

GLOBAL
EDITION



Stuttering

Foundations and Clinical Applications

SECOND EDITION



Ehud Yairi • Carol H. Seery

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SECOND EDITION

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Ehud Yairi

University of Illinois at Urbana-Champaign; Tel Aviv University

Carol H. Seery

University of Wisconsin–Milwaukee

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*To my wife, Janie,
To our children, Micah, Dani, Keren, and to their families.*

—E. Yairi

*To my husband, Tom, and son, David.
To the memories of my father, David F. Hubbard, and my mother,
Frances L. Hubbard.*

—C. Seery



Preface

We wrote *Stuttering: Foundations and Clinical Applications* to serve both instructors and students in speech-language disorders and related fields as a single main text for a general course on stuttering. It is composed of three parts: the nature of stuttering, the explanations of stuttering, and the clinical management of stuttering. Many textbooks on stuttering are dedicated primarily to one or two of these subjects, but few address all three of them equally. We have undertaken to provide a balanced presentation across all three areas.

In addition, we offer a balanced perspective with regard to stuttering etiology, assessment, and treatment methods. We provide a comprehensive coverage of the options from the various viewpoints and relate them to specific age groups.

Finally, we sought a balance in using a written style that is easy to read yet deals with concepts and scientific material with appreciable depth. Whenever appropriate, we have shared examples from our own scholarly, clinical, and personal experiences to enrich the understanding of our readers.

We hope that reading this book enhances your knowledge, as it has ours in writing it.

New to This Edition

The entire text of the second edition of *Stuttering: Foundations and Clinical Applications* has been enhanced with editorial revisions for ease in readability.

Additionally, the new text highlights sections with the latest scientific knowledge of stuttering regarding:

- Incidence and prevalence
- Onset
- Natural recovery
- Genetics

Sections that have been completely revised include:

- Brain anatomy and physiology
- Motor aspects
- Cluttering

Other features modified for improved presentation:

- New case studies
- New tables and figures
- New outline format of treatment procedures
- Revised chapter order in the clinical management section

Instructional Materials

- New/modified slides and exam questions available to instructors

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Contributor

Gagan Bajaj

Department of Audiology and Speech Language Pathology, Manipal University

Reviewers

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Rosemarie Hayhow, Bristol Speech & Language Therapy Research Unit



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Chapter 1

What Is Stuttering?

LEARNER OBJECTIVES

Readers of this chapter will be able to:

- Discriminate definitions of stuttering as speech phenomena or as a complex disorder.
- Analyze concepts and issues related to defining stuttering.
- Evaluate the significance and influence of various stuttering definitions.
- Examine the context of stuttering identification with respect to normal speech and normal disfluency.
- Analyze 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 a phenomenon that would be rather easy to define. When most people think of stuttering, they typically recall speech that everyone would recognize, like the repetitive “I I I I um I um la-la-la-like um.” Hence the common notion is that “everyone knows what stuttering is.” Such, however, is not the case for scholars in the field. For them, the definition of stuttering is far from straightforward. The closer they have looked at stuttering, the more it has grown in complexity. But laypeople too may be confused. We had a case of a child brought to us by parents complaining about his stuttering. We concluded that the child exhibited cleft palate speech with no sign 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 speaking rate and mumbled articulation was the source of confusion, and diagnosed the child with a phonological disorder. Typically, however, identification of ‘stuttering’ needs a closer examination beyond these broad levels of discernment.

In this chapter, we discuss the diversity of the viewpoints about stuttering held by scholars. As professionals and researchers, we must clarify what we mean 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 understand 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 will offer examples of definitions that have been given by clinician-researchers over the years. The differences among the definitions will reveal how difficult it has been to specify an “exact” meaning of “stuttering.”

Sometimes people use the term *stuttering* referring to the overt (surface) features: the speech events. But are those the only essence of stuttering? Another use of *stuttering* is referring to the covert (or hidden) features, particularly the speaker's experience of a loss of control and a host of negative emotional reactions. But must there be an underlying sense of helplessness every time a person stutters? Because stuttering encompasses both overt and covert features, there have been definitions intended to capture both aspects.

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. It is tempting to believe that a thorough definition of stuttering is the goal. But for professional purposes that usually involve measurement, the most useful definition may not be the one that is most thorough. Instead, the most useful definition of stuttering 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 ever-changing properties.

We must point out that a definition is not the same as a set of diagnostic criteria. Trying to define stuttering and undertaking to diagnose it are two different endeavors. Whereas a definition attempts to delineate the meaning of a term, the function of a diagnosis is to determine whether the presenting communication pattern constitutes a clinical problem or a risk for becoming one. Arriving at a clinical diagnosis often involves analysis of the frequency or intensity levels of the parameters found in the definition. For example, if the parameter that defined stuttering was syllable repetitions, the diagnostician would still have to determine whether the number of repetitions raised a need for concern. Specifications, such as the number of repetitions that cause concern, may vary with factors of age, time since onset, consistency, and so on. Researchers strive to study, identify, and enumerate these parameters with ever-increasing details.

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 of the definitions of stuttering 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 of stuttering can appreciate and critically evaluate the issues involved.

Before we proceed, we offer 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—PWS—stutterers
- Normally fluent speakers—NFS—nonstutterers
- Children who stutter—CWS
- Children who do not stutter—normally fluent children—NFC

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). One 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, definitions of “what is stuttering” exert direct impact on theory, research, and clinical application. One method of specifying a phenomenon is to collect samples of cases people can agree on, and then determine features that the cases share in common. But if there has not been any clarity about which cases belong in the sample, then conclusions are apt to be misleading. Definitions impact (1) the population identified, (2) what is quantified about it, and (3) who receives treatment and how progress is evaluated. These three important functions of a definition are elaborated next.

Population Identification

This issue is encountered at the very early stage of stuttering 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 stutterers 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 potential clients and 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 the target measured. For example, Yairi and Ambrose (1999a) investigated 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 no less valid, in a study of the effect of therapy on the speech of young children who stutter, J. Ingham and G. Riley (1998) defined stuttering in terms of what the experimenters *perceived* as stuttered syllables. 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 valid and reliable judgments. 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, affect which research can be consulted during clinical applications.

Evaluation of Clinical Progress

It should be clearer by now that definitions of stuttering have major implications in the clinical arena. Although the matter of diagnosis is separate from the issue of definition, critical decisions of whether a person is diagnosed as exhibiting stuttering and recommended for therapy on the one hand, and, on the other hand, whether he or she has stopped stuttering and should be discharged, hinge on its formal definition as well as evaluative criteria. 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 is also a significant economic motive to establish a clear, acceptable definition of stuttering.

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 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 a disorder involving other important aspects, such as physiology, emotion, cognition, and social facets that have persisted, in addition to the occurrences of the atypical speech events. 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 above, 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. Thus we contrast two types of definitions of stuttering: (1) disordered speech phenomena 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.

Stuttering as Atypical Speech

The event of stuttering only occurs 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

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

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 examine normal speech production and the concepts of speech fluency and disfluency, prior to defining stuttering.

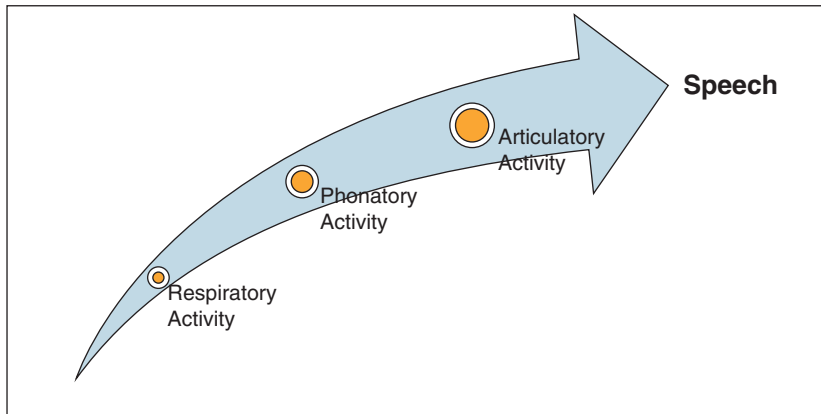
Normally Fluent Speech Production

Normal fluency is recognized by the ease and ongoing flow of speech muscular movement 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.

Levels and Systems

Speech originates in the speaker's brain and involves complex processes, including formulation of an intended message, selection and ordering of words, sounds and syllables, and preparation of utterance rhythm, tempo, and vocal tone. The final spoken output depends on transmission of coordinated neurological commands from the brain to the peripheral motor and sensory mechanisms that regulate the desired speech signals and movements. The gross anatomical components of the peripheral speech system are the lungs, trachea, larynx, pharyngeal cavity, oral cavity, and nasal cavity. The pharyngeal and oral cavities are usually referred to as the *vocal tract*, beginning at the larynx and terminating at the lips. The nasal cavity begins at the velum (soft palate) and ends at the nostrils.

At the motor physiological level, normally fluent speech requires a series of precisely coordinated movements of respiratory, phonatory, and articulatory muscles. Prior to speaking, an optimal air volume within a certain range enters the lungs via inhalation. The air is then expelled into the larynx and the vocal tract. As air rushes from the lungs through the trachea, the vocal cords within the larynx approximate (i.e., are positioned near midline) and are set into gentle vibration, interrupting the airflow with quasi-periodic pulses that result in the sound that we call "voice." In the next stage, the relatively simple acoustic properties of the sound are modulated and filtered as they pass through the vocal tract, being shaped by the movement and positioning of the articulators, especially the tongue, lips, and jaw, creating recognized speech sounds, such as vowels. When the velum is lowered, the nasal cavities are acoustically coupled to the vocal tract to produce the nasal sounds of speech. Other sounds are generated by varying the shape and size at various locations in the vocal tract. For example, some consonants (i.e., fricatives) are formed by generating turbulent noise as the air is forced through various narrow constrictions shaped in the oral cavity, whereas others, such as plosives (or stops), are formed by quick releases of air pressure built up behind obstructions, such as closed lips. Sounds are filtered and modified still further as they blend

Figure 1.1 Motor Physiological Processes in Speech Production

(e.g., for coarticulation) into syllables, words, and sentences. They are then further refined by changes in rate, pitch, intonation, and loudness, which combine alterations of the respiratory, phonatory, and articulatory systems as reflected in Figure 1.1. Thus speech output becomes acoustically complex in 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 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, which is probably 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: respiration, phonation, and articulation. *It is for clinicians to appreciate that these are what speech therapy attempts to restore.* The disruptions frequently appear as 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 the most commonly referred to disfluency 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 normal. But, when produced differently or under some circumstances, disfluent speech is 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” vs. “dysfluencies,” or “disrhythmic phonations” vs. “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.

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 in the speech of children who stutter (CWS) than in the speech of normally fluent children (NFC). Single-syllable word repetition is five 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-but,” the speed of the repetitions is three 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.”

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.

Concerning disfluency types, all conventionally recognized and defined disfluencies found in people who stutter also occur in the speech of normally fluent children. But disfluency types that are most typical to stuttering have been dubbed as “core behaviors” (Van Riper, 1971). Yairi and Ambrose (1992a) refer to these types 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.

Table 1.1 Types of Disfluency

STUTTERING-LIKE DISFLUENCY	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 . . .
Revision	It was, I mean . . .
Interjection	Uhm, well, er

From the speaker’s perspective, the reason(s) underlying the behavior are also important. A normal speech disruption, common to those who do not stutter, is usually associated with reasons that the speaker recognizes, 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 normal disfluency for reasons such as these is shared by the nonstutterer and stutterer alike. By contrast, when the word(s) to be said is fully decided and the speaker is intent to engage in speaking, but the production becomes “stuck” for what seems to be no apparent reason, it is then that the experience by the speaker is apt to fit the label of stuttering.

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 repetition is “stuttering” rather than “normal disfluency” (Martin & Haroldson, 1981). Factors potentially affecting listener judgment include the type, duration, and intensity of the disfluency, as well as the context, past experience, and characteristics (e.g., gender) of the listener (Kawai, Healey, & Carrell, 2007). For example, a person who has relatives who stutter may be more sensitive to disfluencies and exhibit a lower threshold.

Defining Stuttering as Speech Events

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, are evident when a speaker hesitates or reformulates for reasons that may or may not relate to stuttering. 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 Definitions of Stuttered Speech

As early as 1931, Travis defined stuttering objectively as “a disturbance in the rhythm of speech; an intermittent blocking; a convulsive repetition of a sound.” This 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 them, Wendell Johnson was probably most responsible for the widespread adoption of the concept (Johnson, 1955a, 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). 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. 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-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,” that is, sounds, syllables, and monosyllabic words creating some disagreement.

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) has addressed the definition of stuttering as phenomena in a technical paper prepared for its Special Interest Division 4, Fluency and Fluency Disorders (1999). They discuss the issue of definition at greater length, but state 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 (i.e., behaviors used to escape and/or avoid these speech events)” (pp. 4-5). This definition also extends beyond pure speech characteristics to include secondary physical characteristics when applicable.

Yairi and Ambrose (2005, p. 20) 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.

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.

Fluent Speech of People Who Stutter

A substantial percentage, usually most, of the spoken message expressed by people who stutter is fluent. This fact is well-established. On average, only 10% of words in oral reading were found to be stuttered by adults (Bloodstein, 1944). Similarly, a mean of 11.84% stuttered words was found in conversation/storytelling or conversation/reading contexts for children ages 5 through 12 (G. Riley & J. Riley, 1980). An inevitable question is whether a stutterer’s fluent speech is also abnormal in other speech parameters. If yes, should this be considered in the definition? For several decades 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 stutterers from matched samples of nonstutterers (Wendahl & Cole, 1961). Research of the acoustic and physiologic properties of the fluent speech of stutterers has reported

more convincing support. Vowel duration measures (Zimmermann, 1980a), second formant transitions (Robb & Blomgren, 1997), and vocal fold vibrations (Hall & Yairi, 1992) produced by stutterers 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.

Overall, in spite of difficulties arising from a certain amount of overlap between normal disfluency and stuttering, speech-oriented definitions appear to be in reasonably close agreement on the essential elements (disfluency features) that should be included. Experimenters and clinicians are in a position of being able to apply some principles in formulating working definitions for their specific studies or clinical needs. Still, reflecting the incomplete state of knowledge, there are inconsistent applications, and definitions have failed to refer to fluent speech characteristics of PWS. Focusing on speech, they disregard other important aspects of stuttering and therefore may not cover certain cases, such as people with covert stuttering.

Regarding the role of speech-based definition, it was noted that “whatever else the clinical disorder of stuttering entails, there seems to be relatively little disagreement that the term ‘stuttering’ refers to the domain of motor speech production and its disruption by speech disfluencies. Physical, physiological, cognitive, and emotional components, regardless of how frequent or intense they might be, would not be labeled as ‘stuttering’ if they did not accompany a speaker’s disfluent speech” (Yairi & Ambrose, 2005, p. 19).

Stuttering as a Complex Disorder

Multidimensional Characteristics of the Stuttering Disorder

The backdrop for defining stuttering as a complex disorder is its multidimensionality. It involves much more than the overt dimensions of disfluent speech. The multifaceted nature is apparent from the very first contact of a speech-language clinician with an adult who stutters who exhibits lip tremor during stuttering and reports strong anxiety prior to and during talking. For this particular client, the fear associated with stuttered speech is as much, if not more, of a problem than the speech aspects. Also children who stutter may exhibit physical body tension and secondary movements during stuttered speech, as well as avoidance behavior and social withdrawal. The reactions of parents must also be addressed. The clinician realizes that all these have to be described, and if possible quantified.

Six major dimensions of the complex stuttering disorder are distinguished:

1. **Overt speech characteristics:** Interruptions of the normal flow of speech that occur at the respiratory, phonatory, and articulatory levels but are evident