STUTTERING Foundations and Clinical Applications THIRD EDITION

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PREFACE

We initially wrote this book, and since then have been privileged to twice revise and update it, with the aim of presenting a single main text for courses on stuttering that incorporate general information on the nature of stuttering (e.g., incidence and development), a review of its explanations/theoretical perspectives, and a substantial clinical "how to" guide for evaluating and managing the disorder at different ages. Although a good number of books on stuttering are dedicated primarily to one or two of these subjects, only a few address all three of them in an adequately balanced fashion. We believe that our textbook reflects the type of healthy balance that is important for the practicing speech clinician *par excellence*. Whereas clinicians must be well-versed in the broad perspectives, as well as detailed steps, of therapeutic methods, we have included abundant clinical material. Yet, good clinicians must also understand why they do what they do and be able to communicate with their clients, and/or clients' families, and other professionals as well as understand the rationale for their approaches and, if available, the scientific support for their treatments. Furthermore, clients and their families ask questions and/or confront clinicians with what they believe or have heard about stuttering (e.g., "Is it true that stuttering results from brain damage?": "Is it true that stuttering is psychological?"). Therefore, clinicians need to be sufficiently familiar with general explanations of the disorder and with recent scientific findings to be able to respond professionally. Keeping in mind such clinical responsibility, we devote reasonable space to these topics, highlighting the noteworthy advancements in knowledge about stuttering during the past 7-year period between the previous and present editions. Toward these ends, this edition was prepared with extra input from a good number of experts in the field as well as with the benefit of students' feedback. Instructors who have used past editions of this book for both undergraduate and graduate class levels should find the present edition even more amenable for this accommodation. In this respect, we aimed for a written style that was easier to follow even when dealing with scientific concepts and information. We hope that reading this book enhances your knowledge, as it has ours in writing it.

CHAPTER 1 WHAT IS STUTTERING?

LEARNER OBJECTIVES

Readers of this chapter will be able to

- Discriminate between definitions of stuttering as speech phenomena versus a complex disorder
- Understand concepts and issues related to defining fluency, disfluency, and stuttering
- Evaluate the significance and influence of various stuttering definitions
- Appreciate the meaning of stuttering from different points of view and identify sources of definitional diversity

Defining Stuttering: Bases and Aims

At first glance, stuttering appears to be rather easy to define. This, however, is not the case. In societal use, the term "stuttering" may loosely refer to any moments when the flow of speech is disrupted. If a speaker says, "The um, other day, um um I I walked in the park," a listener might comment it sounded like some stuttering. By contrast, speech-language clinicians and those who experience genuine moments of stuttering may not apply the term stuttering so loosely. The term they will apply more appropriately to all types of speech disruptions, stuttering or otherwise, is disfluency.

Speech-language clinicians usually reserve the term stuttering for observed instances of sensorimotor disruptions in the flow of speech that are distinctly different from the hesitations and minor disfluencies commonly found in people's daily chatter. The sensorimotor disruptions involved in genuine stuttering are associated with the apparent momentary loss of a capacity to control or regulate speech actions for moving forward with subsequent sounds or syllables. Because genuine stuttering is a unique sensorimotor experience, speech-language clinicians will carefully examine the speaker's experience and the associated speech characteristics before deciding whether to apply the term stuttering to specific instances of disfluencies.

So what does stuttering sound like on the surface? As we detail a bit later, speech events regarded as stuttering often take the form of sounds or syllables that are repeated too many times, typically fast, held out too long, or forced out with noticeable tension. Still, genuine stuttering can sometimes surface in a variety of other speech disruptions—even in the form of "ums," like those in the example noted previously. For that reason, although for the most part people can recognize stuttering, it is not always possible to differentiate it from common interruptions when speakers temporarily hesitate with the act of speaking. Furthermore, the eyes and ears of listeners will not always detect the underlying, below the surface, sensorimotor events.

The challenge of identifying genuine stuttering is the reason for this first chapter. How can genuine stuttering be distinguished from other speech disfluencies? Not surprisingly, the closer scholars have looked at stuttering, the further its complexity was recognized. Adding to the issue is that occasionally laypeople too may be confused. We had a case of a child brought to us by parents complaining about his stuttering. Our conclusion, however, was that the child exhibited cleft palate speech with no signs of stuttering. The parents concurred that what they called "stuttering" was the child's unusual articulation and voice quality. In another referral for a stuttering problem, we concluded that a fast, unintelligible articulation was the source of the mistaken labeling and diagnosed the child as exhibiting a phonological disorder. Hence, identification of "stuttering" requires an examination beyond broad levels of discernment.

In this chapter, we discuss the diverse viewpoints about stuttering held by scholars. As clinicians and researchers, we must clarify what is meant by the term stuttering, strive to agree on the scope of that term, and determine when it applies. Before attempting either to define stuttering or evaluate its definition, it is important to clarify what definitions are for. The *New Oxford American Dictionary* (Jewell & Abate, 2001) emphasizes that a definition spells out the **exact** meaning of a word or the nature of something. Rather than relying on dictionaries, however, we review examples of definitions offered by clinician-researchers over the years. The differences among them reveal how difficult it has been to specify an "exact" meaning of "stuttering."

While typing on a tablet or computer, have you ever accidentally made double strikes or held the keystroke too long? Suddenly you see an unintended string of the same character on the display. This slight involuntary mismanagement of force and/or timing of your fingers can turn into a repeated series of a letter. It may be that a similar thing happens with speech gestures. If a spoken syllable is slightly mistimed and/or forced too tensely, the result might be a series of several repeated syllables or a sound that is prolonged.



Although precision might seem the ideal outcome of our search, we hold that a definition should be a statement that expresses the **essential** rather than the exact nature or meaning of a matter, distinguishing it from other similar or related concepts. Thus, the aim of defining stuttering should be to state its fundamental properties and set forth the limits unique to this phenomenon. For professional purposes that usually involve measurement, the most useful definition may not be the one that is most thorough. Instead, it is one that remains free from opinion, explanation, or theory. This point is illustrated by analogy through various definitions of "water." If water is defined as "a tasteless liquid," we encounter the problem that "taste" is a matter of opinion. Or, if water is defined as "a liquid compound of hydrogen and oxygen," the application is limited because most "water" contains many other constituent elements. But if people agreed that "water" is the liquid form of what falls from the sky as precipitation, then the concept is ready for discussion, study, and description, including its numerous and everchanging properties.

Definitions of stuttering have varied for many reasons. Some have differed depending on the areas of expertise, interests, and needs of the definers. Others have been influenced by the many characteristics and dimensions of stuttering, typical age of onset, patterns of development, suspected etiology, and more. Over the years, many have boldly announced an answer, but to our knowledge no statement yet has attained the status of attracting unanimous or even a majority agreement. Still, we believe that the wide range of perspectives by the many who have tried to define it yield valuable information that may eventually help us solve the issue of what should be called "*stuttering*."

A useful definition of stuttering needs to be **free of opinion** or explanation so that it enables researchers to explore its various forms and features and generate, confirm, or refute theories of its causes—all without changing the definition. Unfortunately, many have lacked these desired qualities and therefore have not been sufficiently rigorous in support of research. In this chapter we review several definitions of stuttering and consider their content, application, benefits, and limitations so that students can appreciate and critically evaluate the issues involved.

Before we proceed, a few words concerning terminology. To avoid frequent repetitions of the same term, the following abbreviations and referents for each group will be used interchangeably:

- People who stutter or a person who stutters—PWS—stutterers or stutterer
- Normally fluent speakers—NFS—nonstutterers
- Children who stutter—CWS
- Children who do not stutter—normally fluent children—NFC
- Adults who stutter—AWS

Why Is the Definition Important? Practical Implications

One study found that college students tend to pour beer and liquor in quantities that are larger than commonly used standards for single servings (White et al., 2005). A possible reason for the overpouring is students' lack of knowledge of the definition of standard serving sizes. This may pose unfortunate health risks and other hazardous consequences. From a scientific perspective, however, their weak knowledge about the actual serving size casts doubt on the accuracy of various studies of students' reports about their alcohol consumption. Critically, lacking a clear referent, students underestimate their drinking. This example highlights the potentially powerful influence of definitions. Because definitions provide a reference and orientation to their conceptual topics, our ideas of **what is stuttering** exerts direct impact on several research and clinical issues: (1) the population identified, (2) what is quantified about it, and (3) clinical decisions, such as who receives treatment and how progress is evaluated. These three important functions are elaborated next.

Population Identification

This issue is encountered at the very early stage of research—identifying and counting the subpopulation of people who stutter. The specific definition, or the absence of one, can influence the findings concerning incidence and prevalence (to be discussed in Chapter 2), regardless of the data collection method. Consider, for example, the potential inconsistency in a survey that asks hundreds of schoolteachers around the country to report the number of stuttering children in their schools but that does not provide a definition of a child who stutters. Similarly, in the conduct of just about every study of stuttering, the investigator should follow some operational definition to determine who is qualified to be included as a participant who stutters. In comparative studies, it is also necessary to determine who does not stutter to be qualified as a control subject.

Unfortunately, many past studies failed to adhere to the basic definitional requirement. For example, participants were included because they were "regarded" as PWS without further elaboration of what they had to exhibit to be viewed as "stuttering." When such studies have clinical implications, the use of a vaguely defined population makes it difficult to apply their results.

Quantification and Measurement

The implications of a definition extend beyond the selection of research participants. Definition is important to those who look at changes in the phenomena. Investigators and clinicians interested in the amount or characteristics of stuttered speech under various conditions must define, in advance, what the "stuttering" is—that is, what will be counted and measured. For example, Yairi and Ambrose (1999a) investigated periodic changes in the frequency of stuttered speech events in preschool children. They defined stuttering as consisting of three observable speech elements: (1) repetitions of parts of words, (2) repetitions of single-syllable words, and (3) sound prolongations and blocks. They referred to these as "stuttering-like disfluencies." Their definition was based on a long history of investigations revealing a valid and reliable set of overt speech behaviors typical of children who were judged by their parents and clinicians to exhibit stuttering. By contrast, but also valid, in a study of the effect of therapy on the speech of young children who stutter, Ingham and Riley (1998) narrowed their definition to syllables **perceived as stuttered** by trained examiners. No objective, observable characteristics were specified. Their definition was based on an extensive experiment revealing that well-trained examiners can perceptually identify instances of "stuttering" (no further definition) with high reliability. Both sets of researchers have contributed significantly to the knowledge of stuttering, yet their scientific definitions were very different. Decisions about what stuttering is, and how it will be measured, also affect which research can be consulted during clinical applications.

Clinical Decisions

It should be clear by now that definitions of stuttering have major implications in the clinical arena. Although the matter of diagnosis is separate from its definition, the issue is critical to clinical decisions. It is the basis of whether a person is diagnosed as exhibiting stuttering and is, therefore, recommended for clinical intervention (e.g., therapy and/or counseling), and, alternatively, whether he or she has stopped stuttering and should be discharged. Such decisions are more difficult when the person in question exhibits a mild stutter or presents a borderline case. Consumers of clinical services at all stages and levels need to be confident their concerns are not overlooked because of insufficient definitions and diagnoses of the disorder. Several definitions readers may encounter, such as, "Stuttering is a transient disturbance in communicative, propositional, language usage," are not useful in practical situations. Clients and health-care agencies paying for treatment are entitled to insist on reasonable grounds for identification of the condition for which treatment is requested. Thus, in addition to theoretical, research, and clinical purposes, there are also significant ethical and economic motives to establish a clear, acceptable definition of stuttering.

Student clinicians must appreciate that defining stuttering and undertaking to diagnose it are two different endeavors. A definition aims at delineating the **meaning** of a term; a diagnosis attempts to determine whether the presenting communication pattern constitutes a **clinical problem** or the risk for becoming one. Arriving at a clinical diagnosis often involves analysis of the frequency and/ or intensity of the parameters found in the definition. For example, if the parameter that defined stuttering was the frequency of syllable repetitions, the diagnostician would still have to determine whether the numbers of repetitions raised a need for concern. These may vary with factors of age, time since the disorder's onset, consistency, and so on.

What to Define: Atypical (Abnormal) Speech or Complex Disorder?

When the term stuttering or a derivative (e.g., a stutter) is used, the referent may be to either an atypical (abnormal) speech event(s) or to a complex disorder in which atypical speech is but one component. In the statement, "Last night he was stuttering," the term refers exclusively to the occurrence of the surface (overt) phenomena: interruptions of the flow of speech that are perceived as atypical. By contrast, in the statement, "She has had a stuttering problem for quite some time," it may have broader meaning. Here, stuttering may refer to a person who has **habitually** demonstrated atypical speech or it may refer to other important aspects, such as physiological tensions, emotional reactions, cognition, and social facets that have persisted in addition to the occurrences of the atypical speech. This is illustrated in Sheehan's (1958, p. 123) notion of the **stuttering iceberg**: that what we perceive as stuttering events reveals only a small part of the disorder—that is, the tip of the iceberg.

Accordingly, "stuttering" has been defined by scholars as either of the two concepts stated previously, although not always in a mutually exclusive manner. The stuttering literature, however, reveals far too many discussions that fail to establish what needs to be defined, overlooking the two conceptualizations of stuttering and leaving students of the subject bewildered. Here we contrast two types of definitions of stuttering: (1) **disordered speech** and (2) a **complex disorder**. Taking this orientation, the definitional language referring to stuttering as a speech phenomenon generally describes what a person is **doing** when talking. The second, broader concept of stuttering necessitates an entirely different focus. Here, the definitional language usually contains statements about what a person **is** or **has**.¹ We develop these two concepts of stuttering further in the next sections.

¹Johnson (1958) made comparisons between what a person is doing versus what a person is or has.

Stuttering as Atypical Speech

Stuttering events only occur in the context of attempting to speak. It is different from a hiccup that occurs whether a person is speaking or not. The most meaningful speech, like saying one's name, is more apt to be stuttered than a nonsense phrase made up of words in a mixed-up order (Wingate, 1979). For many, the act of saying an isolated speech sound is far less apt to trigger stutter events than delivering a public address. For others, however, the mere attempt to make the sound of an isolated vowel will trigger stuttering. Stuttering is an **involuntary** disruption of the smooth execution of a speaker's intentional speech act. Because stuttering is so inextricably tied to the act of speaking, it will be beneficial to briefly review normal speech production, as well as the concepts of speech fluency and disfluency, prior to defining stuttering. The characterization of fluency is important as a foundation for understanding the disorders of fluency.

Normally Fluent Speech Production

Normal fluency is recognized by the ease and ongoing flow of speech muscular movements and the resultant speech sounds. Speech produced fluently consists of suitable dimensions of (1) rate, the appropriate timing within and across words; (2) continuity, the smooth connections within and across words; and (3) tension effort, the appropriate regulation of exertion or force (Starkweather, 1987). Hence, various levels of the speech system must function properly and in close coordination.

Students of communication disorders know that speech originates in the speaker's brain with the formulating of an intended message, ordering of words, sounds, and syllables, as well as preparing the rhythm, tempo, and vocal tone. The spoken output depends on coordinated neurological commands from the brain to the peripheral motor and sensory mechanisms that execute the desired speech. At that level, speech is produced with lung air (respiratory system) expelled through the larynx (phonatory system), ultimately channeled through the vocal tract: pharynx, oral, and nasal cavities (articulatory system). Normally fluent speech requires a series of precisely coordinated movements of all three. Sounds produced at the larynx and the vocal tract are filtered and modified still further as they blend (e.g., for coarticulation) into syllables, words, and sentences. They are then further refined by changes in rate, pitch, intonation, and loudness, achieved by combined alterations of the respiratory, phonatory, and articulatory systems as reflected in Figure 1–2. The final speech output becomes acoustically complex in



FIGURE 1–2. Motor physiological processes in speech production.

both the frequency and time dimensions, and as a function of the constantly varying length and cross-sectional area of the vocal tract, as well as the position of the articulators (e.g., the tongue) and durations of their movements. Finally, the speech output is also modulated by the speaker's own monitoring of proprioceptive, tactile, kinesthetic, and auditory feedback loops.

This account, familiar to many of you, is presented to make the point that stuttering, at least at the surface level, should be appraised against the larger normal complex structures and functions that are disrupted. It is the precise, delicate, coordinated, and timed array of movements and resultant normal flow of speech that may be disrupted at just about any or all levels of the speech motor system. It is for clinicians to appreciate that these are what speech therapy attempts to restore. The disruptions frequently appear as the various disfluencies described later or as complete cessations of speech, inability to initiate words, respiratory and phonatory irregularities (e.g., running out of air for speech, pitch raising, glottal fry, etc.), and others. Additionally, there is growing evidence to suspect that disruptions underlying disfluency also occur at higher levels of speech planning and control in the brain, as will be discussed in Chapter 7.

Normal Disfluency or Instances of Stuttering?

The various surface interruptions that occur in ongoing speech have been referred to as "disfluencies." For practical purposes, these events have been categorized using linguistic terminology or other descriptors applied to speech events. Among those, the most commonly referred to categories are word repetition, part-word or syllable repetition, sound repetition, phrase repetition, sound prolongation, blockage,² interjection, and revision. Some of these (e.g., phrase repetition) minimally interrupt speech continuity but they do slow down its progress.³ A critical fact is that disfluencies occur not only in the speech of people who stutter but also in the speech of practically all speakers, especially young children (Johnson, 1961a; Yairi, 1981). It is important, therefore, to recognize from the outset that disfluency and stuttering, although related, are not synonymous. In most people and under most circumstances, disfluencies are not too frequent and are regarded as abnormal or stuttering. Thus, the terms disfluency and disfluencies refer to speech disruptions regardless of whether they happen to be normal or abnormal (stuttered) speech.

Alternate spellings of some terms are found in the stuttering literature. Examples are "disfluencies" versus "dysfluencies" or "disrhythmic phonations" versus "dysrhythmic phonations." Although not all writers use the distinction, the prefix "dis-" may be contrasted with "dys-" on purpose. Wingate (2002) explains that the prefix "dis-" is the Latin for "not"; "dys-" refers to "disorder." Therefore, when encountering "dys-," you should understand that the referent may be more closely tied to the disorder of stuttering. By contrast, the prefix "dis-" commonly refers to all disruptions whether specifically stuttered or not. "Dis-," however, has been used much more frequently.

The distinction between "normal disfluency" and "stuttering," sometimes blurred, stems from two sources, speech production and speech perception. From a production perspective, there are abundant data showing that several disfluency types occur much more frequently in the speech of people who are regarded as exhibiting stuttering (Ambrose & Yairi, 1999; Johnson & Associates, 1959). Syllable repetition is a prime example. It is found in the speech of all speakers but its level is 10 times higher

²The categories of sound prolongations and blocks are frequently merged in a single category, disrhythmic phonations. ³Disfluencies are described and discussed in more detail in Chapter 4.

in the speech of children who stutter (CWS) than in the speech of normally fluent children (NFC). Single-syllable word repetition is 5 times higher. In many cases, disfluencies produced by people who stutter not only are more frequent but differ in other properties from those of the same type produced by normally fluent people. When a PWS repeats a syllable such as "an-an-and" or a single-syllable word such as "but-but," the speed of the repetitions is **3 times faster** than repetitions produced by NFS (Throneburg & Yairi, 1994, 2001), the number of repetitions per instance is greater (Ambrose & Yairi, 1995), and their distribution (clustering) within speech is different (Hubbard & Yairi, 1988; Sawyer & Yairi, 2010). From a perceptual perspective, the very same disfluency types also tend to be judged as "stuttering" by listeners (Young, 1984). Of course, the frequency of occurrence is very influential. One or two syllable repetitions per 100 words of running speech may be perceived as normal, but five syllable repetitions in the same amount of speech are likely to be perceived as stuttering (Sander, 1963). Still, listeners vary in how they perceive the same disfluencies as "normal" or "stuttering."

Although a good number of disfluency types may also occur in speech of normally fluent speakers, those that are most typical to stuttering have been dubbed as "core behaviors" (Van Riper, 1971). Yairi and Ambrose (1992a) refer to them as stuttering-like disfluencies, or SLD ("stuttering-like" acknowledges that they are not exclusive to stuttering), and other disfluencies (OD), which are regarded as less stuttering-like and more typical to normally fluent speakers. These are listed in Table 1–1.

From the speaker's perspective, the reason(s) underlying the behavior are also important. A normal speech disruption, common to NFS, is usually associated with reasons such as word finding, a sentence-formulation decision, a reconsideration of message content, a distracting event nearby, and so on. When the speaker recognizes the reason for the speech disruption, he or she is apt to acknowledge it as a "normal disfluency." The experience of these types of normal disfluency events is shared by PWS as well. By contrast, when words to be said are fully decided and the person intends to say them but the production becomes "stuck," the experience by the speaker is apt to fit the label of stuttering. Thus, speech disruptions occur for various reasons and not all of them are stuttering. By now it should be clear that the term that is "opposite" of fluency is disfluency, not stuttering. Stutter events represent just one possible source of disfluency, but are not the only breaks in the flow of speech. There are, in fact, other fluency disorders and other reasons besides stuttering that may account for various disruptions in speech fluency.

Perceptible differences may distinguish many moments of stuttering from normal disfluency, but some listeners may find it difficult to determine if a disfluency they have heard is normal or stuttered. Listeners seem to operate with different perceptual thresholds in regard to "how much is too much?" That is, how much disruption does it take to evoke a person's judgment that a speech is stuttered rather

TABLE 1–1. Types of Disfluency		
	STUTTERING-LIKE DISFLUENCIES	EXAMPLES
	Part-Word Repetition	Bu-bu-but
	Single-Syllable Word Repetition	And-and-and
	Disrhythmic Phonation	Mo—mmy
	OTHER DISFLUENCIES	EXAMPLES
	Phrase Repetition	I like to—I like to
	Multiple-Syllable Word Repetition	Summer -summer -summertime
	Revision	It was, I mean
	Interjection	Uhm, well, er

CHAPTER 1 WHAT IS STUTTERING?

than normally disfluent (Martin & Haroldson, 1981)? Factors potentially affecting listener judgment include the type, duration, and intensity of the disfluencies, as well as the context, past experience, and characteristics (e.g., gender) of the listener (Kawai et al., 2007). For example, a person who has relatives who stutter may be more sensitive to disfluencies and exhibit a lower threshold.

Speech-Oriented "Definitions"

The preceding discussion revealed a precedent for categorizing overt instances of speech disruption into primary (or "core") disfluency types commonly evident as signs of stuttering and secondary (or "other") disfluency types, typically regarded as normal. This two-class structure has been confirmed with empirical research (Lewis, 1991) and, not surprisingly, a number of scientists have offered definitions of stuttering from the standpoint of criteria based on behavioral observations.

Examples of Stuttering Denoting Speech Events

As early as 1931, Travis defined stuttering as "a disturbance in the rhythm of speech; an intermittent blocking; a convulsive repetition of a sound" (p. 33). This rather descriptive definition, proposed at the beginning of the modern era of speech pathology, appears to have influenced Travis's students to coin the term *moment of stuttering*. Among those students, Wendell Johnson was probably most responsible for the widespread adoption of the concept (Johnson, 1955b, p. 13). This terminology suggests that immediately before and immediately after the perceived stuttering, speech was normal—a questionable assumption. In our opinion, the term stuttering event is preferable because it reflects the concept of activity rather than time.

Wingate offered one of the most well-known definitions of stuttering as speech events. At first, he provided a lengthy three-part definition in which the first part focused on core speech features:

The term stuttering means (a) disruption in the fluency of verbal expression, which is (b) characterized by involuntary, audible or silent, repetitions or prolongations in the utterance of short speech elements, namely, sounds, syllables and words of one syllable. These disruptions (c) usually occur frequently or are marked in character and (d) are not readily controllable. (Wingate, 1964, p. 488)

Clearly, this definition would be rather impossible to employ in a research study, although perhaps in clinical situations. Later, however, he argued that the essence of stuttering consisted of "silent or audible elemental repetitions and prolongations" (Wingate, 1988, p. 9). Although present also in the speech of normally fluent people, they are infrequently uttered, especially by adults, and also shorter in length. It is the frequent occurrence and the length of these events in a person's speech that conveys the impression of stuttering. Hence, "a-ai" may be perceived as normal but the longer "a-a-a-a-ai" is more likely to be perceived as stuttering. Wingate's latter definition was helpfully succinct although still insufficiently definitive as to what is meant by "elemental" (sounds? syllables? monosyllabic words?) and lacking any indication of quality and/or frequency.

More recently, Guitar (2014) proposed that stuttering consists of

an abnormally high frequency and/or duration of stoppages in the forward flow of speech. These stoppages usually take the form of (a) repetitions of sounds, syllables or one-syllable words, (b) prolongations of sounds, or (c) "blockages" or "blocks" of airflow or voicing in speech. (p. 7)

These statements offer additional characteristics not mentioned in Wingate's definition.

The American Speech-Language-Hearing Association (ASHA) addressed the definition of stuttering as phenomena in a technical paper prepared for its Special Interest Division 4, Fluency and Fluency Disorders (1999). They stated that "stuttering refers to speech events that contain monosyllabic whole-word repetitions, part-word repetitions, audible sound prolongations, or silent fixations or blockages.

These may or may not be accompanied by accessory (secondary) behaviors (used to escape and/or avoid these speech events)" (pp. 4–5). Notice that this definition also extends beyond pure speech characteristics to include secondary physical characteristics when applicable.

Yairi and Ambrose (2005) considered the fact that normally fluent speakers also produce, at times, some disfluent speech. Therefore, they defined stuttering based on the statistical probability that certain speech patterns will be either produced by people who stutter or will be so perceived by listeners. In their words:

we consider those speech characteristics that young children who stutter tend to produce, and those that are likely to be judged by listeners as stuttering. Thus, children considered to stutter are inclined to exhibit interruptions in the flow of speech in the form of repetition of parts of words (e.g., sounds and syllables) and monosyllabic words, as well as by disrhythmic phonations—prolongations of sounds and arrests of speech (blocks). We have referred to these overt speech phenomena as Stuttering-Like Disfluency (SLD). These are the most common disfluencies produced by children who stutter, as well as the speech events most likely to be perceived as stuttering.(p. 20)

Although their research provided quantification of the previously described, it is not included in the definition.

Interestingly, a few scholars, such as Howell (2009) and Jiang et al. (2012), have raised reservations about the inclusion of monosyllabic words as stuttering. We disagree with them. For an expanded discussion of our view, see Yairi (2013). Our own attempt at definition, which also treats stuttering primarily as atypical speech events, will be provided later in this chapter.

It is not possible for listeners to recognize every instance of stutter events based on surface characteristics. For example, saying "t-t-to" while starting to speak may represent simple hesitation (thus, normal disfluency rather than the feeling of being "blocked") even in the speech of a person who stutters and therefore may not be a stutter event. On the flip side, audible "uh uh uh" may occur but for different reasons. If associated with a moment of gathering thoughts, then it is not a sign of a stutter event. If, however, it is associated with a moment when the speech system is blocked from moving forward into the intended word, then it may be a sign of a stutter event.

Fluent Speech of People Who Stutter

A substantial percentage, usually most, of the spoken message expressed by PWS is fluent. On average, only 10% of words in oral reading were found to be stuttered by adults (Bloodstein, 1944). Similarly, a mean of 12% stuttered words was found in conversation/storytelling for children ages 5 through 12 (Riley & Riley, 1980). An inevitable question is whether the fluent speech of PWS is also abnormal in other speech parameters. If yes, should this be considered in the definition? Indeed, there has been growing evidence that the fluent portions of the speech of PWS differs from the fluency of NFS. For example, when all disfluent segments were removed from tape-recorded speech samples, listeners could still correctly identify the speech of PWS from matched samples of NFS (Wendahl & Cole, 1961). Research of the acoustic and physiologic properties of the fluent speech of PWS has reported more convincing support. Vowel duration (Zimmermann, 1980b), second formant transitions (Robb & Blomgren, 1997), and vocal fold vibrations (Hall & Yairi, 1992) produced by PWS in their fluent speech are different from those produced by normal speakers. These findings have been used in support of arguments against limiting stuttering definitions to disfluent speech characteristics. So far, however, the characteristics of fluent speech of PWS have **not** been incorporated into definitions of stuttering.