Listener Perception of Naturalness for Spoken Utterances Containing Discourse Markers
um, uh, and *like*

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Laura Elizabeth Kawatski

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Dedication

This thesis project is dedicated to my family.

Abstract

This study investigated the effect of discourse markers, *uh, um,* and *like* in spoken utterances on the overall naturalness of the utterance perceived by listeners. Two conditions were explored: *um/uh* contrasted in sentences of high and low predictability, and *like* contrasted in grammatically correct and grammatically incorrect locations within the sentence. Two listener groups consisted of a skilled group, composed of licensed speech language pathologists and graduate students in their second year of a Master's degree program, and an unskilled group of listeners who had no formal training in speech language pathology. The results showed that all listeners, regardless of group, rated a difference in naturalness of sentences in the *like* condition, with ungrammatical *like* rated less natural than grammatical *like*. Listeners did not rate a difference between *uh/um*, nor did they rate a difference between high and low predictability sentences. As a group, unskilled listeners rated sentences, regardless of condition, as less natural than skilled listeners.

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Introduction

Most people think of themselves as clear, fluent speakers (Arnold, 2003).
Many consider themselves to be fluent because they do not think themselves to be
disfluent. The definitions of fluency and disfluency are problematic and concise
explanations are elusive. Hedge (1979) addressed this issue by describing fluency
in both positive and negative terms.

From a positive standpoint, fluency refers to smooth transitions in speech
units at phonetic, syllabic, lexical, and sentential levels. In speech language
pathology, fluency has traditionally been defined speech that does not contain
perceptible deviations in smoothness or flow of speech (ASHA, 1999). From a
negative standpoint, fluency is the absence of disfluency. The crux, however, is
that normal disfluencies are found in the speech of all speakers (Wingate, 1976).
Disfluencies are permitted by listeners, to a certain extent, without them
perceiving the overall speech of the speaker as disfluent.

Disfluency

Any interruption in the speech stream, whether it is normal or abnormal, is
a disfluency (Yairi & Seery, 2010). Examples of speech disfluency include: word
repetition, part-word or syllable repetition, sound repetition, phrase repetition,
sound prolongation, interjection, and revision (Yairi & Seery). The speech of both
normal speakers and those who have been diagnosed as having a speech disorder
contains disfluencies. It is the character of the aforementioned disfluencies, such
as type, duration, and frequency, which differentiates normal from abnormal

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speech, and effectively serves to diagnose speech disorders such as stuttering and cluttering. Given this definition, albeit succinct, most people are correct when they self-identify as fluent speakers. However, if the definitions of fluency and disfluency are explored in greater detail and within all of the contexts of language in which they are utilized, we find them to be significantly more complex.

Stuttering, a fluency disorder, is defined as speech events that contain monosyllabic whole-word repetitions, part-word repetitions, audible sound prolongations, or silent fixations or blockages, which may or may not be accompanied by secondary behaviors (i.e., behaviors used to escape and/or avoid these speech events) (ASHA, 1999). Some examples of such accessory behaviors are eye blinks, tremors of the lips or face, facial tics or grimacing, jerking of the head, irregular breathing, or fist clenching. A person who stutters may also avoid difficult words or sounds via silence or circumlocution or word substitutions.

According to the American Speech Language and Hearing Association, disfluencies that are most commonly regarded as normal include: "hesitations or long pauses for language formulation (e.g., "This is our [*pause*] miscellaneous group"); word fillers (e.g., "The color is *like* red"), also known as "filled pauses"; nonword fillers (sometimes called interjections, e.g., "The color is *uh* red"); and phrase repetitions (e.g., "*This is a—this is a* problem")". Disfluencies that are most commonly regarded as abnormal include: "part-word (or sound/syllable) repetitions (e.g., "Look at the *buh-buh-ba*-baby"); prolongations (e.g., "*Ssssssss*ometimes we stay home"); blockages (silent fixations/prolongations of

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articulatory postures) or *noticeable and unusually* long (tense/silent) pauses at

unusual locations to postpone or avoid (e.g., "Give me a glass (*3-sec pause*) of

water"); and any of the above categories when accompanied by decidedly greater

than average duration, *effort*, tension, or struggle". There are also certain

disfluencies that are classified as ambiguous: whole word repetitions (e.g., "*I-I-I*

want to go" or "This is a *better-better* solution"). Stuttering is diagnosed based

upon the presence of sound prolongations, excessive duration of disfluencies

(greater than one second), broken words, total disfluencies that exceed 5%, and at

least 2% of words spoken are part-word repetitions (Yairi & Seery, 2010).

In the United States, the prevalence of stuttering (the number of people

who stutter at a given point in time) is approximately 1% and the incidence of

stuttering (the number of people who will stutter during their life time) is 4.5%

(Andrews & Harris, 1964). From the perspective of disfluency as disordered

speech, most people are correct when they identify themselves as being fluent

speakers. From the perspective of disfluency as any interruption in the speech

stream, most people are actually not as fluent as they believe themselves to be.

Discourse Markers

In a summary across multiple studies, Fox Tree (1995) estimated that

approximately 6% of spoken words are either disfluent, or are affected by some

form of disfluency. Spontaneous discourse of normal speakers is laden with

pauses (which may be silent, or filled with words like *um*), hesitations,

interjections ('Er, not really'), repetitions ('I'd like to – I'd like to …'), and

utterance restarts ('You have to – You should ...'). Fillers such as *uh* and *um* are used to fill pauses (Clark & Wasow, 1998; Fox Tree & Clark, 1997) and tag words such as *like* ('He wanted to like, go home')*, you know* ('It makes a difference when, you know, you trust someone)*, okay* ('We should just go in, okay, and sit down')*, right* ('I went in, right, and then I saw him')*,* and *well* ('No one had seen her in, well, a long time') affix to the words of an utterance which carry the content of the message.

Researchers often classify and label discourse markers differently. For example, Bright (1992) described *um, uh, like* and *you know,* as 'vocal hiccups'; Barr (2001), Croucher (2004), and Corley & Stewart (2008) labeled *uh* and *um* as 'fillers'; Bussman (1984) termed *um, like, uh, you know, well, by the way,* as 'markers'; Hudson Kam & Edwards (2008) called *uh* and *um* 'delay markers'; Schourup (1983) used 'common discourse particles' to refer to *well, oh, like,* and *y'know;* Schiffrin (1987) addressed *well, now, so, but, oh , or, I mean, and, y'know, then, uh, um,* and *like* as 'discourse markers'. The latter will be used in the present paper.

The discourse markers *um, uh, like* are linguistic items which function in cognitive, social, expressive, and textual domains (Bright, 1992). Discourse markers, in general, affect communicators' conversational consistency and coherence, allowing speakers feel more comfortable about their conversation skills and to collect their thoughts before speaking (Bussman, 1984). They are also considered to be contextualization cues, helping conversation partners to

negotiate meaning, find common ground, or to hold the conversational floor when one speaker has not decided what he wants to say or how he wants to say it (Watts, 1989; Jucker & Smith, 1998). For example, in a conversation between a native English speaker (NS) and a non-native English speaker (NNS) (Pica, 1987):

> NNS: And they have the chwach there.
> NS: The what?
> NNS: The chwach. I know someone that.
> NS: What does it mean?
> NNS: Like um like American people they always go there every Sunday.
> NS: Yes?
> NNS: You know, every morning that there pr- that-the American people get dressed up to go to um chwach.
> NS: Oh to church. I see.

Clark and Fox Tree (2002) posit that speakers use *uh* and *um* in different ways during spontaneous speech. They found that *um* was more likely than *uh* to be followed by a pause. When *uh* was followed by a pause, the pause was shorter in duration than the pause following *um*. Thus, *uh* precedes a minor delay in speech, and an *um* precedes more major delay.

Both *uh* and *um* suggest that the speaker is either searching for a word, deciding what to say next, or wants to hold the conversation floor (Clark & Fox Tree, 2002). The information following *uh* or *um* is presumably new or more complex; in either case, the information is more difficult for the speaker to retrieve from his or her mental lexicon or memory. A study investigating how young speakers of American English learn to distinguish between *uh* and *um*

found that children did not distinguish between *uh* and *um* at ages 3 and 4, but they did distinguish the two by ages 5 and 6 (Hudson Kam & Edwards, 2008).

Fox Tree (2001) investigated how *um* and *uh* affects listeners' on-line comprehension of utterances and summarized a contrasting argument: discourse markers either have no effect on on-line comprehension, or they do have an effect. The *no effect* proposition is supported by the theory that discourse markers *um* and *uh* may be filtered out of the speech stream before word integration begins. If *um* and *uh* are automatically filtered out before processing begins, people should have difficulty noticing them, which Christenfeld (1995) found to be true. Christenfeld also found that people are able to notice *um* and *uh* when they want to, implying that the filter is not always automatic, and is therefore, under conscious control to some extent.

Additional support for the *no effect* proposition is that *um* and *uh* function at a different level of comprehension than the rest of the utterance. As a result, they are observed and processed separately, without influencing the content words in the utterance. *Um* and *uh* may be processed on a pragmatic or prosodic level in the message. That is, listeners may notice *um* and *uh* concurrent with noticing the emotional state of the speaker. Taken together, these observations guide the listener's overall interpretation of the speaker's intention, message, and the shared communicative interaction in general.

The opposing argument is that *um* and *uh* do disrupt on-line comprehension. This perspective garners support from the *filter hypothesis* and

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from *failed attempts at incorporation*. The filter hypothesis posits that when *um* and *uh* are filtered out, the very process of filtering the words from the speech stream is the source for disruption. To understand the failed attempts explanation, a succinct outline of the general speech process must first be understood. The speech process involves the identification of words, assigning of grammatical roles, and connecting to syntactic representations of each word as it is fits within a greater utterance. *Um* and *uh* interfere with this process because they cannot be combined with surrounding words to form syntactic constructions (Clark & Fox Tree, 2000).

Like is somewhat more complex than the *uh* and *um* because *like* has considerably more syntactic and pragmatic functions. Grammatically, *like* can function as a verb, 'I don't really *like* her that much'; noun, 'He grew up with the *likes* of the company of all great fighters'; preposition, 'It looks *like* a snail, it just is a snail'; conjunction, 'It felt *like* everything had dropped away'; adverb, 'I don't want to talk *like* that'; and suffix, 'He said I went "(mumbling)" or something like stroke-*like'* (D'Arcy, 2005). As a discourse marker, *like* functions as an approximator (indicating: approximately, about), 'It was *like* three hundred dollars'; exemplifier (indicating: for instance), 'Traffic might be chaotic, *like* around the university'; hedge (reduces the semantic value of the word which it modifies), 'Hockey is kind of *like* interesting too'; quotation (introduces directly reported speech), 'He was *like,* 'it's okay'' (Jucker, 1998). *Like* is inarguably multipurpose. It operates as a means of metalinguistic focus, drawing listeners'

attention to the information which follows; as a hesitation; and as a form of loose talk, to indicate that the information is not quite exact and should not be interpreted as such.

The inclusion of *like* as a discourse marker in the current study has targeted one very particular occurrence of *like.* In her doctoral dissertation on *like,* D'Arcy (2005) observed that *like* never appeared before the conjunctions "but/and/or" upon investigation of a corpus of contemporary Toronto English. Based on D'Arcy's findings, the decision to contrast the occurrence of *like* appearing before and after a conjunction was chosen for analysis in the present study.

Within every age and social group in today's society, an attuned ear will notice discourse markers *um, uh,* and *like* interspersed amidst the content words in the speech stream. Depending on the frequency of use or the context of communication, discourse markers may have negative consequences for the perceived communicative ability of the speaker. The fluency of a speaker's delivery can impact how listeners perceive him or her (Croucher, 2004), consequently affecting credibility. Common beliefs regarding the use of *like, um,* or *uh* in both casual and formal speech is that the speaker will sound uneducated or uncertain. When attention is drawn to the dangerously intrusive nature of these discourse markers, individuals attempt to extinguish them. Self-help guides (e.g., Dewey, 2011) and organizations like Toastmasters strive to help speakers

improve self-monitoring and to decrease the use of superfluous and potentially detrimental filler words.

Traditionally, disfluencies were seen as potentially harmful to the comprehension process (Martin & Strange, 1968). Evidence about how people process spontaneous speech, with all of natural disfluencies is sparse (Brennan & Schober, 2001) and the assumptions seem to be that disfluencies uniformly present obstacles to comprehension and should be excluded in order to study comprehension in its purest form (Brennan & Schober).

However, research has also suggested that speech disfluencies are neither random, nor mindless (Underhill, 1988) and that disfluencies may actually aid listener comprehension. In fact, some disfluencies may present information that listeners use to compensate for processing difficulties that would otherwise be hindered without them (Brennan & Schober, 2001). Listeners may have resources for managing both the process and the content of conversation (Clark, 1994, 1996), simultaneously interpreting the main purpose of the utterance as well as secondary signals (i.e., paralinguistic features) about the utterance itself.

Successful comprehension of spontaneous speech, including disfluencies is particularly intriguing because much of the time, listeners do not experience disfluencies as disruptive and when they do take note of them, they have trouble categorizing them consistently (Brennan & Schober, 2001). On the other hand, a content analysis of folk definitions of the meanings of *um* and *uh, like,* and *you*

know, indicated that people did hold intuitive understandings of the meanings of these words that differentiated them from each other (Fox Tree, 2007).

Speech Language Pathologists and graduate students aspiring to become clinicians are conditioned to notice filler words and discourse markers in order to determine if the speaker exhibits a speech fluency disorder, such as stuttering or cluttering. Furthermore, keen attention to speech disfluencies may be a useful method of tracking progress throughout intervention.

Perception studies within the field of speech and language pathology have often focused on the perception of the types of disfluencies that are more characteristic of stuttered speech. The focus of this thesis project is not on overtly stuttered speech, but rather on the disfluencies that occur in the natural discourse of ordinary speakers – people who have not been diagnosed as having speech disorders. This project explores listener perception of discourse disfluencies occurring in natural speech; specifically, how the location and/or type of disfluency affect a listener's perception of overall naturalness of the utterance.

While the focus of this experiment is not on the perception of stuttered speech, or even stuttered events in spontaneous speech, aspects of such studies contributed to the development of the experimental design. Susca and Traunmuller (1994) concluded that listeners appear to judge a person's speech in more ways than just the presence or absence of stuttering. They found that listeners attended to six different themes affecting a speaker's production: speech

rate, voice characteristics, articulatory skill, characteristics of speech flow, amount of effort demonstrated while speaking, and the naturalness of utterances.

For this experiment, naturalness of speech was chosen as the perceptual continuum upon which listeners rated spoken utterances. Speech is natural if it conforms to the listener's standards of rate, rhythm, intonation, and stress patterning, and if it conforms to the syntactic structure of the utterance being produced (Yorkston et al., 2010). This study investigated listener perception of naturalness with syntactical variation in utterances containing the discourse markers *uh, um* and *like*.

Predictions

If speech language pathologists (henceforth, SLPs) receive extensive training purposed to hone their ability in the identification of speech and language deviation and disorder, then SLPs (i.e., skilled listeners) will be more critical of speech anomalies than people who have not had training as an SLP (i.e., unskilled listeners). Therefore, skilled listeners will be more likely to judge both grammatical and ungrammatical *like* as less natural than unskilled listeners, and to be more critical of the presence of *uh* and *um,* rating them as less natural regardless of the type discourse marker or type of sentence. Unskilled listeners will be less critical than skilled listeners, subsequently judging all utterances as more natural than the skilled listeners. A caveat to these expectations was inspired by research conducted by Fox Tree (2002) which suggested that *um* is more likely than *uh* to be produced before semantically complex, or difficult to retrieve

information. Therefore, it was postulated that listeners may differentiate the

naturalness of *um/uh* in sentences that were variably difficult, i.e., variably

predictable. *Um* would be perceived as more natural in low predictability

sentences than *um* in the high predictability sentences, and *uh* would be perceived

as less natural in both low and high predictability sentences.

Methods

Participants

A total of 48 participants volunteered to participate in this experiment. The group of unskilled listeners was composed of 27 graduate and undergraduate students from the University of Minnesota, and members of the Twin Cities community. Male to female ratio was 16:11. Twenty-four out of the 27 participants in the unskilled listener group were of white ethnicity. Time spent living in the Twin Cities ranged from 6 months to 28 years, with an average of 10 years. All participants were native English speakers, and nine indicated some level of ability in a language other than English. All reported their speech, language, and hearing to be within normal limits. Average age of participants was 24 years, with a range of 19-33. All participants had completed education at the level of some college at the time of the study. Four participants indicated having completed a four year degree and five participants identified themselves as post-graduate or advanced degree. On a rating scale indicating time spent with children under five years of age (Appendix A), participants ranged from 1-9, with an average of 3.

The skilled listener group was composed of 21 SLPs from the Twin Cities area; five of these SLPs were Master's degree graduate students in their second year at the University of Minnesota. Male to female ratio was 3:18. All participants in the skilled listener group were of white ethnicity. Time spent living in the Twin Cities ranged from 1.5 years to 50 years, with an average of 15 years.

All participants were native speakers of English, and 11 indicated some level

ability in a language other than English. All considered their speech, language,

and hearing to be within normal limits. Average age of skilled listeners was 33

years, with a range of 23-55. Half of the skilled listeners were employed in an

elementary school setting at the time of participation. This was expected, as the

majority of recruitment for speech language pathologists was done through

contacts in Minneapolis and St. Paul Public Schools. Consequently, the current

clientele for SLP caseload was primarily pre-Kindergarten to elementary school

age.

TABLE 2.1
Skilled Listener Experience

Current work environment	Current clientele	Years at current job	Experience with clinical populations; C: Child A: Adult	Previous work environments & years at each	Total years of experience	Time spent with children (1-10)[a]
private practice, university clinic	elementary school age, adults	6	Apraxia (C,A), dysarthria (C,A), articulation (C,A), phonology (C), autism (C), structural anomalies (A), voice (C,A), fluency (C,A)	Elementary school (3), hospital (3), nursing home (1), private practice (2)	15	4
outpatient clinic	adults, elderly	2 months	Dysarthria (A), Articulation (C), Phonology (C), Autism (C, A), Fluency (A)	N/A	Graduate student	6
elementary, transition high school	elementary age, HS - 21	3 months	Apraxia (A), Dysarthria (C,A), Articulation (C), Phonology (C), Autism (C,A), Structural Anomalies (C), Voice (C,A),	N/A	Graduate Student	4

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			Fluency (C,A), Other			
early education center	pre-Kindergarten	<1	Apraxia (C), Articulation (C), Phonology (C), Structural Anomalies (C)	Elementary (<1)	<1	8
early education center, elementary	pre K, elementary	2.5	Apraxia (C), Articulation (C), Phonology (C), Autism (C), Fluency (A)	Not provided	2.5 years	9
elementary	elementary	1.5	Apraxia (C), Dysarthria (A), Autism (C), Structural Anomalies (C), Voice (A), Fluency (C)	Elementary (2), middle (2), high (2), hospital (.5)	4	2
transition high school	secondary school, adult	2.5	Dysarthria (A), Articulation (C), Autism (C), other	Middle (6), hospital (>10),	>20	1
middle school	elementary, secondary	3	Apraxia (A), Dysarthria (A), Articulation (C), Phonology (C), Autism (C), Structural Anomalies (C)	Elementary (5.5), hospital (2)	7	8
hospital, autism center	pre K, elementary, adult, elderly	10 months	Apraxia (C, A), Dysarthria (A), Articulation (C), Phonology (C), Autism (C, A), Voice (A), Fluency (C)	N/A	Graduate Student	9
not currently in practicum	N/A	N/A	Apraxia (A), Dysarthria (A), Articulation (C), Phonology (C), Autism (C), Structural Anomalies (C), Voice (C,A), Fluency (C,A)	N/A	Graduate Student	1
private practice	pre K, elementary, secondary	6 months	Apraxia (C), Dysarthria (C), Articulation (C), Phonology (C), Autism (C), Structural Anomalies (C,A), Voice (C,A), Fluency (C,A), other	N/A	Graduate Student	8
elementary, early	pre k, elementary,	10	Apraxia (C,A), Dysarthria (A),	Early education (3),	10	10

education center, hospital	adults, elderly		Articulation (C), Phonology (C), Autism (C), Structural Anomalies (C), Voice (C), Fluency (C)	Middle (1), high (3), hospital (1),		
early education center, elementary	pre k, elementary	20	Apraxia (C), Dysarthria (C), Articulation (C), Phonology (C), Autism (C), Structural Anomalies (C), Voice (C), Fluency (C), other	Early education (4)	25	10
hospital	secondary school, adult, elderly	3 months	Apraxia (C,A), Dysarthria (A), Articulation (C, A), Phonology (C), Autism (C,A), Structural Anomalies (C,A), Voice (C,A), Fluency (C,A), other	no	1	2
hospital, clinic	infant, pre K, elementary, secondary, adult, elderly	5	Apraxia (C,A), Dysarthria (C,A), Articulation (C,A), Phonology (C,A), Autism (C,A), Structural Anomalies (C,A), Voice (C,A), Fluency (C,A)	Elementary (1.5), high (.5), hospital (<1), nursing home (<1)	5	5
early education center	pre K	8	Apraxia (C,A), Dysarthria (C,A), Articulation (C), Phonology (C), Autism (C A), Structural Anomalies (C,A), Voice (C,A), Fluency (C,A)	Elementary (3), high (.5), early education (5), hospital (2)	10	10
elementary school	pre K, elementary	2	Apraxia (C), Dysarthria (C), Articulation (C), Phonology (C), Autism (C), Structural Anomalies (C),	Middle (x), hospital (x)	30	4

			Voice (C), Fluency (C)			
elementary school, high school	elementary, secondary	2	Apraxia (A), Dysarthria (A), Articulation (C), Autism (C), Voice (A), Other	Early education (1.5), nursing home (.5)	4	2
elementary school	elementary	12	Apraxia (C), Articulation (C), Phonology (C), Autism (C), Structural Anomalies (C), Voice (C), Fluency (C)	Early education (5)	12	10
middle school	secondary	8 months	Articulation (C), Phonology(C), Autism (C), Structural Anomalies (C), Fluency (C)	No	1	2
elementary school	pre K, elementary	5	Apraxia (C), Articulation (C), Phonology (C), Autism (C), Fluency (C)	No	6	3

[a]Time spent with children under five years of age; scale of 1-10; with 10 being the most

Materials and Design

The primary script for the *like* portion of this project was inspired by a search of spoken language in the Corpus of Contemporary American English (COCA, Davies, 2008-). The COCA contains more than 425 million words of text and is equally divided among spoken, fiction, popular magazines, newspapers, and academic texts. It is updated yearly (the most recent texts are from March 2011), including 20 million words each year from 1990-2011 (Davies). A basic search of spoken language utterances containing *like* adjacent to the conjunctions *and/or/but* was conducted, and stimuli were selected and manipulated at the discretion of the author of this paper, given findings from the search. Two scripts were generated: grammatically correct *like* (like preceded by a conjunction:

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and/but/or, like) and grammatically incorrect *like* (*like* followed by a conjunction: *like, and/but/or*). Eighteen sentences each were constructed for the grammatically correct and incorrect occurrences of *like,* totaling 36 sentences for the *like* portion of the experiment. The length of utterance for *like* stimuli varied from 6 words to a short paragraph (Appendix C). Utterances contained no more than one additional occurrence of *like,* which was not a discourse marker in form or function (five of the eighteen *like* utterances contained one ancillary *like* each).

The primary script for the *um/uh* portion of this project was generated from the Speech Perception in Noise (SPIN) sentences task. Stimuli sentences were constructed from both the high and low predictability sentences. Eleven sentences of high predictability were constructed for both *um* and *uh* conditions, totaling 22 sentences. Twelve sentences of low predictability were constructed for both *um* and *uh* conditions, totaling 24 sentences. The length of *um/uh* sentences ranged from 7 – 10 words (Appendix D). All *um/uh* sentences were parallel in form, with the discourse marker occurring before the object of the verb, which was always a content word occurring after an article (e.g., the *um/uh* crumbs).
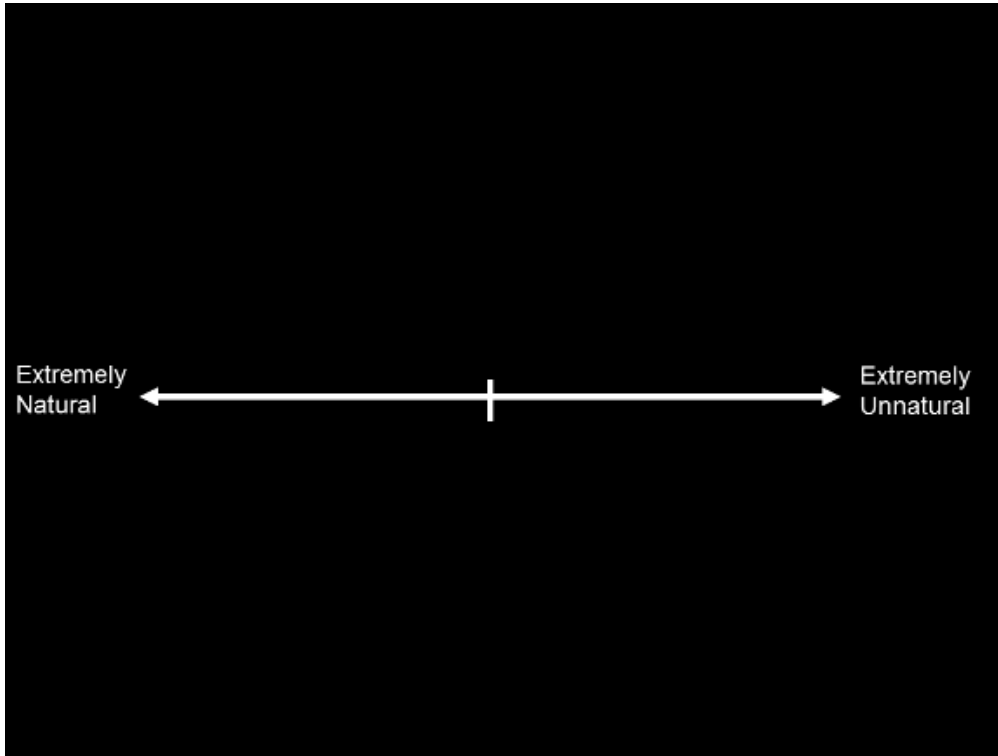
Distractor sentences were also included in the stimuli; these sentences were selected from the longest sentences in the Assessment of Intelligibility of Dysarthric Speech [AIDS] (Yorkston et al., 1984). There were eleven total distractor sentences included in the experiment (Appendix E). Participants from both groups heard a total of 93 utterances, a within-subjects and within-items counterbalanced design. The script was read aloud by an adult female speaker

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who was in her late twenties. She was highly skilled and therefore most likely to read all the different sentence types equally naturally in modal register.

Procedure

The speech naturalness judgment task was programmed and run using the E-prime experiment management software (Schneider, Eschmann, & Zuccolotto, 2002. Version 1.2). Participants sat at a 14 inch computer monitor in a sound-treated booth, and were asked to listen to spoken stimuli presented via over-the-ear headphones. Written instructions for the task were provided on the computer monitor at the beginning of the experiment. There was no model provided as an example for participants. Upon auditory presentation of each utterance, the participant was instructed to respond to his/her overall perceived naturalness of the utterance using a Visual Analog Scale presented on the computer monitor. A horizontal line with a double-headed arrow depicted the continuum of naturalness, allowing participants to rate the utterance anywhere on the scale from natural to unnatural. The horizontal line on the screen began at 87 pixels on the left hand side of the screen, indicating "Extremely Natural" and ended at 530 pixels on the right hand side of the screen, indicating "Extremely Unnatural". Participants were instructed to point and click with the mouse anywhere on the line which they felt correlated with the overall naturalness of the utterance heard. Instructions encouraged participants to utilize the entirety of the scale. Mouse clicks were recorded and later analyzed. Participation in this experiment lasted approximately 25 minutes.

FIGURE 2.1
A screenshot of the Visual Analog Scale

In order to increase the number of skilled listeners and to accommodate the schedules of working SLPs, ten subjects participated in the study outside of the Speech Research Lab. The author of this paper went to SLPs' respective places of work throughout the Twin Cities metro area. For these subjects, conscientious accommodations were made in order to replicate the quiet, non-distractible environment of a sound booth. The study was run on a Dell Latitude D 620 laptop with over-the-ear headphones and an external mouse. All participants were compensated $10 for their participation.
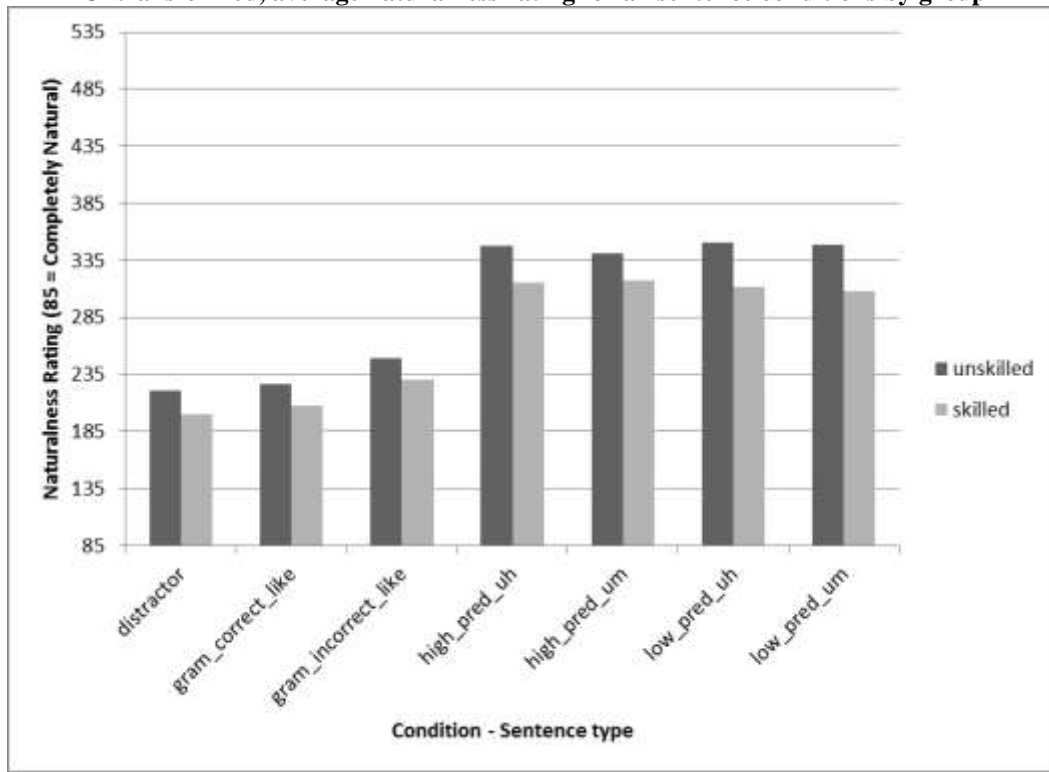
Results

The dependent measure in this study was participants' rating of overall naturalness for each spoken utterance. Naturalness ratings were indicated by the location of the participant's mouse click on the visual analog scale in Figure 2.1. The x-axis ranged from 85 to 535 pixels and was depicted on a horizontal line bound by "Extremely Natural" on the left side to "Extremely Unnatural" on the right side. A click on the "Extremely Natural" side of the line was logged as 85 and a click on the "Extremely Unnatural" side of the scale was logged as 535.

Data was analyzed for outliers and mouse clicks outside of the range of 235 – 255 on the y-axis were considered outliers and excluded because these mouse clicks indicated that the participant's click was located on a point on the visual display which was not located on the horizontal continuum of naturalness. The reader can refer to Figure 2.1 in the Methods section for review of the visual analog scale. Forty-seven data points were removed from the data. The majority of outlier reponses were accounted for by three subjects: two unskilled listeners and one skilled listener.

Participants' naturalness ratings were recorded and then averaged within each sentence condition (i.e., high/low predictable *um/uh,* grammatically correct/grammatically incorrect *like*). Figure 3.1 displays the untransformed, average ratings by participants within all sentence conditions. The y-axis on Figure 3.1 corresponds to the average of participants' mouse clicks on the naturalness continuum of the visual analog scale within the given sentence

condition, which is located on the x-axis. The y-axis ranges from 85 to 535. A rating of 85 corresponds to listener's rating toward the left side of the naturalness continuum, i.e., "Completely Natural." A rating of 535 corresponds to listener's rating toward the right side of the naturalness continuum, i.e., "Completely Unnatural." Therefore, a lower value indicates that the average rating by participants for a given sentence condition was more natural, and a higher value indicates that he average rating by participants for a given sentence was less natural. Sentence conditions are located on the x-axis in Figure 3.1: grammatically correct like (i.e., post-conjunction *like*), grammatically incorrect *like* (i.e., pre-conjunction *like*), *uh* in sentences of high predictability, *um* in sentences of high predictability, *uh* in sentences of low predictability, and *um* in sentences of high predictability.

FIGURE 3.1
Untransformed, average naturalness rating for all sentence conditions by group

As demonstrated by Figure 3.1, the average naturalness rating by skilled listeners was more natural than the average naturalness rating by the unskilled listener group.

TABLE 3.1
Average of naturalness rating, by sentence condition, by group

Variable	unskilled			skilled		
	Mean	Standard Deviation	Range	Mean	Standard Deviation	Range
Distractor	221	68	100 - 390	200	75	116 – 362
Grammatically correct *like*	226	57	136 - 324	208	58	166 – 365
Grammatically incorrect *like*	249	55	169 - 400	231	65	122 – 394
High predictability *uh*	347	79	201 - 527	315	100	116 - 436
Low predictability *uh*	351	74	176 - 463	311	97	116 - 432
High predictability *um*	341	77	200 - 533	317	95	115 - 445
Low predictability *um*	349	76	189 - 517	308	96	116 - 438

Note: Small numbers indicate more natural while larger numbers indicate less natural

In general, unskilled listeners rated all sentences as more natural than did

the skilled listeners; however, statistical analysis of data using a three factor,

mixed model Analysis of Variance (ANOVA) showed no significant effects. A p-

value of <0.05 was considered a statistically significant effect.

ANOVA results for *um/uh* data are displayed in Table 3.2. For the first

variable, predictability (i.e., high versus low predictability sentences), there was

not a statistically significant effect, $F(1, 46) = .007$, $p = .933$. Between groups

(i.e., skilled versus unskilled listeners ratings of high/low predictability

sentences), there was not a statistically significant effect, $F(1, 46) = 2.417$, $p =$

.127. For the second variable, discourse marker type (i.e., *um* versus *uh*), there

was not a significant effect, $F(1, 46) = 1.681$, $p = .201$. That is, participants'

ratings of sentences containing *um* and sentences containing *uh* did not have a

statistically significant effect. Between groups (i.e., skilled versus unskilled),

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there was not a significant effect of discourse marker type either, F(1, 46) = .756, p = .389. There was not a significant effect of the naturalness ratings when analyzing between sentence predictability and discourse marker type, F(1, 46) = .005, p = .253. There was also not a significant effect when analyzing predictability, type, and group, F(1, 46) = 1.337, p = .253. Finally, there was no main effect when analyzing the naturalness rating of all sentences between groups, F(1, 46) = 1.940, p = .170.

TABLE 3.2
ANOVA results for *um/uh* data

Factor	Degrees of Freedom	F-value	p-value	Mean Squared Error
predictability	1,46	.007	.933	763.434
predictability * group	1,46	2.417	.127	763.434
type	1,46	1.681	.201	191.262
type * group	1,46	.756	.389	191.262
predictabilty * type	1,46	.005	.942	239.123
predictability * type* group	1,46	1.337	.253	239.123
group	1,46	1.940	.170	28314.873

Note: *Significant at p<0.05 level; predictability indicates high versus low predictability; type indicates *uh* versus *um;* group indicates unskilled versus skilled group

For *um/uh* data, with group (i.e., skilled or unskilled) as the between subjects factor and discourse marker type (*um/uh*) and predictability (high/low) as within subjects factors, there were no significant main effects of predictability, type, or group, nor did these factors interact significantly.

Like data was analyzed using a two factor, mixed-model ANOVA, with accuracy as the within subjects factor and participant group as the between

subjects factor. With type as the variable (i.e., grammatically correct versus grammatically incorrect *like*), there was a significant effect, $F(1, 46) = 48.39$, $p = <.001$. That is, participants rated a difference in the naturalness of sentences containing grammatically correct *like* versus sentences containing a grammatically incorrect *like*. A between group analysis of type yielded effects that were not significant, $F(1, 46) = .010$, $p = .919$. Finally, there was no significant effect between group's overall rating of naturalness for the stimuli sentences, $F(1, 46) = 1.23$, $p = .274$.

TABLE 3.3
ANOVA results for *like* data

Factor	Degrees of Freedom	F-value	p-value	Mean Squared Error
type	1,46	48.388	<.001*	256.225
type * group	1,46	.010	.919	256.225
group	1,46	1.228	.274	6661.424

Note: *Significant at p<0.05 level; type indicates grammatically correct versus grammatically incorrect *like;* group indicates unskilled versus skilled group

In general, skilled rated utterances as more natural than unskilled listeners, regardless of sentence condition; however, Table 3.2 and Table 3.3 demonstrate that in neither condition: between group for *um/uh* and between group for grammatically correct and grammatically *like,* did results achieve significance. Both groups treated *uh* and *um* sentences similarly. They did not rate high and low predictability utterances differently, nor did they rate *uh* and *um* sentences differently. Overall, *um* and *uh* sentences were generally considered to be less natural than *like* utterances for both groups. Distractor utterances were rated as more natural than all utterances containing discourse markers.

Post Hoc Analysis

Because the *like* data yielded significant results for listener perception of grammatical and ungrammatical *like*, a more in depth analysis of the utterances was conducted in order the determine whether the apparent effect of naturalness ratings was due to the behavior of specific stimuli.

Figure 4.1 demonstrates the difference between listeners' average naturalness rating for ungrammatical and grammatical versions of the same sentence. That is, the average naturalness rating for the grammatically correct version of a sentence was subtracted from the average naturalness rating for the grammatically incorrect version of the same sentence, in order to calculate the difference, and to then compare the skilled group to the unskilled group. Positive values indicate that the group rated the ungrammatical *like* sentence as less natural than the grammatical *like* sentence. Conversely, negative numbers indicate that the participant group rated the grammatical *like* sentence as less natural than the ungrammatical *like* sentence. For example, in sentence four, unskilled listeners rated the ungrammatical *like* form as much less natural than the grammatical *like* form. Skilled listeners also rated a moderate difference in naturalness between the ungrammatical and grammatical forms; however, the average rating was not as discrepant as the unskilled listeners. For sentence nine, both groups rated the grammatical form of the sentence as less natural than the ungrammatical form.

FIGURE 4.1
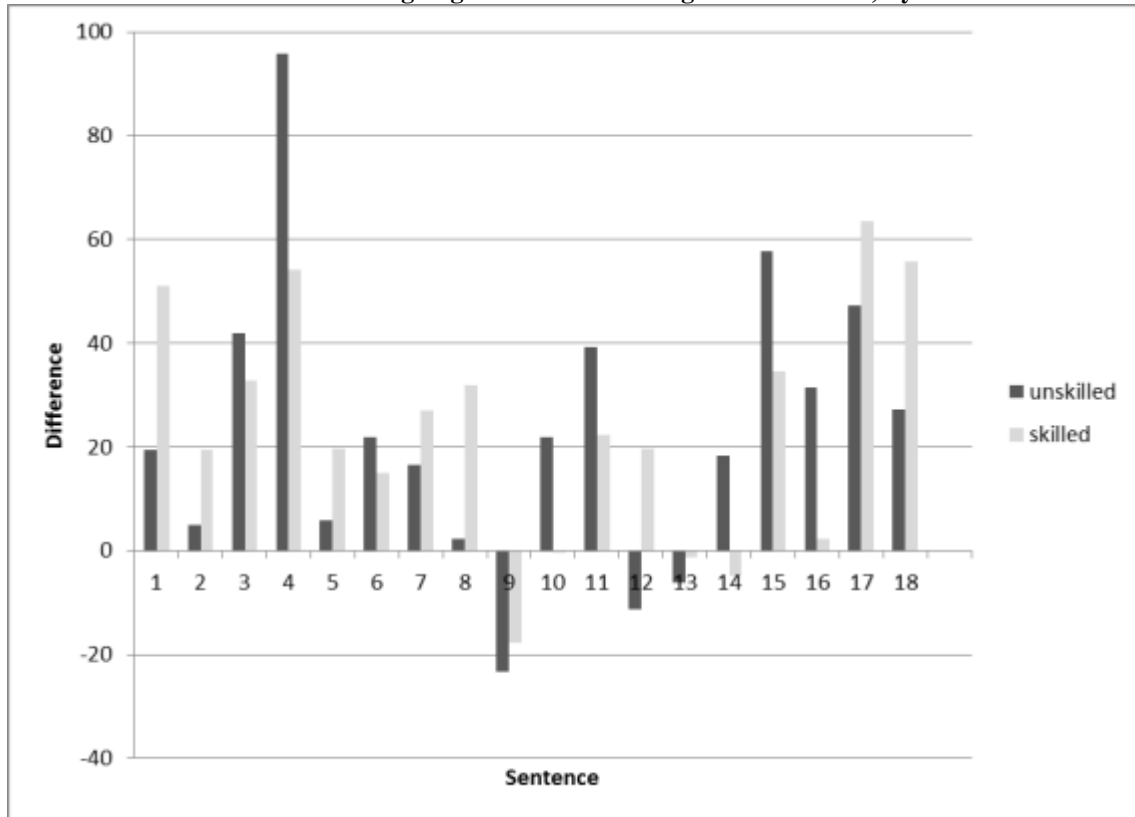**Difference in naturalness rating of grammatical and ungrammatical *like,* by sentence**

Table 4.1 demonstrates a comparison of the average naturalness rating for each sentence between the unskilled and the skilled group. There were eight utterances with a notably large difference between perception of naturalness by unskilled and skilled listeners. Three of these were grammatically incorrect *like* and five were grammatically correct *like.* Of these utterances, there was one stimuli pair (i.e., exact same semantic content, with differentiable *like* condition) and the rest were unpaired; therefore, it was concluded that the semantic content did not have a noticeable effect on average naturalness rating. Of the 36 *like* stimuli, there were six instances in which the skilled listeners perceived the

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utterance to be less natural than the unskilled listeners. Three of these utterances were considered to be correct instances of *like* and three were incorrect. Of these utterances, there was one stimuli pair, and the rest were unpaired; as mentioned previously, semantic content did not have a noticeable effect on average naturalness rating.

TABLE 4.1
Between group average difference in naturalness rating for *um/uh* and *like* utterances

Sentence	unskilled	skilled	Difference between group rating
A1	247	186	61
B10	253	194	59
B16	288	230	58
B15	292	246	46
A17	253	209	44
A8	225	186	39
A10	231	194	37
A18	233	199	34
B1	267	237	30
A16	257	228	29
B4	327	299	28
B17	300	273	27
B6	251	227	24
A12	195	171	24
A15	234	212	23
A9	255	233	22
B3	241	219	22
A2	208	187	20
B9	232	215	17
A6	229	212	17
A5	196	180	16
A3	199	187	13
B8	227	218	10
B14	239	231	9
A7	212	202	9
A13	220	212	8

B18	260	254	6
B2	212	207	6
B13	214	211	3
B5	202	199	3
B7	228	229	-1
B12	184	191	-7
B11	269	281	-12
A14	221	235	-14
A4	232	245	-14
A11	230	259	-29

Note: Shaded rows indicate greatest difference between group ratings of perceived naturalness. Negative value indicates skilled group perceived utterance as less natural than unskilled group.

Discussion

This study investigated the effect of discourse markers *uh, um,* and *like* in spoken utterances on the overall naturalness of the utterance perceived by listeners. Discourse markers *um/uh* were contrasted in sentences of high and low predictability, because previous studies (e.g., Clark & Fox Tree, 2002) have shown that *um* is used before a longer pause than *uh* in spontaneous speech, or before information that is new, more complex, or difficult for the speaker to retrieve due to memory or cognitive difficulty. This study, however, did not find that listeners (neither skilled speech language pathologists, nor people without training in speech language pathology) differentiated between the discourse fillers *um* and *uh* in spoken utterances. *Like,* as a discourse marker, was contrasted in grammatically incorrect and grammatically correct locations within the sentence: pre- and post- conjunction, respectively. In her doctoral thesis on the word *like,* D'Arcy (2005) found that speakers did not produce the word *like* before a conjunction (e.g., *like* but) in her review of a corpus of English spoken in Toronto, Canada. This study explored listeners' perception of the naturalness of *like* in pre- and post- conjunction locations within an utterance and results found that listeners, on average, regardless of training in speech language pathology, rated a difference in the perceived naturalness of grammatically incorrect and grammatically correct sentences containing *like.* Listeners rated sentences containing *like* in the pre-conjunction position (i.e., *like* but) as less natural than post-conjunction (i.e., but *like*).

Two participant groups participated in this study. The first consisted of a skilled group, composed of licensed speech language pathologists and graduate students in their second year of a Master's degree program. The second, an unskilled group, was composed of undergraduate, graduate, and non-student who had no training in speech language pathology. Groups were not matched. For example, the male to female ratio in the skilled group was 3:18, and 16:11 for the unskilled group. This may have had on both within- and between-group analysis of average naturalness rating of the stimuli utterances.

Results indicated that all listeners, regardless of group, rated a difference in naturalness of sentences in the *like* condition, with grammatically incorrect *like* rated less natural than grammatically correct *like.* Listeners did not rate a difference between *um/uh*, nor did they rate a difference between high and low predictability sentences in the *um/uh* condition. As a group, unskilled listeners rated sentences, as less natural than skilled listeners, regardless of condition.

All listeners heard a total of 93 spoken utterances and were asked to rate the naturalness of each utterance. Utterances in the *um/uh* condition of this study were taken from low and high predictability sentences from the Speech Perception in Noise (SPIN) test. Utterances in the *like* condition were generated from a key word search in the Corpus of Contemporary American English (COCA). A search for the phrase "like and/or/but", restricted to spoken material was conducted within the COCA. Stimuli utterances of varied length were constructed from the results.

The content of the stimuli sentences may have influenced participants'

responses. Fox Tree and Clark (2002) found that speaker differentiate between *uh*

and *um,* given complexity or novelty of the information following the discourse

marker. In this study, high and low predictability sentences from the SPIN task

were used as stimuli to resemble difficult to retrieve information (i.e., low

predictability) and less difficult to retrieve information (i.e., high predictability),

and no significant effect was found for predictability condition or for discourse

marker. One hypothesis for a no significance result may be that the stimuli

sentences were too similar in syntactic structure. Semantic content was varied, but

the syntactic structure of each of the sentences was such that *um* or *uh* was

inserted into the direct object of the verb, directly after the article which modified

it. For example: He should have known about the (*um/uh*) dust. Participants may

have noticed, either subconsciously or consciously that the structure of the *um/uh*

stimuli was similar and rated them as similarly natural.

The *like* sentences were taken from excerpts of spoken language in the

COCA, and were selected for the occurrence and location of *like.* Content and

length of utterance varied. Length of utterance may have had an effect on listener

perception of naturalness. By selecting utterances from spontaneously produced

discourse taken from popular media sources, utterances were taken out of their

original context, and this extraction from context may also have affected

perception of naturalness. Anecdotally, a few participants commented during

informal debriefing, that the longer utterances did not make sense because they

were tangential and decontextualized; this may have caused the listener to rate the utterance as less natural.

The length of the utterances may also have affected listener response between *um/uh* and *like* stimuli. Overall, listeners rated *uh/um* utterances as less natural than *like* utterances, and *uh/um* sentences were generally shorter than *like* sentences. While the study did not seek to compare these two disfluencies directly, it is an interesting observation from which to further hypothesize rationale for listeners' responses and to perhaps explore more in future research.

It was hypothesized that, due to skilled clinical training, SLPs would be more critical of utterances containing discourse markers *um, uh* and *like,* and therefore rate the utterances in this study to be less natural. Results, however, indicate the contrary - skilled listeners were more lenient than unskilled listeners in their naturalness rating of utterances containing discourse markers.

The majority of the skilled listeners who participated in this study worked with children. During an informal oral debriefing, one skilled participant indicated that children are often disfluent, and compared to the children she treats, the utterances did sound relatively natural. During a separate, informal oral debriefing, another participant from the skilled listener group stated that due to her professional experience working with bilingual children, who often insert *uh* and *um* into their spontaneous speech, she most often rated the utterances in this study toward the "Extremely Natural" side of the continuum. During yet another informal debriefing, a third skilled participant mentioned that she rated utterances

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as more natural at the beginning of the study with the expectation that she would hear aberrantly unnatural disfluencies or disordered speech later.

The case may be that skilled listeners are conditioned to listen for disfluencies in speech, and are in fact more critical, when the disfluencies more closely resemble stuttered events. However, because the utterances in this study contained natural, normal speech disfluencies, and not overtly stuttered events, this hypothesis cannot be addressed with the current data.

In order to control for effects of prosodic variation and perceptual characteristics that may influence listeners rating of naturalness, one highly trained speaker was utilized to produce all of the utterances in the current study. Therefore, speaker characteristics were not considered to be a factor affecting listener responses to the stimuli sentences. However, the intent of this study was to replicate spontaneous conversation, but due to rehearsal of the speaker in preparation for stimuli generation, sentences were not purely spontaneous in nature, which may also have affect listeners' perception of naturalness. Using only one speaker potentially limits the generalizability of the findings as it does not address whether the same results would apply to listener perception of male and female speakers, fast and slow speakers, good and bad speakers, and to formal speeches and casual chats. Multiple speakers, however, would have introduced multiple uncontrolled variables. This is an area of potential research in the future.

The directions at the beginning of the experiment instructed participants to rate each utterance as how natural they perceived it to sound in regular conversation. No further definition of naturalness was provided, nor was there an example provided for participants before beginning the experiment. Participants may have had unique and different definitions of naturalness, which may have affected their rating of the stimuli utterances.

This experiment did not account for aspects of familiarity to person, environment, or topic of conversation that may affect listener perception of the speaker. The experiment essentially mimicked a situation in which a speech pathologist would be asked to assess a client's speech in order to judge speaker disfluencies and to make appropriate therapeutic recommendations, if warranted.

In conclusion, unskilled listeners tend to rate spoken utterances containing natural disfluencies, or discourse markers: *uh, um* and *like* as less natural than skilled listeners regardless of type of sentence for respective discourse marker (i.e., high/low predictability for *uh/um* and grammatically correct/grammatically incorrect for *like)*. Both groups rated grammatically incorrect *like* as less natural than grammatically correct *like* indicating that the word *like,* albeit abundant in semantic and syntactic function in spoken English today, may have rules for appropriate location within a sentence when it functions as a discourse marker. This study only investigated *like* as a discourse marker adjacent to conjunctions *and, or,* and *but.*

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Unskilled Listener Survey

Subject ID _____ Date of Birth _____ Age _____

Where were you born? _____ How long have you lived in the Twin Cities? _____

What is your gender? _____ What is your ethnicity? _____

What is your primary language? _____

What other languages do you speak (if any)?
_____

On a scale of 1-10, how much time do you spend around children under 5? _____
1 = no time at all, 10 = most of your time spent around young children (parent,
day care teacher)

Do you consider that your speech, language, and hearing are within normal
limits?
yes ____   no ____   If no, please explain
_____

Are you a student?
yes ____   no ____
If so, what year are you in right now _____

What is the highest year of school you have completed?
_____ Some high school
_____ Completed high school
_____ Some college
_____ Completed 2 year degree
_____ Completed 4 year degree
_____ Post-graduate courses
_____ Advanced Degree

Please provide any of the following information that you can:

As a child, did you have frequent ear infections? yes ____   no ____

As a child, did you have PE tubes in one or both ears in order to prevent ear
infection? yes ____   no ____

As a child or an adult, were you ever you ever diagnosed with a hearing, speech, language, or learning problem? yes ___ no ___

If yes, please describe

_____

As a child or an adult, did you ever participate in speech or language therapy programs? yes ___ no ___

If yes, please describe

_____

Thank you for participating in this study!

Skilled Listener Survey: Speech Language Pathologists

Subject ID _____ Date of Birth _____ Age _____

Where were you born? _____
How long have you lived in the Twin Cities? _____

What is your gender? _____ What is your ethnicity? _____

What is your primary language? _____

What other languages do you speak (if any) _____

On a scale of 1-10, how much time do you spend around children under 5? _____
1 = no time at all, 10 = most of your time spent around young children (parent, day care teacher)

Do you consider that your speech, language, and hearing are within normal limits? yes ___   no ___   If no, please explain
_____

How many years have you been a Speech Language Pathologist?
_____

Current work status:
Full___ Part___ Not currently working___

Current work environment:
- o Elementary school
- o Middle school
- o High school
- o Early education center
- o Hospital
- o Nursing Home
- o Private practice
- o Other _____

Current clientele:
- o Infants
- o Pre-Kindergarten
- o Elementary school age

- o Secondary school age
- o Adults
- o Elderly
- o Other _____

How long have you worked at your current job?
_____

Have you worked in any other settings previously?
If so, please indicate:

o Elementary school	# of years
o Middle school	# of years
o High school	# of years
o Early education center	# of years
o Hospital	# of years
o Nursing Home	# of years
o Private practice	# of years
o Other _____	# of years

With which populations have you worked?

	Children	Adult
o Apraxia	☐	☐
o Dysarthria	☐	☐
o Articulation disorders	☐	☐
o Phonological disorders	☐	☐
o Autism	☐	☐
o Structural anomalies	☐	☐
o Voice	☐	☐
o Fluency	☐	☐
o Other _____	☐	☐

Thank you for participating in this study!

Like Script

Label	Grammatically correct and/or/but like	Label	Grammatically Incorrect like and/or/but
A1	It's as if the arrangement makes sense, everything's working, and then we just do it; And then sometimes it's just wearing the wrong outfit and sometimes the bones are in totally the wrong body **and like** it's just a matter of trying to remember which is which.	B1	It's as if the arrangement makes sense, everything's working, and then we just do it; And then sometimes it's just wearing the wrong outfit and sometimes the bones are in totally the wrong body **like and** it's just a matter of trying to remember which is which.
A2	I always <u>like</u> to try to do something that's a little different **and like** my take and twist on all this kind of stuff is way off from what everyone else would say.	B2	I always <u>like</u> to try to do something that's a little different **like and** my take and twist on all this kind of stuff is way off from what everyone else would say.
A3	**But like** just learning the language, different culture, different food. You know, the first couple of years, I couldn't even see my family. So that was the hardest part.	B3	**Like but** just learning the language, different culture, different food. You know, the first couple of years, I couldn't even see my family. So that was the hardest part.
A4	**But like** who are you with?	B4	**Like but** who are you with?
A5	She judges me, of course, because she's my mother **but like** if I've done something wrong, she says, It's OK, but you need to learn from it.' And so I feel very comfortable telling her	B5	She judges me, of course, because she's my mother **like but** if I've done something wrong, she says, It's OK, but you need to learn from it.' And so I feel very comfortable telling her things that maybe not

	things that maybe not everybody would feel comfortable telling their parents about.		everybody would feel comfortable telling their parents about.
A6	Attitude, to me, is more important than facts. It is more important than the past, than education, than money, and it goes on and on like that. I mean, they assume I'm stupid, or without any good manners, **or like,** my mother did not teach me how to say "please" and "thank you."	B6	Attitude, to me, is more important than facts. It is more important than the past, than education, than money, and it goes on and on like that. I mean, they assume I'm stupid, or without any good manners, **like or,** my mother did not teach me how to say "please" and "thank you."
A7	It's just the way I am. I hang out with people I do and do the things I do now, but not totally walk all over them. I'm able to go out with my friends and not totally be limited to, 'Stay in your room,' 'Do this,' **or like,** You have to do this whenever I say.' But I'm not going to become, a perfect little all-American daughter. I'm not going to be that way.	B7	It's just the way I am. I hang out with people I do and do the things I do now, but not totally walk all over them. I'm able to go out with my friends and not totally be limited to, 'Stay in your room,' 'Do this,' **like or,** You have to do this whenever I say.' But I'm not going to become, a perfect little all-American daughter. I'm not going to be that way.
A8	And you know we were just completely stressed out this whole time. Only to find out, after all that, that we do still have a few weeks left on unemployment that we can stretch and get by. **And like** Kansas is one of those states where we don't have all the tiers. We only have three tiers here because the unemployment rate is only	B8	And you know, we were just completely stressed out this whole time. Only to find out, after all that, that we do still have a few weeks left on unemployment that we can stretch and get by. **Like and** Kansas is one of those states where we don't have all the tiers. We only have three tiers here because the unemployment rate is only six percent for

	six percent for Kansas.		Kansas.
A9	I didn't know if it would stop her. I just wanted her to sit still. Of course, at that point, yes, logically, you think about it, oh, is she really gonna talk to me now? Of course not, that was stupid. But she was driving off anyway **and like**, this is my only chance.	B9	I didn't know if it would stop her. I just wanted her to sit still. Of course, at that point, yes, logically, you think about it, oh, is she really gonna talk to me now? Of course not, that was stupid. But she was driving off anyway **like and**, this is my only chance.
A10	My question is, was she dating anyone? And also, do they know how long it was going to take her to go run those errands? **And like** what really happened to this girl? Did her boyfriend or someone come? Or did she have personal problems that someone would want to hurt her?	B10	My question is, was she dating anyone? And also, do they know how long it was going to take her to go run those errands? **Like and** what really happened to this girl? Did her boyfriend or someone come? Or did she have personal problems that someone would want to hurt her?
A11	Yeah. Today for example, I can still think about it, thinking **and like** why'd do you that, or now the world's going to see that, people might see at work. Or, yeah, it's just, I guess, a regret. Because I opened up to the world. And that's what I did.	B11	Yeah. Today for example, I can still think about it, thinking **like and** why'd do you that, or now the world's going to see that, people might see at work. Or, yeah, it's just, I guess, a regret. Because I opened up to the world. And that's what I did.
A12	And I just remember the simple things that sound probably a bit silly to other people, but just getting ready together like the two girls again, putting their makeup on, putting little dresses on and stuff. It was just so nice because that's the Kate that I	B12	And I just remember the simple things that sound probably a bit silly to other people, but just getting ready together like the two girls again, putting their makeup on, putting little dresses on and stuff. It was just so nice because that's the Kate that I knew. **Like and** we always used

	knew. **And like** we always used to do girlie stuff together.		to do girlie stuff together.
A13	I mean it is somewhat tempting, but at the same time I'm just so proud that I've come this far **and like**, I know when I look at my grades that it is purely by my own ability.	B13	I mean it is somewhat tempting, but at the same time I'm just so proud that I've come this far **like and**, I know when I look at my grades that it is purely by my own ability.
A14	All our extra change we always save just in case we need it, **and like**, there's a place that we can go to and cash it in for money, and it helps us out sometimes if we go up there and cash it.	B14	All our extra change we always save just in case we need it, **like and** there's a place that we can go to and cash it in for money, and it helps us out sometimes if we go up there and cash it.
A15	Yeah, I would say, to say the least. That movie is amazing. **And like** the meal was the whole point of it because the food that they make encompasses the history of their family and the relationship they have together and what they do with this business and how they exercise their skills. And I feel like it really addresses all the things that you've talked about that make a great movie.	B15	Yeah, I would say, to say the least. That movie is amazing. **Like and** the meal was the whole point of it because the food that they make encompasses the history of their family and the relationship they have together and what they do with this business and how they exercise their skills. And I feel like it really addresses all the things that you've talked about that make a great movie.
A16	We're 30 miles from the nearest supermarket, and the power in our area was that, during a rainstorm or if a squirrel got fried by the electricity, we'd be out for at least two or three days. There were quite a bit of times when I was growing up when my folks would sit around the woodstove, **and like**, they'd read by	B16	We're 30 miles from the nearest supermarket, and the power in our area was that, during a rainstorm or if a squirrel got fried by the electricity, we'd be out for at least two or three days. There were quite a bit of times when I was growing up when my folks would sit around the woodstove, **like and**, they'd read by candlelight of Edgar Allen Poe, because my dad was

	candlelight of Edgar Allen Poe, because my dad was such a fan.		such a fan.
A17	Not only that, but in the op-ed that you mentioned that President Obama wrote on Sunday, which I thought was quite remarkable for a president, you know, to sort of say those things for big moments, **and like**, maybe they thought this was a big moment which they should even be more worried. But one of the things that was missing was what they claimed for a long time, which is they were going to create or save, 3 or 4 million jobs, and now that is no longer around.	B17	Not only that, but in the op-ed that you mentioned that President Obama wrote on Sunday, which I thought was quite remarkable for a president, you know, to sort of say those things for big moments, **like and**, maybe they thought this was a big moment which they should even be more worried. But one of the things that was missing was what they claimed for a long time, which is they were going to create or save, 3 or 4 million jobs, and now that is no longer around.
A18	They like hanging out with me, while I don't know if they'll say they do, but I mean, you just don't get anything better than that on this earth. And we get to share goals **and like** make art together. It just was a great time to be with my family.	B18	They like hanging out with me, while I don't know if they'll say they do, but I mean, you just don't get anything better than that on this earth. And we get to share goals **like and** make art together. It just was a great time to be with my family.

APPENDIX D

Um/Uh Script

Low predictable *uh*	Low predictable *um*
We should discuss the **uh** dust.	We should discuss the **um** dust.
Paul was interested in the **uh** sap.	Paul was interested in the **um** sap.
I should have known about the **uh** gum.	I should have known about the **um** gum.
The woman knew about the **uh** lid.	The woman knew about the **um** lid.
He won't consider the **uh** waffles.	He won't consider the **um** waffles.
They heard I asked about the **uh** bet.	They heard I asked about the **um** bet.
Harry had thought about the **uh** logs.	Harry had thought about the **um** logs.
Miss White must have known about the **uh** pie.	Miss White must have known about the **um** pie.
We were interested in the **uh** stamp.	We were interested in the **um** stamp.
I hope he asked about the **uh** mate.	I hope he asked about the **um** mate.
We hear you called about the **uh** lock.	We hear you called about the **um** lock.
Tom is talking about the **uh** fee.	Tom is talking about the **um** fee.

High predictable *uh*	High predictable *um*
Harry slept on the **uh** folding cot.	Harry slept on the **um** folding cot.
How long can you hold your **uh** breath?	How long can you hold your **um** breath?
The cookies were kept in the **uh** jar.	The cookies were kept in the **um** jar.
We heard the ticking of the **uh** clock.	We heard the ticking of the **um** clock.
He was scared out of his **uh** wits.	He was scared out of his **um** wits.
The super highway has **uh** six lanes.	The super highway has **uh** six lanes.
Ruth poured herself a cup of **uh** tea.	Ruth poured herself a cup of **um** tea.
A bicycle has **uh** two wheels.	A bicycle has **um** two wheels.
It was stuck together with **uh** glue.	It was stuck together with **um** glue.
The guest were welcomed by the **uh** host.	The guest were welcomed by the **um** host.
Break the bread into **uh** crumbs.	Break the bread into **um** crumbs.

APPENDIX E

Fluent Sentences

Give your friend a bunch of brightly colored balloons tied with a big, red bow.
You can wrap up the cookies and serve them at the end of the meal.
For a different sort of tree, hang up colorful rolled up socks instead of ornaments.
If you read the fine print, you'll find that most brands must be defrosted first.
It may seem that there are a number of steps in the processing of cheese.
The inn is an unusual retreat built into the ruins on a long, black beach.
The material should cover the top of the seed for the best growing pattern.
We wanted to get out of there and see if we could find our car.
If the barometer is correct, conditions should be good for the growing number of fishermen.
A good travel brochure explains what to do in a country and when to visit.
It took us about an hour of driving around before we found a parking space.