

## Responses of adults who stutter to the anticipation of stuttering



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### ABSTRACT

**Purpose:** Many people who stutter experience the phenomenon of anticipation—the sense that stuttering will occur before it is physically and overtly realized. A systematic investigation of how people who stutter respond to anticipation has not been previously reported. The purposes of this study were to provide self-report evidence of what people do in response to anticipation of stuttering and to determine the extent to which this anticipation occurs.

**Methods:** Thirty adults who stutter indicated on a Likert rating scale the extent to which they anticipate stuttering and answered three open-ended (written) questions regarding how they respond to anticipation.

**Results:** All participants reported experiencing anticipation at least “sometimes,” and 77% of the participants reported experiencing anticipation “often” or “always.” The extent to which participants reported experiencing anticipation was not related to stuttering severity, impact, or treatment history. Analysis of written responses revealed 24 major categories, which were heuristically divided into *action* or *non-action* responses. Categories representing avoidance and self-management strategies were further divided into 14 and 19 subcategories, respectively. Participants were just as likely to view anticipation as helpful as they were to view it as harmful.

**Conclusion:** Findings demonstrate that most, if not all, adults who stutter experience anticipation, and the majority of adults who stutter report doing so at least often. Adults who stutter respond to this anticipation by altering the speech production process in various ways. Results highlight the importance of the role that anticipation plays in how stuttering behaviors manifest themselves.

**Educational Objectives:** The reader will be able to: (a) summarize existing literature on the anticipation of stuttering; (b) describe the role and extent of anticipation of stuttering in adults; (c) describe the various ways that adults who stutter respond to anticipation; (d) describe the importance of measuring anticipation in clinical and research domains.

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## 1. Introduction

Researchers have long studied the phenomenon of anticipation of stuttering (e.g., Alm, 2004; Arenas, 2012; Bakker, Brutten, Janssen, & Meulen, 1991; Bloodstein, 1972; Brocklehurst & Corley, 2011; Brocklehurst, Lickley, & Corley, 2013; Brutten & Janssen, 1979; Johnson & Sinn, 1937; Johnson & Solomon, 1937; Knott, Johnson, & Webster, 1937; Martin & Haroldson, 1967; Milisen, 1938; Packman & Onslow, 2000; Peters & Hulstijn, 1984; Sheehan, 1953; Van Riper, 1936). Broadly, anticipation refers to a speaker's proprioceptive and/or cognitive sense that he or she is about to stutter. Anticipation contributes to anticipatory anxiety, or anxiety about imminent stuttering (Alm, 2004; Bloodstein, 1960; Bowers, Saltuklaroglu, & Kalinowski, 2012), as well as generalized (or longer term) stuttering-related anxiety or fear based on prior experiences (e.g., Beilby, Byrnes, Meagher, & Yaruss, 2013; Plexico, Manning, & DiLollo, 2005; Plexico, Manning, & Levitt, 2009a; Tran, Blumgart, & Craig, 2011; Yaruss & Quesal, 2004).

Although the experience of anticipation is widely recognized, the nature and role of anticipation is not well understood. Early research on stuttering sought a causal relationship between anticipation and the moment of stuttering, using prediction of stuttering by a speaker as an indication of anticipation (Bloodstein, 1960; Johnson & Sinn, 1937; Johnson & Solomon, 1937; Knott et al., 1937; Van Riper, 1936; Wingate, 1975). This work assumed that if anticipation occurred, the speaker should be able to predict when a moment of stuttering would occur and signal that prediction (e.g., by raising a hand). People who stutter are not always able to signal prediction, however, because the sensation of an impending moment of stuttering may occur too closely in time to the moment of stuttering itself (i.e., there may not be enough time to raise a hand). Additionally, anticipation may cause a speaker to make some type of change in speech production (e.g., pausing, substituting a word), in which case the overt moment of stuttering may be averted completely.

Acknowledging inherent difficulties in using speakers' predictions about stuttering to study anticipation, as well as more general concerns about subjective reports, researchers turned to more objective measures to study anticipation. As a group, people who stutter exhibit pre-speech increases in pulse rate acceleration and vasoconstriction (Van Riper & Milisen, 1939), reductions in heart rate (Peters & Hulstijn, 1984; Weber & Smith, 1990), and increases in skin conductance (Bowers et al., 2012; Weber & Smith, 1990). Other physiological investigations of anticipation have revealed increases in orofacial muscle activation prior to overt stuttering (Murray, Empson, & Weaver, 1987; Shrum, 1967; Thürmer, Thumfart, & Kittel, 1983; Van Lieshout, Hulstijn, & Peters, 1996); longer visual fixation while reading words with high expectancy of stuttering (Bakker et al., 1991; Brutten & Janssen, 1979); changes in fundamental frequency, reduced speech rate, and aberrant formant transitions in the acoustic signal preceding stuttered events (Falck, Lawler, & Yonovitz, 1985; Knox, 1975); and abnormalities in recruitment of speech preparatory brain areas (Peters, Love, Otto, Wood, & Benignus, 1976; Salmelin, Schnitzler, Schmitz, & Freund, 2000; Walla, Mayer, Deecke, & Thurner, 2004). Adults who stutter also exhibit longer speech response times when producing words that they expect to be stuttered, or words that they perceive as being more "difficult" (Arenas, 2012; Van Lieshout, Ben-David, Lipski, & Namasivayam, 2014).

The studies above indicate that people who stutter develop the ability to anticipate moments of speech disruption. This anticipation can be a conscious process associated with high levels of awareness, or a more subconscious process associated with lower levels of awareness (e.g., Johnson & Sinn, 1937). If a speaker anticipates stuttering (whether conscious or subconscious), he or she may adopt an alternative speaking strategy (e.g., stalling, hesitation, substitution of words) in an attempt to compensate for or prevent the anticipated difficulty. While it is widely accepted that individuals who stutter develop strategies to cope with stuttering (for reviews, see Bloodstein & Bernstein-Ratner, 2008; Guitar, 2013; Johnson, 1959; Manning, 2009; Van Riper, 1971; Yairi & Seery, 2015), a systematic analysis of how those who stutter respond to anticipation has not been conducted.

Furthermore, the extent to which anticipation occurs has only been indirectly examined in two studies. Wingate (1975) collected subjective reports of speaker prediction ability which revealed that nine of ten participants were able to predict stuttering at least "sometimes," though no correlation was found between prediction and *actual* moments of overt stuttering. In a more recent study, Vanryckeghem, Brutten, Uddin, and van Borsel (2004) used the Behavior Checklist (BCL) to examine self-reported coping responses to "anticipation **and/or** speech disruption" (p. 237; emphasis added). They reported that adults who stutter employed substitutions "somewhat frequently," whereas pausing before saying a feared word and using starter phrases and interjections were incorporated "infrequently" to "somewhat frequently." Given the format of the BCL, participants in Vanryckeghem et al. (2004) were restricted to responding to pre-determined behaviors, so they were not able to describe these behaviors themselves. Thus, the extent to which the participants experience anticipation may have been underestimated.

The covert nature of anticipation could lead many speech-language pathologists (SLPs), especially those who are less experienced, to under-report the presence of anticipation. If anticipation is a common experience for many people who stutter, those who work with this population should be adept at identifying it, as well as supporting productive responses to it. In order to more directly and accurately measure anticipation, it is necessary to gain a deeper understanding of the phenomenon. The purposes of the present study were (1) to provide a systematic, qualitative analysis of anticipation of stuttering, with a particular focus on what people who stutter do when they anticipate stuttering; and (2) to measure the extent to which anticipation occurs in adults who stutter. This analysis will facilitate future quantitative investigations of the anticipation of stuttering. This study will also provide clinicians with information to improve their ability to measure the extent of anticipation and tailor their interventions to help people who stutter manage this difficult-to-observe but seemingly ever-present feature of stuttering.

## 2. Methodology

### 2.1. Phenomenological research

This study was part of a larger study examining contextual influences on speech motor stability in people who do and do not stutter. It was approved by the University Institutional Review Board of the City University of New York and the National Stuttering Association (NSA) Research Committee. Data analysis followed a phenomenological approach, similar to that of [Plexico, Manning, and Dilollo \(2010\)](#). Phenomenological research aims to increase understanding of the phenomenon of interest (in this case, anticipation of stuttering) through systematic analysis of individual responses from a group of individuals who share that common experience. In phenomenological analysis, the self-reported experiences and views of each participant are central to forming an *essential structure* in the data; it is by creating this structure that the nature of the phenomenon is revealed ([Riemen, 1986](#)). Phenomenological research is particularly useful for the study of anticipation because the covert nature of anticipation has made the phenomenon difficult to measure objectively. In particular, if an anticipated stuttering event is ultimately avoided, that event would not be marked for the collection of any objective measures.

An additional strength of phenomenological research is that each investigator introduces his or her unique background and experiences into the analysis. The diverse experiences of the current authors added to a rich interpretation of the results. The first author is a certified speech-language pathologist with more than five years of experience in the area of stuttering, a PhD candidate in the area of fluency disorders, and person who stutters. The second and third authors are clinicians, researchers, and professors specializing in stuttering with more than 60 combined years of clinical experience and experience with qualitative research; the second author is a non-stuttering speaker whereas the third author is a person who stutters. The fourth author is a Clinical Fellow in speech-language pathology and non-stuttering speaker. The fifth author is a researcher and professor with more than 30 years of experience in speech perception and production, and a non-stuttering speaker.

### 2.2. Participants

Participants were 30 adults who stutter (10 female, 20 male), ranging in age from 18 to 50 years (mean age = 27.21 years; SD = 6.30 years). They were recruited via an email distributed by the NSA, flyers in the community, correspondence with local SLPs, and word of mouth. Participants met the following requirements: (1) diagnosed as stuttering by the first author; (2) demonstrated the ability to write coherent responses to questions about their own sense of anticipation of stuttering; and (3) demonstrated scores on both the *Overall Assessment of the Speaker's Experience of Stuttering* (OASES; [Yaruss & Quesal, 2010](#)) and the *Stuttering Severity Instrument–4th Edition* (SSI-4; [Riley, 2009](#)) that were indicative of stuttering. SSI-4 scoring was validated by conducting a correlational analysis on 20 randomly selected SSI-4 scores calculated by the first and fourth authors ( $r = .92$ ). As shown in [Table 1](#), the participants had various backgrounds, severity ratings, and prior speech therapy experiences. Two participants had between 1 and 6 months of therapy, five participants had between 7 and 12 months of therapy, five participants had between 12 and 24 months of therapy, sixteen participants reported having more than two years of therapy, and two participants reported no prior therapy. Ten of these participants reported receiving intensive therapy at some point. (Specific information about the nature of the prior therapy was not analyzed here.)

### 2.3. Data collection

Participants were provided with the following general description of anticipation:

*Anticipation of stuttering is the feeling that a person has when he or she thinks or knows that he or she is going to stutter. Some people who stutter anticipate stuttering when they are about to speak. Others anticipate stuttering well in advance of speaking. Others who stutter do not anticipate stuttering at all.*

Participants subsequently responded in written form to five questions. The first question asked whether participants experienced anticipation of stuttering (yes/no). Participants then marked on a 5-point Likert scale their response to, "How often do you anticipate stuttering?" Responses were "1" Never, "2" Rarely, "3" Sometimes, "4" Often, and "5" Always. Finally, participants responded to the following three, open-ended questions:

1. Describe what you do when you anticipate stuttering. Please give some examples. Be as thorough as possible.
2. Do you do anything to prevent stuttering? If so, what are some of those things? Please describe.
3. Does being able to anticipate stuttering help/hinder your ability to communicate? If so, please give examples. Be as thorough as possible.

The questions were designed specifically to elicit responses regarding what adults who stutter **do** when they experience anticipation (i.e., they were action-based). However, because phenomenological research allows participants to describe phenomena themselves, it was expected that participant responses would reflect a continuum of action (e.g., "I switch the word," "I prepare my muscles") to non-action or passive (e.g., "I feel anxious," "I freeze"). While active responses were the

**Table 1**

Participant descriptions. Age; gender; stuttering impact/severity; therapy experience; self-reported extent of anticipation; participant agreement with essential structure summary (seven participants did not respond.).

Participant	Age	Gender	OASES	SSI-4	TxHistory	Extent Rating	Credibility
P01	26	F	1.55	18	12–24 months	3	7
P02	31	F	1.74	18	1–6 months	3	
P03	27	F	1.4	19	12–24 months	4	7
P04	26	F	1.79	17	12–24 months	4	
P05	28	F	2.03	22	7–12 months	4	7
P06	29	F	2.36	28	>24 months	4	7
P07	49	F	2.61	13	12–24 months	3	7
P08	21	F	1.77	27	>24 months	4	7
P09	24	F	2.17	26	7–12 months	4	6
P10	24	F	1.98	8	1–6 months	3	6
P11	35	M	3.61	32	7–12 months	5	7
P12	23	M	3.18	28	7–12 months	4	6
P13	27	M	2.02	15	>24 months	4	7
P14	36	M	3.02	17	12–24 months	4	7
P15	27	M	1.46	9	No therapy	5	3.5
P16	22	M	2.2	27	>24 months	4	6
P17	28	M	2.03	11	No therapy	3	
P18	24	M	1.48	17	>24 months	4	7
P19	26	M	2.35	27	>24 months	4	5
P20	32	M	2.63	21	>24 months	3	
P21	23	M	2.53	43	>24 months	4	7
P22	26	M	2.65	19	>24 months	4	
P23	22	M	1.61	30	7–12 months	3	7
P24	35	M	2.94	13	>24 months	5	
P25	25	M	1.73	21	>24 months	4	7
P26	31	M	3.18	24	>24 months	4	5
P27	27	M	2.59	29	>24 months	4	6
P28	19	M	3.2	46	>24 months	4	7
P29	33	M	2.32	22	>24 months	4	
P30	18	M	2.35	33	>24 months	5	7

target of this study, it is also recognized that passive responses are critical to the stuttering experience and likely contributing factors to active behaviors.

#### 2.4. Data analysis

The analytical process was adapted from [Plexico et al. \(2010\)](#), who followed [Riemen \(1986\)](#). It included the following steps:

1. The first author read all participant responses to all questions to gain a general and broad understanding of the nature of the responses.
2. Through second and third readings, the first author extracted “meaning units,” each of which corresponded to one main idea from the participants’ responses. For example, the sentence, “. . . I will answer questions in the order that is ‘easiest,’ and use fillers, substitutions, and circumlocuting. . .” (P01) yielded three meaningful units (related to answering in the order that was easiest, fillers, and substitutions/circumlocutions), whereas the sentence, “When I anticipate stuttering I become anxious and tense” (P04) yielded two meaningful units (becoming anxious and becoming tense).
3. Meaning units were grouped into categories (and sub-categories) by the first author. These categories were distributed in a spreadsheet via email to the other authors, who analyzed the categories for concurrence. Disagreement was addressed as a group via email until all categories were agreed upon.
4. The agreed-upon categories were used to develop a brief summary of how adults who stutter experience and respond to anticipation of stuttering. This summary represented the essential structure in the data.

#### 2.5. Credibility

The approach for establishing researcher credibility was adapted from [Plexico et al. \(2010\)](#), who followed [Cresswell \(1998\)](#).

1. Via email, several teleconferences, and in-person, the first, second, and third authors discussed their professional and personal biases and assumptions related to the nature and prevalence of anticipation, as well as the extent to which anticipation of stuttering occurs. The investigators have different backgrounds, which also reduced the possibility of their sharing biases.

2. The essential structure summary was emailed to all participants for validation. Participants were asked to read the essential structure summary, indicate via a seven-point Likert scale how accurately it reflected their own observations related to anticipation of stuttering (1 indicated “not at all” and 7 indicated “very much,” as in Plexico et al., 2010), and provide feedback. Of the thirty participants, twenty-three (77%) responded, yielding a mean rating of 6.61 and standard deviation of .64 (see Table 1).

### 3. Results

The participants produced 347 sentences in total (average number of sentences per participant = 11.57, or approximately 4 sentences per question per participant). These sentences contained 281 meaning units. Through the review process described above, these meaning units were divided into 24 main categories. Two of these categories (avoidance strategies, self-management strategies) included various sub-categories, as depicted in Fig. 1. Heuristically, the data were divided into two classes: action responses and non-action responses. Action responses included affective, behavioral, and cognitive *changes* to the speech production process that the speaker made when experiencing anticipation. Examples of action responses include implementing a speech technique and avoiding a sound or word. Non-action responses included affective, behavioral, and cognitive *states* that the speaker experienced during anticipation. Examples of non-action responses include how the speaker thinks or feels about his current situation, as well as general reactions to and interpretations of anticipation.

#### 3.1. Action responses

All thirty participants reported employing at least one strategy in response to anticipation of stuttering. These strategies can be described in terms of avoidance, self-management, and approach strategies.

##### 3.1.1. Avoidance strategies

Twenty-six (87%) of the participants contributed meaning units to the avoidance strategies category. Avoidance strategies included any behavioral response to anticipation that participants reported employing in an attempt to hide or escape from an impending moment of stuttering. Twenty-four (80%) of the participants reported circumlocuting or substituting in response to anticipation; this was the most prominent sub-category. For example, P01 stated, “When retelling a story with a group of friends I may switch the order of names that ‘help’ the sentence flow.” Similarly, P07 reported, “I sometimes substitute other words for the word I really want to say,” and P11 wrote, “I substitute words and rephrase when I anticipate stuttering.” Discussing the covert nature of stuttering, P15 wrote, “I switch words and avoid those words I will stutter on—however, this does not prevent stuttering, because I am still blocking—I’m just choosing to not do it aloud.” P15 described that for him, the observable features of stuttering (e.g., blocking) are not necessary for a moment of stuttering to occur—that is, he reported experiencing stuttering even though his listener may not have seen or heard any difference in his speech.

Eleven (37%) of the participants reported avoiding situations in response to anticipation. Three participants explicitly stated that they avoid situations, whereas others were less explicit. P10 discussed concerns about speaking in class (“I’m hesitant to raise my hand in class. . . I’ll email my questions”) and P14 described attempting to “isolate a person away from a group” when he experiences anticipation. Relatedly, seven (23%) of the participants reported making a decision to not talk at all. P05 described the thought process behind this decision:

*If I do avoid, it’s usually because I don’t think the person will be able to comprehend the issue, don’t want to take the effort to educate them in that moment, or I just really feel physically out of control with a certain anticipated word and would rather not feel that/deal with that. Thus, I would avoid the word or words or maybe just not talk, but situations where I would do this are never \*that\* important.*

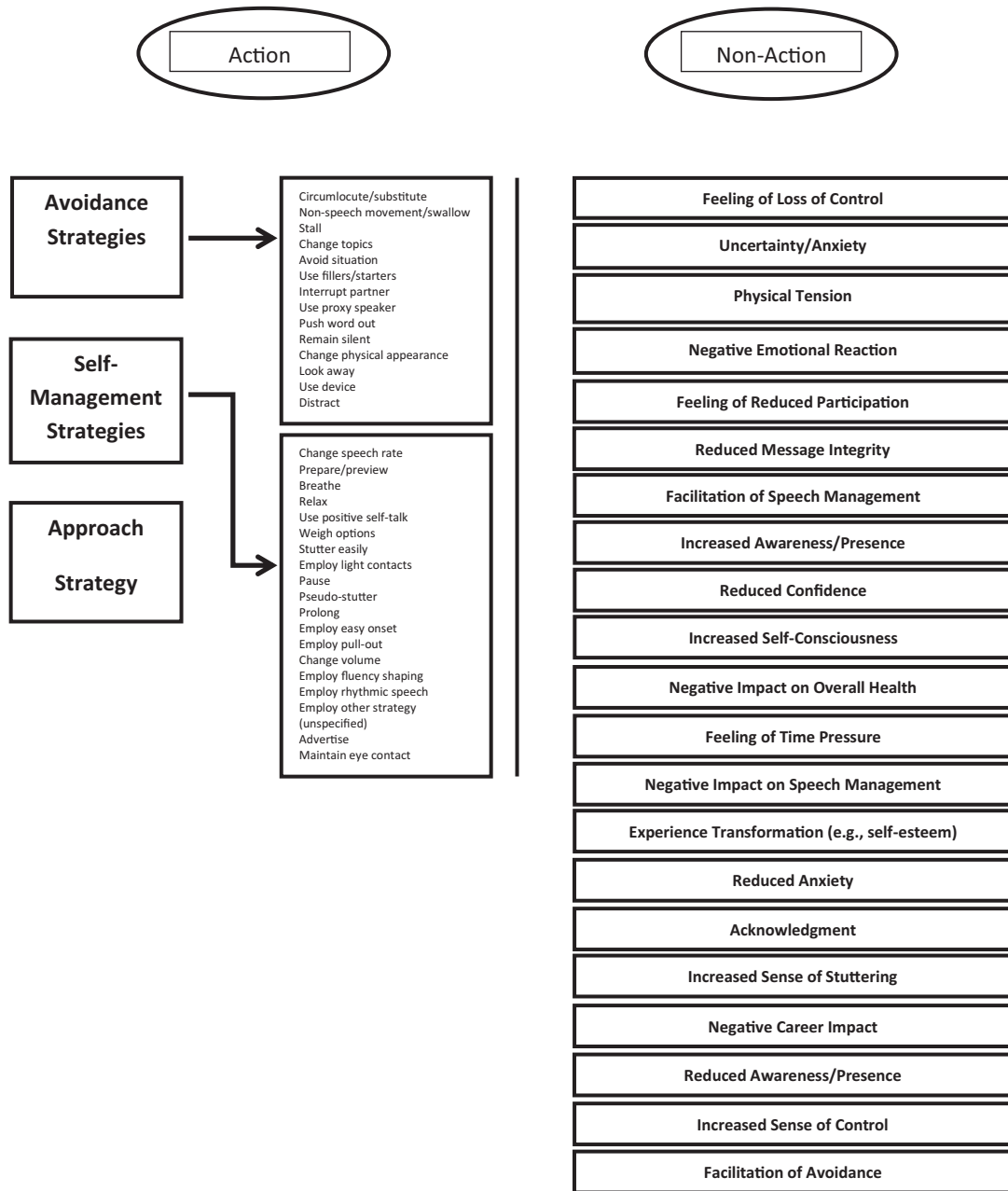
Seven (23%) of the participants also reported adding meaningless speech (e.g., starters or fillers) before or during utterances in which they anticipate stuttering, in order to avoid or postpone an overt moment of stuttering. Four participants used the term *filler*; P16 described inserting “umms” into his speech, and P12 used the term *starter*. P26 described his experience:

*When I know that I’m about to stutter I will try to employ tricks like adding words I can say in front of difficult words. . . Also, I have difficulty saying my name so I’ll always begin with “Hi my name is . . .”*

Six (20%) of the participants reported making non-speech movements when experiencing anticipation, because they believed that such movements would help them get through the stuttering moment. Participants described moving their heads, hands, or legs, or swallowing when sensing anticipation. It has long been known that many people who stutter exhibit these accessory behaviors, but such behaviors have always been described as “secondary” to core or primary features of stuttering (e.g., prolongations, repetitions). The participants in the current study described these behaviors as occurring in response to *anticipation*, not to the stuttering behaviors themselves.

Five (17%) of the participants reported stalling in response to the experience of anticipation. P09 exemplified this process:

*I try and buy some time. I might pretend like I forgot the name of something and act like I am thinking. If I anticipate stuttering at the beginning of an utterance I might not say it right away and wait until the stuttering passes.*



**Fig. 1.** Classification of responses to anticipation of stuttering. 24 major categories were divided into two heuristic classes: action and non-action. Major categories under action responses included avoidance and self-management (see body for clarification), and approach strategies; avoidance and self-management were further divided into 14 and 19 sub-categories, respectively. Non-action responses included the remaining 21 major categories.

Other avoidance strategies reported by participants to a lesser degree included looking away, pretending to use a device such as an iPhone, distracting themselves, interrupting, letting someone else talk, turning to substances (i.e., alcohol), and changing topics.

### 3.1.2. Self-management strategies

Twenty-six participants (87%) contributed meaning units to the self-management strategies category. “Self-management strategy” is used here in the most general sense—that is, it includes traditional therapy strategies (e.g., speech or stuttering modification techniques), as well as strategies that were learned or developed independently outside of therapy (e.g.,



self-preparation, breathing, or relaxation techniques). Eleven (37%) of the participants reported that anticipation allows them to preview and prepare for speech production. Five participants described responding to anticipation by “analyzing the situation” or “focusing” on speech production. For example, P05 stated, “Depending on the circumstance, I analyze how and if stuttering is going to affect the situation or communication.” Six participants described “preparing” or “bracing” themselves for speech production. P12 stated, “I try to prep myself for the word I anticipate blocking on.”

Eight (27%) of the participants reported that they respond to anticipation by changing their speech rate. Some participants reported attempting to reduce their rate; some reported increasing their rate; others reported either increasing or decreasing (i.e., varying) their rate depending upon the situation. Seven (23%) of the participants reported that when they experience anticipation, they incorporate pseudo- or fake stuttering. P18 stated, “. . . when I anticipate stuttering on a word I will voluntarily stutter on words before, usually it results in me not stuttering on the anticipated word.” P18 further explained that, because this pseudo-stuttering is often less severe than his real stuttering would typically be, the effect of pseudo-stuttering in response to anticipation is smoother or easier speech production.

Six (20%) of the participants described attempting to “relax” or “calm down” when experiencing anticipation. Note that these participants described *attempting* to employ this strategy, though several participants stated that their attempts at relaxation are not always successful. For example, P01 wrote:

*To the general observer this would not be noticeable, but my muscles tense up, especially in my throat. To regulate this I focus on my breath, deep breathe, and relax. When unable to regulate, I generally will circumlocute, or use substitutions to express what I want to say.*

Other reported self-management strategies, each described by fewer than 15% of the participants, included using easy onsets (13%), pausing (13%), implementing positive self-talk (13%), using breathing techniques (10%), changing speech loudness (10%), stuttering more easily (10%), using fluency shaping (10%), using light contacts (10%), advertising (7%), maintaining eye contact (7%), and using prolonged (3%) and rhythmic (3%) speech. Twenty-three (77%) of the participants reported using traditional speech therapy techniques (e.g., changing speech rate, using easy-onsets, pseudostuttering, light contacts, previewing and preparing) when they experience anticipation of stuttering.

### 3.1.3. Approach strategies

Thirteen (43%) of the participants contributed meaning units to the approach strategies category. “Approach” is used to reflect the speaker’s conscious decision to move forward with the current speech plan—a deliberate action in response to the anticipation of stuttering. For example, P04 stated:

*I typically try very hard not to avoid speaking or switch words because I know that doing so makes me feel bad afterwards. I try to say the words I want to regardless of stuttering. . .*

P04 exemplifies how “trying hard not to stutter,” confronting stuttering, or openly stuttering, is not the same as uninterrupted speech because the speaker is focusing on doing something *in addition to* producing speech (e.g., stuttering openly). Typical speakers generally do not think about facing a fear of sounding different. P04 goes on to say, “Sometimes I will catch myself switching words or not speaking in a group. Typically when I start to do those things, I force myself to stutter more to face that fear.”

Similarly, P15 stated, “When I’m on zero time constraints I will speak freely and openly stutter most of the time, but not all the time.” Both P04 and P15 also demonstrate that people who stutter often experience both avoidance and approach strategies in the same situation.

### 3.2. Non-action responses

Non-action responses included those responses that did not involve participants changing their current communicative strategy, or states resulting from anticipation. Sixteen (53%) of the participants reported that they experience anxiety or uncertainty when they anticipate stuttering (i.e., anticipatory anxiety). P05 described her experience:

*It can generate a lot of anxiety, leading up to the situations I mentioned. . . This anxiety, over time, creates a sort of speculation habit of always having to know how people are going to react, I guess as a form of protection so as to not get blindsided by negative responses.*

Several participants described anxiety as dependent on the importance of the topic or conversational partner. P13 wrote, “Sometimes I get anxious and/or nervous when I anticipate stuttering, depending on what the situation is and who I am speaking to.” P21 exemplifies the experience of anxiety resulting from anticipation:

*When I anticipate stuttering, I tend to grow over-conscious of the word which I am about to say. I become more anxious and feel as if am putting all my energies in saying that particular word. In the process, I feel as I totally lose control of what I am speaking about, and sometimes totally forget about the content of the speech.*

Twelve (40%) of the participants reported becoming physically tense during anticipation—in addition to or prior to becoming tense during the moment of stuttering itself. Specifically, tension was described in the throat/larynx, chest, and limbs, as

well as generally throughout the body. Ten (33%) of the participants reported that anticipation contributes to reduced message integrity. For example, several participants described focusing on stuttering and not on message content. P11 described his experience:

*I would say [anticipation] hinder[s] particularly when your primary focus [is] the likelihood of stuttering rather than getting my point across. The anticipation causes unnecessary tension and nervousness. In my last meeting, I was so consumed with anticipation that I didn't really focus on the topic and what others were saying.*

Ten (33%) of the participants indicated that anticipation facilitates speech management by reminding them to use strategies that they have developed in or out of therapy. Most participants who contributed meaning units to this category described how anticipation provides them with knowledge and awareness that stuttering is forthcoming. As a result, they are provided an opportunity to change their approach to communication. For example, P23 stated, "Anticipating stuttering helps my ability to communicate because I can think of the techniques I will use prior to a challenging situation or problem words."

P25 stated:

*I feel that it is helpful because when I feel the anticipation of a block I have the ability to do something. Sometimes I can get in control of the block and sometimes I cannot. I feel more comfortable having the ability to anticipate it, then not because I can be prepared and work on what happens when the block occurs.*

Conversely, five (17%) of the participants indicated that anticipation negatively impacts their ability to manage stuttering. P29 stated, "Anticipation of stuttering hinders my ability to communicate. It will just sometimes be too much to even say at that point, or not worth the stress."

Twelve participants indicated that anticipation both facilitated and negatively impacted speech management. For example, P12 stated:

*Anticipating stuttering is a double-edged sword. It cues my mind in to the word that I will block on. If I think fast enough, I can usually figure out a way to make it through the sentence. Oftentimes, this is not the case and I end up hesitating awkwardly. In this sense, the anticipation hinders my ability to communicate because I'm strategizing while trying to speak fluently. However, when effective the anticipation can sometimes mask the fact that I am a stutterer which gives me more confidence in front of strangers.*

Seven (23%) of the participants indicated that anticipation leads to reduced participation in school, work, or social settings. P10 stated, "In school, I'm hesitant to raise hand in class. . . will email my questions. . . Tend to be more quiet in general. . ." P24 reported that at work, he skips meetings altogether and "gets a more junior person" to serve as a proxy for him. P17 described the subtleties of anticipation during a conversation:

*. . . it delays normal speaking reaction time and in a social situation, someone else will in turn speak before me, therefore dictating the flow of conversation away from what I may have to say.*

Other non-action themes that emerged included a feeling of loss of control, negative emotional reaction (e.g., embarrassment, fear, shame), confidence reduction, reduced awareness and presence, and facilitation of avoidance.

### 3.3. Anticipation: helpful or harmful overall?

Thirteen (43%) of the participants indicated that anticipating stuttering is both helpful and harmful. P04 stated:

*I think it can do both. Sometimes being able to anticipate stuttering increases stuttering related anxiety and can cause me to stutter more. But I also think anticipating stuttering can help me prepare and manage my speech easier.*

Similarly, P13 stated:

*Anticipating stuttering both helps and hinders my ability to communicate. It hinders my ability to communicate to the extent that it makes me fearful of talking or that it leads to my focusing on stuttering/speech more than the actual content of the communication/conversation. It helps my ability to communicate to the extent that it allows me to do something to address the stuttering and make me and my listeners more comfortable, such as implementing physical strategies, pausing, and/or advertising.*

Eleven (37%) of the participants indicated that anticipating stuttering is not at all helpful. P18 described how anticipation hinders his ability to communicate, negatively impacting his ability to be present and a good listener:

*It hinders my ability to communicate. When I am anticipating stuttering I am focusing on how I am going to say something instead of what I want to say. This always takes any attention away from the person I'm speaking with, making me a bad listener and putting me at a disadvantage to give a proper response. Anticipating a stutter during speaking removes me from the present moment. Worrying about a few seconds into the future when what I am presently saying might be irrelevant or in-comprehensible to the listener. In the past when I would anticipate a stutter I would try to word switch and my sentence*



would make no sense. Going around a room [for example], introducing ourselves, I would not know a thing about anyone because I was anticipating stuttering on my name.

Only four (13%) of the participants indicated that anticipation was exclusively helpful.

### 3.4. Extent of anticipation

In order to determine the extent to which people who stutter experience anticipation, participants were asked to rate on a five-point Likert scale how much they anticipate stuttering. Four (13%) of the participants responded “always,” nineteen (63%) reported “often,” and seven (23%) responded “sometimes.” No participants responded “rarely” or “never.” Thus, the overwhelming majority of adults who stutter (77%) reported experiencing anticipation of stuttering at least often.

### 3.5. Stuttering severity, impact, and anticipation

To examine the relationships between self-reported ratings of extent of anticipation and the severity and impact ratings, non-parametric Spearman’s rho correlations were calculated. No significant relationships were found between participant ratings of anticipation and OASES scores ( $r_s [29] = .24, p = .19$ ) or SSI-4 scores ( $r_s [29] = .26, p = .17$ ).

### 3.6. Effects of therapy

To examine the relationship between self-reported anticipation ratings and treatment history, participant time in therapy was grouped into five categories: no therapy, 1–6 months, 7–12 months, 12–24 months, > 24 months. Spearman’s rho did not reveal a significant relationship between time in therapy and extent of anticipation ( $r_s [29] = .29, p = .12$ ).

### 3.7. Essential structure

Based on the results described above, the following essential structure of anticipation of stuttering was developed:

*Anticipation of stuttering can be characterized by both non-action and action responses. Non-action responses include affective, behavioral, or cognitive states that result from anticipation of stuttering, as well as general effects of anticipation on the speaker and the communicative exchange. The most common non-action responses resulting from anticipation include feelings of anxiety or uncertainty, physical tension, and reduced confidence. Action responses include strategies (whether productive or non-productive) that a speaker intentionally adopts to cope with anticipation. In most cases, these changes occur before disrupted speech becomes observable. The most common action responses include avoidance strategies and self-management strategies. The proportion of adults who stutter who employ avoidance strategies is equal to the proportion who employ self-management strategies. Avoidance strategies most commonly include alterations to the message (e.g., circumlocutions, substitutions, starters/fillers) and situation avoidance. Self-management strategies most commonly include previewing and preparing for speech production, changing speech rate, pseudo-stuttering, and attempting to relax. Many adults who stutter respond to anticipation by adopting approach strategies (e.g., stuttering openly) or confronting fears. Anticipation can both facilitate and impede the management of stuttering, and it can contribute to reduced message integrity and reduced participation. The experience of anticipation varies greatly between speakers. All adults who stutter experience anticipation to some degree, and an overwhelming majority of adults who stutter report doing so at least often.*

## 4. Discussion

The purpose of this study was to gain a deeper understanding of the phenomenon of anticipation of stuttering, with a focus on how adults who stutter actively respond to anticipation. Thirty adults who stutter provided written responses to three open-ended questions about anticipation, and indicated the extent to which they anticipate stuttering on a five-point Likert scale. All participants reported employing some kind of strategy to change their speech production in response to anticipation. Participants were just as likely to employ an avoidance strategy as they were to employ a self-management strategy—that is, 87% of the participants reported using at least one avoidance strategy, and 87% of the participants reported using at least one self-management strategy. The most reported avoidance strategy was altering the linguistic plan by circumlocuting or substituting words; this was exhibited by 80% of participants. This finding concurs with that of Vanryckeghem et al. (2004), who reported that 82% of people who stutter reported substituting one word for another. Importantly, findings in the current study reflect responses specifically to the *anticipation* of stuttering, and not to the (overt) moment of stuttering itself. Self-management strategies were more individualized than avoidance strategies. That is, whereas most participants reported circumlocuting and/or substituting as an avoidance strategy, self-management strategies were more evenly distributed across participants, and included previewing speech and preparing for the moment of stuttering, changing speech rate, pseudo-stuttering, relaxing speech muscles, using easy onsets, and stuttering more easily. The participants’ selection of specific self-management strategies was presumably dependent, at least in part, on their prior therapy experiences (except for the two participants without a treatment history). Most participants who indicated using avoidance strategies

also reported employing a strategy by which they approached stuttering moments, and all participants who reported an approach strategy had a history of treatment.

For the most part, participants indicated that anticipation can be both helpful and harmful, or only harmful. (Only four participants called anticipation entirely helpful.) Anticipation was described as harmful when it contributed to anxiety or fear and/or reduced their interactions, and helpful when it made participants aware of stuttering so that they could employ a self-management strategy. These results can be interpreted using the framework established by Plexico and colleagues (Plexico et al., 2009a; Plexico, Manning, & Levitt, 2009b), who proposed that speakers who stutter adopt emotion-based coping when a problem appears to be out of their control and self-focused or problem-focused coping when they achieve a sense of agency over their problem. The use of avoidance strategies then could be regarded as emotion-based coping, whereas the use of treatment techniques or approach strategies could be regarded as self- or problem-focused coping. However, the current study was not primarily concerned with determining whether the various responses to anticipation were productive or not. Rather, the current work was concerned with identifying those changes speakers might make in response to anticipation.

More than half of the participants reported experiencing anxiety or uncertainty as a result of their anticipation of stuttering. It is well-known that many people who stutter exhibit increased anxiety during communicative situations (particularly social anxiety; Blumgart, Tran, & Craig, 2010; Craig, Blumgart, & Tran, 2009; DiLollo, Manning, & Neimeyer, 2003; Iverach & Rapee, 2013; Manning & Beck, 2013; Manning, 2009; Messenger, Onslow, Packman, & Menzies, 2004), but the relationship between anxiety and stuttering is not well understood. One reason is that anxiety operates on various timescales, from a generalized (or “looming”) sense of communicative difficulty, to a more focused sense of impending difficulty. Anxiety in the moment and longer-term or looming anxiety are both based on the speaker’s interpretation of events (e.g., past history, learning), and should be viewed as emotionally and/or cognitively based phenomena. The questionnaire in the current study inquired about anticipation, not the emotional or cognitive reactions that are associated with it (e.g., anticipatory anxiety, fear). However, since emotional and cognitive reactions to stuttering can be strong, and are often more memorable than the physical act of stuttering itself, participants in this study wrote about these reactions as well (as evidenced mostly by “non-action” responses). The results highlight that, indeed, these processes are strongly intertwined. Future research should focus on describing their interactions.

Significant relationships were not found between self-reported extent of anticipation and either severity or impact of stuttering (based on the SSI-4 and OASES protocols, respectively). Thus, it is not necessarily the case that those adults who stutter who report experiencing higher levels of anticipation are more overtly severe or more impacted by the disorder. This suggests that anticipation develops independently of the severity and impact of overt speech disfluencies, as well as cognitive and emotional reactions to stuttering. Additionally, therapy experience did not appear to be related to the degree to which participants reported experiencing anticipation, nor did the extent of anticipation appear to be related to the time that participants spent in therapy.

#### 4.1. Implications

Because of the high prevalence of anticipation among people who stutter, and because anticipation directly affects the presence of overt stuttering behaviors, SLPs and students should take anticipation into account in clinical assessment and treatment of stuttering. The current findings highlight those behaviors that occur more often as a result of anticipation (e.g., circumlocutions, substitutions, previewing, changing speech rate), and this information can be used to tailor treatments for individuals who stutter. For example, SLPs can take an inventory of specific anticipatory behaviors using those identified in this study to guide discussions with their clients. After an anticipation profile is established, the SLP and client can work toward identifying those behaviors that most impact the speaker’s communicative abilities (whether in adaptive or maladaptive ways). These behaviors can then be systematically addressed in therapy. Further, it is evident that anticipation can be viewed by people who stutter as both helpful and harmful. Therapies should therefore be geared toward supporting productive responses, as well as facilitating the transition from maladaptive to productive, or from emotion-based coping to self- or problem-focused coping [as outlined by Plexico et al. (2009a, 2009b)].

The current findings also highlight the extent to which communicative behaviors of speakers who stutter may change (in form and extent) as a result of anticipation. If the majority of adults who stutter are altering the speech production process in response to anticipation (which occurs before moments of stuttering), then measurements of stuttering, whether perceptual, acoustic, kinematic, myographic, or neurological, may reflect phenomena that precede the observable breakdown in speech. Moreover, given that people who stutter appear to take action to change their speech when they experience anticipation, researchers and clinicians are potentially missing many (overt) stuttering moments that would have occurred had the speech production process not been altered. This may be one reason that many studies report an overwhelming percentage of mild or mild-moderate participants who stutter compared to more severe participants. This also may be why some investigators have not revealed correlations between speech production abilities of people who stutter and severity ratings (e.g., Cai et al., 2011). Future studies on anticipation could measure speech reaction time in addition to other dependent variables of interest (e.g., speech kinematics, as in Van Lieshout et al., 2014), to gain further insight regarding the processes occurring prior to speech execution. Additionally, examinations of anticipation could incorporate feared sounds or words in order to increase the possibility of stuttering, while appropriately controlling for linguistic and other factors.

The current findings should also facilitate theory development. Participant responses support the assertion that anticipation occurs on various timescales, from a generalized sense that stuttering will occur in communicative situations to an imminent sense that stuttering will occur (see also Wingate, 1975, for a discussion of short- and long-term anticipation). Importantly, all forms of anticipation influence one another throughout the development of stuttering. Future work could employ computational approaches that are suited to model phenomena that occur on different timescales. For example, Dynamic Field Theory (DFT) leverages recent advances in cognitive science, motor control, mathematics, and robotics to explain phenomena that occur on different timescales (see Sandamirskaya & Schöner, 2010; Sandamirskaya, Zibner, Schneegans, & Schöner, 2013; Spencer, Perone, & Johnson, 2009). For stuttering, DFT could be applied to formalize and potentially explain the dynamic relationship(s) between the development of anticipation and the actual, in-the-moment changes to speech production that it precipitates.

Lastly, the present findings raise interesting questions about how stuttering is defined. Currently, most definitions of stuttering are primarily based on surface features of the disorder; that is, stuttering is primarily characterized by overt features (e.g., repetitions and prolongations; for discussion, see Jackson, Quesal, & Yaruss, 2012). This is problematic because the current results demonstrate that the majority of adults who stutter report experiencing anticipation often, and subsequently changing the speech production process often. Thus, the frequency of stuttering is under-estimated if based exclusively on overt stuttering moments rather than a more inclusive definition that accounts for speech production changes made by the speaker. It is speculated here that anticipation is more likely a sense (or *prescience*, as Wingate, 1975 suggested) that something has (already) gone awry with the speech production system. Future studies of anticipation may help to shed additional light on the speaker's experience of the moment of stuttering and the processes leading up to the production of observable disfluencies.

#### 4.2. Limitations

The present study involved only three questions administered in written form. It is possible that the strategies that adults who stutter employ in response to anticipation are under-reported in this study, due to a lack of (self-)awareness on the part of speakers or an inability to remember what strategies they employ at the time when they were responding to the questions. Future studies could build on present findings through the use of interview procedures by which participants can elaborate on their answers and examiners can ask follow-up questions. Furthermore, providing additional guidance regarding the nature of anticipation may have encouraged participants to focus more on active (compared to passive) responses to anticipation. Of course, the design of this study did not permit differentiation of conscious and subconscious forms of anticipation. Future research should focus on identifying more subconscious forms of anticipation, as well as responses to them.

Additionally, phenomenological research only represents the collective experiences of those participants studied, so results are not necessarily generalizable to the larger population of individuals who stutter. Nevertheless, the consistency of findings presented across participants suggests that anticipation and associated adaptive strategies are highly prevalent among adults who stutter. Finally, the current study focused on adults, who may have a long history of anticipation of stuttering which may have changed and evolved throughout the progression of stuttering. Examining the development of anticipation in children will offer critical insights into the nature and development of stuttering and people's reactions to stuttering. Particularly, it will be important to examine how close to onset anticipation begins, the different ways it manifests in young children, and whether it is primarily helpful or harmful at earlier ages.

### 5. Conclusion

The results of the current study suggest that the majority of adults who stutter experience anticipation of stuttering at least often, and that stuttering speakers develop various behaviors to cope with anticipation. These behaviors alter the speech production process, often before these changes become noticeable to listeners. Many of these strategies have clear detrimental effects on the general well-being of those who stutter, while others allow for productive compensations. These findings suggest that clinicians and researchers need to take into consideration the impact that anticipation may have on the speech production process, and ultimately, how anticipation affects the communicative behaviors of those who stutter.

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## CONTINUING EDUCATION

### Responses of adults who stutter to the anticipation of stuttering

#### QUESTIONS

1. Research suggests that all of the following statements are true, except:
  - a. Those individuals with a positive family history of stuttering are more likely to experience anticipation.
  - b. Anticipation may alter the speech production process for adults who stutter, often before speech behaviors are realized.
  - c. Pre-speech levels of autonomic arousal have been shown to be different in people who do and do not stutter, particularly for words that begin with feared sounds.
  - d. People who stutter have demonstrated increased muscle activation prior to speech onset.
  - e. People who stutter have demonstrated aberrancies in the acoustic signal preceding overt moments of stuttering.
2. Current findings suggest that the majority of adults who stutter report experiencing anticipation:
  - a. Always
  - b. Often
  - c. Sometimes
  - d. Rarely
  - e. Never
3. Based on current results, which appears to be the most prominently employed strategy in response to anticipation?
  - a. Circumlocuting or substituting a word
  - b. Stuttering Modification
  - c. Positive self-talk
  - d. Avoiding situation
  - e. Employing non-speech movements
4. Results from the current study indicate that:
  - a. Anticipation appears to be more harmful than it is helpful for adults who stutter.
  - b. Anticipation occurs in a relatively small subgroup of adults who stutter.
  - c. Anticipation is more likely to facilitate speech management than it is to impede speech management.
  - d. Anticipation generally makes it more difficult for adults who stutter to employ speech strategies.
  - e. Some responses to anticipation are more beneficial than others.
5. Which statement is true regarding the relationship(s) between anticipation and stuttering severity?
  - a. Stuttering severity appears to influence the extent to which adults who stutter report experiencing anticipation.
  - b. Scores from the Stuttering Severity Instrument—4th Edition appear to be inversely related to the extent to which adults who stutter report experiencing anticipation.
  - c. Scores from the Overall Assessment of the Speaker's Experience of Stuttering appear to be positively related to the extent to which adults who stutter report experiencing anticipation.
  - d. Stuttering severity appears to develop independently of self-reported ratings of extent of anticipation.
  - e. The extent to which adults who stutter report experiencing anticipation appears to influence stuttering severity ratings.

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