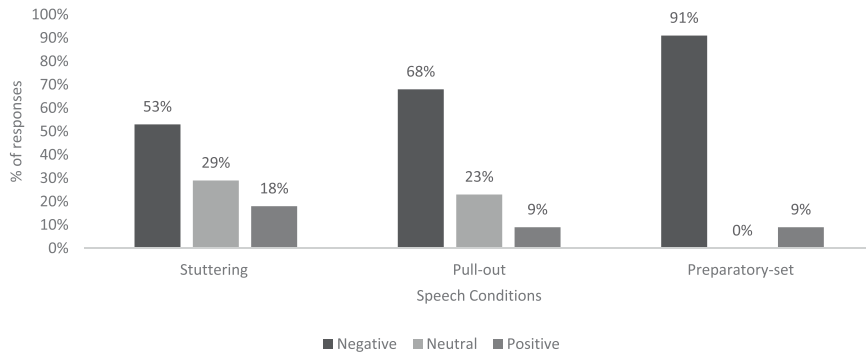


Fig. 1. Overall Impression of the Speaker’s Speech Across Listeners and Speech Conditions.

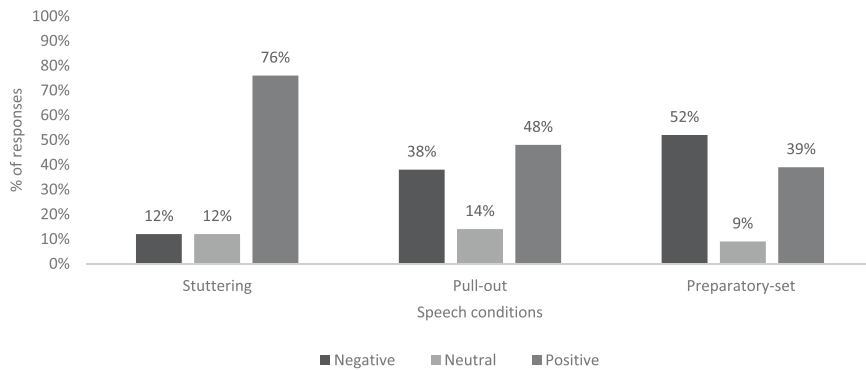


Fig. 2. Overall Responses of Participant’s Willingness to Converse With the Speaker Across Speech Conditions.

3.2.4. Speech description

Participant responses to the question “How would you describe this person’s manner of speaking?” ranged in length from a single word (e.g., “relaxed”) to a full sentence. Some answers involved descriptions which applied to more than one theme (i.e., “Slow, but still confident,” coded as negative speech attribute and positive comment). These types of comments were placed in more than one category, which resulted in a greater number of comments than the total number of participants. Primary reoccurring themes are provided in Table 2.

3.2.4.1. Negative speech attribute. This theme emerged from negative comments made about the speaker’s manner of speaking and it collected the largest percentage of responses in the speech modification conditions. Comments for the stuttered speech condition included “he has a bad stutter,” and “scattered, he needs to work on linking his words together.” Comments for the pull-out condition included: “It’s slow, like he has a stutter” and “[the] manner of speaking did not flow.” Comments for the preparatory-set condition included: “start and stop, with trouble forming sentences” and “slow and hard to produce, he had trouble getting his words out.”

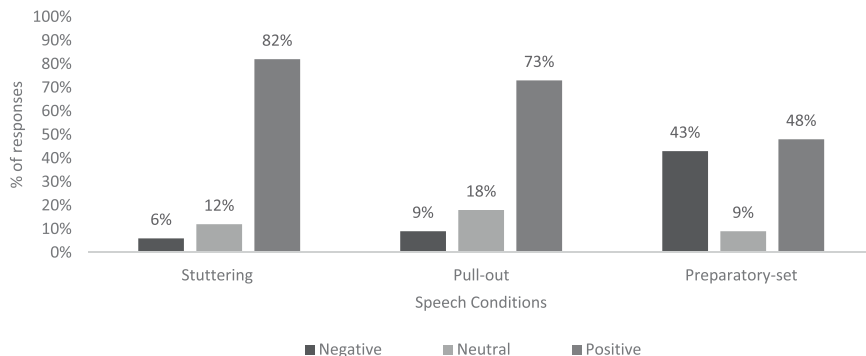


Fig. 3. Overall Responses of Participant’s Willingness to Introduce the Speaker to Their Friends Across Speech Conditions.

3.2.4.2. Negative character attribute. This theme was composed of comments referring to the speaker's character. The comments were interpreted as negative or undesirable. The preparatory-set condition received the highest percentage of negative comments related to the speaker's character trait. Comments included: "he is very boring and dull," "very unpleasant, not confident at all," and "very shy." Comments for the pull-out condition included "nervous" and "he didn't sound confident." "Agitated" and "nervous" were used for the stuttered speech condition.

3.2.4.3. Positive comments. Positive comments were most often part of compound sentences counterbalancing a negative comment, although not all positive comments showed this pattern. Examples of comments included "slow but still confident" and "he was well spoken and had good pronunciation and volume" for the stuttered speech condition. Comments for the pull-out condition included "articulate but slightly jumbled due to his speech impediment" and "a little wavering, but still in a good standard." The only positive comment for the preparatory-set condition was "he was nice."

3.2.4.4. Disability. Describing the speech conditions as an impairment, a handicap, or a disability formed a smaller but substantial theme. Pull-outs received the most comments for this theme, including: "he is a little handicapped," "impaired," and "rather stunted." There was one comment for the stuttered condition, "speech impediment," and there were no comments for the preparatory-set condition.

4. Discussion

The purpose of this investigation was to analyse listener perceptions of unmodified speech with stuttering, speech with pull-outs, and speech with preparatory-sets. Listeners' perceptions were evaluated with scales describing personality, speech naturalness, listener comfort, and perceived handicap, as well as descriptive questions regarding the participants' impression of the speaker's manner of speaking and their willingness to socially interact with him.

Participants reported more favorable perceptions of unmodified stuttered speech than speech with a stuttering modification technique in every measure except for speech naturalness. Preparatory-set was the only condition with no audible stuttering, yet it received the most negative personality ratings and 91% of listeners reported a negative impression of this technique. Participants were the least comfortable listening to speech with pull-outs and rated it to be the most handicapping form of speech.

4.1. Less favorable perception of speech techniques compared to unmodified stuttering

Less favorable perceptions of speech techniques, when compared to unmodified stuttering, may reflect a number of different listener-based factors. For example, it is possible that the negative personality ratings attributed to preparatory-sets may be due to participants not identifying what was heard as a speech disorder but instead as a product of a psychological disorder. As noted by Boyle et al. (2009), PWS' personalities are judged more negatively when the cause of stuttering is believed to be psychological in origin. In the current study, the use of preparatory-sets resulted in a decrease in tension and speech rate at the onset of words, which may have been interpreted as pauses or hesitations by listeners. Von Tiling (2011) found that the use of typical disfluencies (i.e., including pauses) in the absence of stuttering resulted in (a) participants not identifying this form of speaking as a chronic speech disorder and (b) more negative ratings on emotional competence (e.g., pleasantness, self-confidence) compared to unmodified stuttered speech. Accordingly, participants in the current study disproportionately described the preparatory-set condition with negative character attributes (e.g., *dull*; *not confident*), suggesting that, similarly to the hesitant speech condition in Von Tiling (2011), this form of speaking was often attributed to emotional incompetence.

The use of pull-outs decreased the duration and audible tension of stuttered speech, but it was nevertheless perceived as a more handicapping form of speaking than unmodified stuttered speech. This supports Manning et al.'s (1999) findings with mild stuttering but differs from Lee and Manning's (2010) findings with severe stuttering. It could be that pull-outs did not significantly reduce the struggle and tension found in moderate stuttering compared to severe stuttering. In the present study, pull-outs were also rated as less comfortable to listen to than unmodified stuttered speech. It is possible that listeners were more familiar, and therefore more comfortable, with unmodified stuttered speech. Interestingly, listener comfort did not impact the participants' reported willingness to socially interact with those who use pull-outs compared to unmodified stuttered speech.

Findings from the current study, along with the previous data (Manning et al., 1999; Lee & Manning, 2010; Von Tiling, 2011), suggest that no speech technique used has been shown to result in more positive ratings than those of stuttered speech; even when paired with a self-disclosure of stuttering (Lee & Manning, 2010). It may be that verbal communication is so strongly associated with perceived personality that any atypical speech pattern, even those used to suppress stuttered speech, negatively affects listeners'

Table 2
Total percentage of participant comments towards each major theme.

| Theme | Stuttered speech (total = 21) | Pull-out (total = 25) | Preparatory-set (total = 24) |
|---------------------------|-------------------------------|-----------------------|------------------------------|
| Negative speech attribute | 38.0 % | 52.0 % | 54.0 % |
| Negative character traits | 9.5 % | 16.0 % | 42.0 % |
| Positive comments | 47.5 % | 16.0 % | 4.0 % |
| Disability/Handicap | 5.0 % | 16.0 % | 0 % |

evaluation. It should be noted that, despite significant differences between conditions, the mean rating across all conditions skewed negative across all scales. This indicates that negative perceptions persist towards those who stutter with or without the use of speech techniques. For example, the mean ratings for the personality scale were below the neutral mark across conditions (neutral midpoint value = 3). This includes the individual scale items of *afraid*, *insecure*, *shy*, *fearful*, *withdrawn*, *self-conscious*, and *hesitant* on which individuals' scores were observed to be below the neutral mark. These attributes are often ascribed as stereotypes for PWS even in the absence of audio samples (e.g., Craig et al., 2003; Dorsey & Guenther, 2000; Ruscello et al., 1994). We acknowledge that the stuttering stereotype is pervasive, and these ratings in the current study likely reflect these default listener reactions to PWS as well as the characteristics of speech produced in each sample. The specific impact of self-disclosure in the presence and absence of specific speech techniques was not the target of the present study but it is possible that the perceived stuttering stereotype is best mediated by unapologetic disclosure coupled with open stuttering (see Byrd et al., 2017a,b; Croft & Byrd, 2021) rather than the use of speech techniques. The critical point to be drawn from the present study is that the negative attributes associated with the stuttering stereotype were not diminished, and in some cases were worsened, by the use of stuttering modification techniques.

Listeners were significantly less willing to have repeated conversations and to introduce the speaker who used preparatory-sets to their friends compared to unmodified stuttered speech. This finding is intriguing as there were no differences in the comfort level reported by the listeners between the two conditions. This suggests that listener comfort with atypical speech is not related to the participants' willingness to socially interact with the speaker. Again, this finding may be explained by participants not recognizing preparatory-sets as a speech disorder but as a psychological disorder which could have led to greater distancing (Boyle et al., 2009).

The proportion of participants not willing to have repeated conversation with those

who use pull-outs and preparatory-sets (38 % and 52 %, respectively) was worryingly high. The results suggest that PWS taught to use preparatory-sets may face significantly greater social penalty than PWS who do not modify their stuttering. This finding supports the social marginalization experienced by PWS even after using speech modification techniques described by prominent textbooks on fluency disorders (e.g., Guitar, 2019; Manning & DiLollo, 2017; Shapiro, 2011, Van Riper, 1973), and incorporated in much of the therapy received by adults who stutter (e.g., National Stuttering Association, 2009).

5. Clinical Implications

Overall, listeners reported a negative perception of those who stutter as well as those who use stuttering modification techniques. Findings suggest that even if a PWS eliminates or decreases stuttering by the use of stuttering modification techniques, they will not necessarily face less negative social interaction or be judged more positively. Of importance, speech modification is only one component of stuttering modification therapy and desensitization to stuttering is addressed before speech modifications. However, clinicians may not always adhere to the order of phases in stuttering modification therapy and these techniques may not always be used exclusively within traditional stuttering modification therapy. For example, the preparatory-sets used in this investigation are identical to the technique of "slides" used in other forms of stuttering intervention (Guitar, 2019). Pull-outs and preparatory-sets are described in almost all recent graduate-level fluency disorder textbooks (Hale et al., 2021) and clinicians should be made aware and communicate to PWS that speech modifications will not decrease negative social interaction or stereotypes. The findings highlight the importance of desensitization to negative listener reactions even, and specially, in those who are able to use speech modifications to eliminate stuttering.

It should also be noted that, according to Van Riper (1973), stuttering modification techniques were not primarily designed to please listeners but to help the speaker feel more in control, reduce the tension and struggle with stuttering, and reduce avoidances. At the same time, we must recognize the impact of negative attitudes and stereotypes on activity limitations (WHO-ICF, 2013) and the high post-therapy relapse due to embarrassment about using speech techniques (Craig & Hancock, 1995). Further, even PWS who use speech techniques primarily for the purpose of facilitating the forward flow of speech or reducing tension should be informed by clinicians, without qualification, that these techniques may negatively impact listener perceptions. For example, the use of pull-outs may be disadvantageous in situations where perceived handicap or listener comfort may be an issue, such as job interviews and public speaking events. The use of preparatory-sets may be counterproductive in situations where social connections may be prioritized, such as networking events. A final, critical point to consider is the relative gain that comes with simply stuttering with no attempt to modify speech, a scenario that requires considerably less cognitive effort from PWS. Instead, clinical efforts may be focused toward managing communicative interactions using techniques that do not rely on fluent speech production (see Byrd et al., 2016, 2018, 2021, 2022a,b).

We provide these clinical implications with caution and emphasize that stuttering intervention must be individualized to the PWS' needs and that using any speech technique for the sole purpose of pleasing listeners is not recommended. Further, PWS must recognize that by conforming to the social standard of communicative normalcy – that is speaking in a manner that is deemed to be more 'acceptable' by society – the PWS will be indirectly reinforcing the notion that certain speech patterns are less acceptable or a less valid form of communication. Considering all this, the speech techniques examined in this study must be introduced to PWS with transparency. Upon consideration of this information, the use of speech techniques must be ultimately decided by the PWS.

6. Limitations

The current investigation contains limitations that should be addressed in future investigations. A bipolar adjective scale was used to analyse the perception of the speaker's personality and it was assumed that adjective pairs were weighted equally by the listener and that a higher mean indicated more positive results. It is possible that the participants interpreted the value of the adjective pairs differently (e.g., some participants may have perceived shyness as a positive attribute). Audio samples were used because, in prior

investigations, no significant differences in listener perceptions of stuttering were observed between audio and video presentations (Panico et al., 2005; Turnbaugh et al., 1981); however, this mode of presentation may elicit different listener responses than during natural, face-to-face interaction (however, see Von Tiling, 2011). The participant sample was composed of entirely undergraduate students from one university and 67 % were female. Although relatively balanced, this gender distribution may not be representative and may not account for gender-based listener perception differences of PWS (Byrd et al., 2017). Another potential variable influencing listener reaction is the affective qualities of the speaker during production. Examination of the effects of speaker confidence or enthusiasm using such techniques, which is likely to vary during the course of treatment, upon listener perception warrants investigation in future studies. Finally, as noted, there continues to be limited literature on the effect of speech-techniques on listener perception. Future investigations should address the limitations above and explore alternative methods that may influence listener perceptions, such as self-disclosure of stuttering.

7. Conclusion

Upon listening to one randomized speech sample of either unmodified stuttered speech, speech with pull-outs, or speech with preparatory-sets, naïve listeners generally perceived those who stutter and those who use speech techniques negatively. Unmodified stuttered speech of a moderate severity was rated significantly more positively than speech with stuttering modification techniques in all measurements except speech naturalness. The results support previous findings that speech techniques do not improve stereotypes of PWS or listeners' willingness to socially interact with PWS.

Conflict of interest

The authors report no conflict of interest.

Data availability

The data that has been used is confidential.

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