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
Preface

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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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 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.”
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
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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

\(^1\)Johnson (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...
(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.

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.”

\(^2\)The categories of sound prolongations and blocks are frequently merged in a single category, disrhythmic phonations.

\(^3\)Disfluencies 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

<table>
<thead>
<tr>
<th>STUTTERING-LIKE DISFLUENCY</th>
<th>EXAMPLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part-Word Repetition</td>
<td>Bu-bu-but</td>
</tr>
<tr>
<td>Single-Syllable Word Repetition</td>
<td>And-and-and</td>
</tr>
<tr>
<td>Dishrhythmic Phonation</td>
<td>Mo—my</td>
</tr>
<tr>
<td>OTHER DISFLUENCIES</td>
<td>EXAMPLES</td>
</tr>
<tr>
<td>Phrase Repetition</td>
<td>I like to—I like to . . .</td>
</tr>
<tr>
<td>Revision</td>
<td>It was, I mean . . .</td>
</tr>
<tr>
<td>Interjection</td>
<td>Uhm, well, er</td>
</tr>
</tbody>
</table>

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.
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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...
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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
acoustically as repetitions of speech segments, prolongations, and/or cessation of sound, and so on.

2. **Physical concomitants:** Tense body movements, especially in the head and neck, but also in other parts of the body, often manifest in association with the overt speech events. These are known as “secondary characteristics.” They are not necessary for stuttering to occur or be diagnosed, but may appear as the person struggles through a stuttering event.

3. **Physiological activity:** Stuttered speech is associated with changes in blood flow, skin reactions, pupil responses, brainwave activities, and other physiological changes. Many of these cannot be observed with the naked eye but have been well documented by means of sophisticated technology.

4. **Affective features:** Strong emotional reactions about talking, especially fears of speaking in many situations, are quite common. When these emotions become intense, leading to avoidance of speaking, the emotional dimension of the disorder could overshadow that of the atypical speech. Even children, particularly those with sensitive temperaments and slow adaptation to change, may react to their speech difficulties with fear of speaking, avoidance of speaking, sadness, and/or frustration.

5. **Cognitive processes:** Clinicians familiar with stuttering are likely to have heard parents, teachers, relatives, or other listeners comment that the person who stutters is “thinking faster than he can talk.” A parent may comment, “He has so much to say and he just can’t get it all out at once.” These assumptions could be valid. The cognitive underpinnings of the selection, planning, preparation, and execution of speech may, in effect, present “overload” for the person who stutters, yielding stuttered speech. Second, the speaker’s response to the experience of speech disruptions is influenced by his or her concepts about the nature of the disorder and the language used to characterize it. For example, a person may relate his or her perception of stuttering as “words getting stuck” in the throat, likening words to objects when actually, muscular activity and movement is interrupted.

6. **Social dynamics.** The function of speech is to communicate with others—listeners. Most speakers watch for the signs that their listeners hear, think, and respond to what was said to them. When stutter events are carried along with the message, both the speaker and the listener may change their communicative actions midstream. The speaker’s communicative influence can be spoiled if listeners pay more attention to the stuttering than the message, or worse, if listeners make derisive or judgmental evaluations. These dynamics lead speakers who stutter to become more watchful of listeners, inspired by the fear of stuttering itself and the strong need to avert the undesired social impact of disrupted communication. In turn, the disorder of stuttering can have devastating effects on social interactions such as class participation, initiating conversations, answering the telephone, dating, adjustments to new environments, and making career choices.
Additionally, in complex ways, stuttering is also interwoven with the language and phonological development of some children. These aspects can have particularly important implications for clinical intervention during early childhood. Finally, all of the above are impacted by genetic factors, a topic we expand on in later chapters.

**Diversity of Disorder-Oriented Definitions**

Reviewing the plethora of definitions of the complex stuttering disorder, and the diversity encountered, one may raise the legitimate question of whether the experts who offered them were addressing the same condition. It also becomes evident that not all definitions have adhered to the expected purpose of clarifying the meaning, scope, and application of a term. Some digress to explain stuttering or merely offer a point of view regarding its etiology; others constitute descriptions of a few selected features. Even those that provide descriptions have not offered a characterization that sufficiently distinguishes the disorder of stuttering from other speech problems (e.g., apraxic speech, aphasic speech, cluttering, etc.). Before we proceed with examples of these definitions, we should understand the potential sources of the diversity among them.

Within the *complex disorder* conceptual framework, a further division of the definitions must be noted: Some are confined to a single domain, (e.g., neurologic factors), whereas others encompass interactions among multiple domains (e.g., motoric and psychologic). Until the 1940s, many professionals who expressed active interest in stuttering were psychiatrists, physicians representing other specialties, psychologists, and more. Understandably, these professionals operated from different knowledge bases, informational sources, general perspectives, entrenched conventions, and strong biases. Although they looked at many of the same facts, they arrived at different definitions that reflected their diverse backgrounds. They also were inclined to examine only one piece, or a few, of the stuttering puzzle, those that were more in tune with their particular area of expertise, eager for a clear-cut definition that also promoted their theoretical orientation. Having pointed this out, it is only fair to acknowledge that varying experiences and circumstances do indeed provide different types and amounts of information about any particular problem. For example, scholars and clinicians who work primarily with young children who stutter are likely to have a different perspective and understanding of the disorder than those who work exclusively with adults. If, however, people with different areas of knowledge and expertise work together to solve the multidimensional puzzle of stuttering, understanding of the disorder will continue to grow.

**Examples of Definitions of Stuttering as a Complex Disorder**

Different frames of reference, reflecting various theoretical positions that have influenced definitions of the stuttering disorder are organized here into six subcategories. Examples of organic, psychopathogenic, psychosocial, learning-based orientations, listener-based, and speaker-based perspectives (i.e., from the standpoint of the person who stutters) are presented next.
Chapter 1 / What Is Stuttering

**Organic Orientations**

During much of the first half of the 20th century, the view that stuttering is organically based was popular as seen in West, Nelson, and Berry’s (1939) reflection that stuttering, like left-handedness, twinning, or other atypical subpopulation characteristics, rests on some common heritable factor of structure or biochemistry. Years later, West (1958) was more specific in stating that stuttering is “primarily an epileptic disorder that manifests itself in dyssynergies of the neuromotor mechanism for oral language” (p. 197). In our view, this provides a good example of an attempted definition that, instead, ought to be classified as an explanation. In relation to the previous discussion, note that it does not treat stuttering as a surface phenomenon but as a disorder. Further, as such, it is focused on a single etiological variable, a faulty neurological system. It does not define stuttering as a complex disorder.

Also representing the organic orientation is Van Riper’s (1971) definition that highlights the timing of muscle movement. He proposed that “stuttering is a disorder of timing . . . when a person stutters on a word, there is a temporal disruption of the simultaneous and successive programming of muscular movement required to produce one of the word’s integrated sounds, or to emit one of its syllables appropriately” (p. 415). This definition treats stuttering as a disorder and focuses on a single variable. In the same source, however, Van Riper stated that “stuttering occurs when a forward flow of speech is interrupted by a motorically disrupted sound, syllable, or word or the speaker’s reactions thereto” (p. 15). This definition has the advantage that it acknowledges the reality that stutter events can take many different behavioral forms (i.e., prolonged sounds, repetitions, etc.). Note, however, that it also encompasses the inner experience of a person who stutters. By combining these two elements of surface and covert features, it treats stuttering as a truly complex disorder.

**Listener-Based Orientations**

Most stuttering definitions are based on the listener’s perspective. For that reason, many definitions focus on visible characteristics and take the form of this one found in *Churchill’s Illustrated Medical Dictionary*: “A speech disorder affecting the fluency of production, often characterized by repetitions of certain sounds, syllables, words, or phrases, and by the prolongation of sounds and blocking of the articulation of words. Severer forms may be associated with facial grimacing, limb and postural gestures, involuntary grunts, or impaired control of airflow. The severity of symptoms may vary with the speaker’s situation and audience.” Reflecting its medical orientation, the dictionary goes on to state, “It is unusual to find evidence of neurological dysfunction in the confirmed adolescent or adult stutterer” (Koenisberger, 1989, pp. 1802–1803).

**Psychopathogenic Orientations**

Viewing stuttering as a psychopathological disorder was similarly popular during the first half of the 20th century. Although this theoretical orientation has lost much ground, a brief review illuminates the diversity of opinions. Coriat (1943a, p. 28) conceived
stuttering to be “a psychoneurosis caused by the persistence into later life of early pregenital oral nursing, oral sadistic, and anal sadistic components.” A quarter century later, Glauber (1958, p. 78) suggested that “stuttering is a neurotic disorder in which personality disturbance is in part reflected in speech. . . . Stuttering is a symptom of a psychopathological condition classified as pregenital conversion neurosis.” Similarly, Murphy and Fitzsimons (1960, p. 17) stated, “First, stuttering behavior is primarily a psychogenically motivated symptom which manifests itself most discernibly in oral function.” Again, all three definitions are primarily explanations, viewing stuttering as an underlying psychological disorder but limited in scope to a single essential factor.

**Psychosocial Orientations**

Another take on stuttering is seen in the attempts to define it as a psychosocial problem. As Fletcher (1928, p. 226) conceived it, stuttering is “a morbidity of social consciousness, a hyper-sensitivity of social attitude, a pathological social response.” The main factors that operate here are fear, anxiety, inferiority feelings, and so on, in terms of social relationships, all of which have their genesis in specific experiences. The fears and anxiety are not general but in the anticipation of the necessity to speak under certain defined conditions that set off the pathological reactions. Another perspective of stuttering within the context of social interaction was offered by Eisenson (1958, p. 244), who proposed that “stuttering is a transient disturbance in communicative propositional language usage.” This concept of stuttering emphasizes its social impact as a breakdown in conveying meaning when communicating with others. Again, the above are not definitions but descriptions and explanations.

**Learning Orientations**

In the 1950s, when psychological learning theories were popular, Johnson (1955a, pp. 23–24) offered his famous definition that the essence of stuttering was “an anticipatory apprehensive hypertonic avoidance reaction.” Although the definition lacks specific reference to speech, Johnson’s writings clearly point out speech as the cause of the anticipation. Accordingly, stuttering occurs when (based on past experience) a speaker anticipates stuttering and reacts by setting off an acquired (learned) array of cognitive, emotional, and tense physical responses that end up as struggled, stuttered speech. This experience is similar to the act of tight-roping walking. There is a circular, slightly troublesome, nature to this definition in that it necessitates another definition to characterize the stuttering events that prompted the initial reaction.

In this group of learning-oriented definitions we also cite Brutten and Shoemaker (1967, p. 61), who defined stuttering as “a form of fluency failure that results from conditioned negative emotions.” This definition, as the previous one, would hardly aid anyone attempting to identify stuttering. It is merely a statement concerning the authors’ belief about its cause: certain acquired (learned) emotions that trigger fluency failure.

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4Pregenital refers to the organization of the child’s sexual development during the early infantile period, before the genital zone became its focus.
The Speaker’s Perspective

Stemming from a difference in basic conceptualization, another factor has impacted the diversity of stuttering definitions. Whereas most definitions assume a listener-observer’s frame of reference, a few are based on the speaker’s, that is, the person who stutters, point of view (e.g., Perkins, 1990a). Related to this matter, there are people who stutter severely yet never miss an opportunity to speak, and people who stutter very mildly but hesitate to speak at all, revealing a wide contrast in the speaker’s perceptions of their stuttering problem. One can argue, therefore, that the personal point of view has implications for describing, diagnosing, and treating stuttering, and hence, also in defining it. This point of view was the subject of exchange between Brocklehurst (2013) as a proponent and Yairi (2013) presenting a skeptical position, particularly regarding research applications.

One scholar recently suggested that the criterion for determining whether adults are identified as people who stutter is whether they identify themselves as such (Brocklehurst, 2013). Imagine the problems that this approach could create when conducting research. Suppose a team of investigators wishes to compare a group of people who stutter (PWS) with a control group of normally fluent speakers (NFS) on a particular parameter. In selecting participants for the experimental (stuttering) group all of the investigators perceive the speech of one volunteer as normal though the person insists that he stutters. Should they accept self-identification as a sufficient basis, and include him as a stutterer? Similarly, imagine that the investigators perceive stuttering in the speech of another volunteer who insists that she does not stutter. Should they accept her self-identification and include the volunteer as a nonstutterer? Our answer is negative in both cases.

One example of a succinct definition of stuttering that zeroes in on the speaker’s perspective was offered by Perkins (1990a). He proposed that “loss of control of the ability to voluntarily continue a disrupted utterance is the essence of stuttering” (p. 376). Again from the perspective of the person who stutters, the speaker’s feeling of loss of control of his or her speech is a key characteristic, but it is difficult to distinguish this problem from others such as an apraxia of speech or spastic dysphonia.

Another definition of stuttering from the speaker’s point of view was adopted by the World Health Organization: “Disorders of rhythm of speech in which the individual knows precisely what he wishes to say, but at the time is unable to say it because of involuntary, repetitive prolongation or cessation of a sound” (World Health Organization, 1977). Here, considerable weight is given to the inner experiences of the person while it also includes the basic symptomatology. As is the case with the Perkins definition, however, it may be difficult to distinguish the defining characteristics from apraxia. The additional limitation of these definitions is that stuttering might constitute a variety of different experiences for different people who perceive themselves to stutter.
Part 1 / Nature of Stuttering

Figure 1.2  A Model of the Stuttering Disorder

Other Views
One approach to overcoming the challenge of individual differences among those who stutter was presented by Yaruss and Quesal (2006). They included components of body function and structure, personal and environmental factors, and activity/participation in their model of the stuttering disorder. They also describe three levels of the disorder: impairment, disability, and handicap. Figure 1.2 conveys the essence of these three levels. Based on the International Classification of Functioning, Disability, and Health (ICF; WHO, 2001) impairment is evidenced when body function and structure are impeded, disability is realized when speech performance does not conform to social expectations, and handicap is experienced when goals for social participation are not achieved. Their model, however, is mainly useful for considering what stuttering involves, rather than providing a definition of what it is.

Overall, the few definitions just cited that address stuttering as a complex disorder are sufficient to demonstrate a wide diversity in the ways the supposed essence of stuttering has been captured, conceiving of it as an organic/motor disorder, psychiatric disorder, psychosocial disorder, learned disorder, and a disorder affecting a speaker’s intentional control. The definitions differ so greatly that one might almost wonder if all of them refer to the same disorder. From a practical point of view, although each definition depicts one or several relevant parameters of stuttering, none of them is sufficiently specific (precise) to be useful in the identification of people who exhibit the disorder.

Our Point of View
In the preceding discussion of how to define stuttering as a disorder, we highlighted its multidimensional characteristics. In view of its complexity and the vast individual and age variations across multiple dimensions, it is nearly impossible to formulate a definition to satisfy the desired criteria. With these reservations in mind, we nevertheless offer our own opinion.

An ideal definition of stuttering should endure even when diverse theories across time are proposed to explain it. We are inclined to define stuttering in as pure and as simple a form as possible, similar to how water has been defined, essentially as what falls as liquid precipitation. Such a definition should prove beneficial even if, just like water, stuttering is rarely encountered in a pure and simple form. Hence, stripped down to essentials, we define stuttering as articulatory gestures in a holding pattern (repetition,
prolongation, block) in an attempted delivery of syllables (including single-syllable words) or elements of syllables.

For research purposes, we define stuttering events when speech is characterized by periods of frequent and/or intense disruptions to the integration of syllable or elements of syllables as components of spoken utterances. At its minimum, such disruptions consist of gestural holding patterns of repeated and/or elongated speech elements, including sound, syllable, or a single-syllable words. Examples of such disruptions include repetitions that are fast in tempo, especially those consisting of two or more extra iterations, prolongations that are longer than a half second, and complete articulatory blockages of speech sounds.

At its onset in young children, stuttering is a speech disorder (also known as “developmental stuttering” because of its childhood onset) in those who are prone to experience intermittent disruptions in the form of one or all of the speech events described above. These disruptions occur at levels sufficient to distract listeners and interfere with communication. The disorder is genetically based but highly responsive to environmental factors. When the disorder persists, it expands to acquire additional characteristics reflected in dynamic, multidimensional patterns of overt body tensions, motor-physiological adaptations, as well as emotional, cognitive, and social reactions. To the person who stutters, these additional aspects of the disorder may be more disturbing than the stuttered speech events.

Summary

The definition of stuttering has several very important research, theoretical, clinical, as well as financial implications. The term stuttering may refer to certain speech events or to the complex disorder. Defining stuttering, especially as a disorder, has proved to be a difficult task that has not yet been successfully accomplished. This is not surprising considering its multidimensionality. Several points were highlighted in this chapter:

- Disorder-based definitions have continued to reflect a wide diversity of perspectives from psychogenic to neurogenic to learning, and to that of the stutterer’s subjective perception. Still, some progress has been made as reflected in the World Health Organization’s view of the problem.

- Disagreement is considerably narrower regarding the definition of stuttering as a speech phenomenon.

- There was an early tendency that lasted for some time, to present a confusing picture of speech characteristics, overemphasizing overlap between normal disfluency and

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5The concept of stuttering as a disruption to the integration of syllables was developed and supported most thoroughly by Wingate (1988).
stuttering. Considerable progress, however, has been made to clarify the differences between what is normal and what is not, and in zeroing on the essential features of disfluent events necessary for a definition.

- The diversity of opinion among scholars on (1) what stuttering is and (2) who is qualified as a “stutterer” has had a strong impact on how the disorder has been understood, investigated, and treated.
- The continuing conflicting views and the difficulties in arriving at a reasonable agreement could affect the overall progress in the field.
- Additional information about the fluent speech of people who stutter may strengthen future definitions of stuttering.
- The definition of stuttering may be improved in the future if speech scientists can find better ways to characterize and detect its overt and covert dimensions.

**Study Questions and Discussion Topics**

1. What is the purpose of a definition of a phenomenon?
2. Why is a definition of stuttering important? List and explain at least three reasons.
3. What are the two main categories of definitions of stuttering? Explain. Refer to two examples of each category.
4. What factors appear to have caused diversity in definitions of stuttering?
5. What are the similarities and differences between normal disfluency and stuttered speech?
6. Assume you will conduct a research project to study the effect of a new treatment on the frequency of stuttering. Which of the definitions cited in this chapter can be used for (a) selecting participants who stutter, and (b) measuring the frequency of stuttering?

**Websites**


**Suggested Readings**


Chapter 2

Who and How Many Stutter?

LEARNER OBJECTIVES

Readers of this chapter will:

■ Understand the meanings of *incidence* and *prevalence* in general, and relate them to stuttering in particular.
■ Understand population characteristics (e.g., age, gender) that influence the incidence and prevalence of stuttering.
■ Understand the methodologies employed in incidence and prevalence studies of stuttering.
■ Be familiar with incidence and prevalence findings and appreciate their implications as well as limitations.
■ Evaluate implications of incidence and prevalence data toward an understanding of stuttering and its possible etiologies.

Incidence and Prevalence

The question of how many people experience the disorder of stuttering is one of the first raised by the professionals who study and/or treat it. The answer is not simple, because the question can be approached from different angles or contexts. Customarily, scientists distinguish between *incidence*—the probability that new cases of any disorder will develop over a period of time, and *prevalence*—the estimate of all the cases of the disorder at a given time. For example, many individuals in the population at large have had at least one ear infection at some point in life. The percentage of individuals who have *ever* developed an ear infection would be an estimate of incidence, and if by “ever” we mean at any time in life, then this would be the *lifetime incidence*. By contrast, a smaller percentage of people are apt to have ear infections at the particular time a population is examined. This would be the *prevalence* of ear infections when a survey is conducted (e.g., of 6-month-olds at a day-care facility). Naturally, the percentages will vary by age and season; for example, young children have more ear infections than older ones, especially during the winter months.

Interpretation of Incidence and Prevalence Data

For stuttering, examples of these measures are found in a study by Andrews and Harris (1964). In their longitudinal survey of 1,000 children who were followed for 16 years after the time of birth, the incidence of developmental stuttering, in this case *lifetime* incidence,\(^1\) was approximately 4.5% because there were 45 cases of stuttering that

\(^1\)The 16-year span is considered sufficient for “lifetime” incidence of developmental stuttering because it typically starts, and resolves for most, long before the 16th birthday.
lasted any duration. By contrast, the prevalence of stuttering among the children surveyed at the end of the study was approximately 1%, reflecting the fact that only 10 were regarded as exhibiting stuttering at the time. The comparison just cited highlights the higher rates of stuttering incidence across the life span in contrast to the prevalence figures of those who stutter at a specific given time. Unfortunately, the stuttering literature has often confused the two terms, using incidence when the writer was actually referring to prevalence.

The change in incidence and prevalence for 30 children followed longitudinally over a 3-year period is illustrated in Figure 2.1. Data were collected from the same sample population on the same date, once a year. Each square in the grid represents one child. A minimum of 2 months of stuttering was required to count the case. In year 1, there were three cases of stuttering that began among the 30 children, for an incidence of 10% (3 of 30). In year 2, four new cases began, for an incidence of 13.3% (4 of 30). Because two children recovered naturally among the three previous cases, the prevalence of the disorder for that year is 16.7% (5 of 30). In year 3, there was a new incidence of 6.7% (2 of 30) but the prevalence drops to 13.3% (4 of 30) because three additional children recovered. The overall incidence of stuttering for the 3 years combined is 30% (9 of 30) with an average of 10% (3/30) per year. The prevalence also changed from year to year.

This example demonstrates that there are several ways of looking at incidence and prevalence data. It may be reported for specific, limited periods, for an overall period, or as an average across periods. Appropriate evaluation of the validity of incidence and prevalence estimates depends on a firm grasp of their definitions and the time frame involved for the target population. As with a number of other disorders (e.g., ear infections), cases of stuttering typically continue for a certain period of time and then subside. This additional dimension affects the estimates of incidence and prevalence and their interpretation. Recall that in the Andrews and Harris (1964) results, the lifetime incidence of stuttering was approximately 4.5%. This estimate was based on cases of stuttering that had lasted for any duration. By contrast, when the researchers examined only those cases that had lasted for at least 6 months, the incidence was only 3%. Thus incidence estimates may be influenced by an investigator's imposition of a minimal time that the disorder lingers in order to count a case. We hold that the true frequency of
the phenomenon cannot be appreciated unless all cases that exhibit properly diagnosed stuttering, even for a short time, are counted.

Which is greater, the incidence of a disorder or its prevalence? It all depends on the time period used as a basis for comparison. When compared within a limited duration—for example, a 1-year span between the ages of 6 and 7—the incidence of only new stuttering cases that appear will be lower than the prevalence that includes all of the continuing cases. But when compared with the lifetime incidence, which is the number of people who have ever stuttered, the latter exceeds the prevalence, or number of people who currently stutter.

The Significance of Incidence and Prevalence

Information about the incidence and prevalence of stuttering in general, and with respect to specific factors such as age, gender, race, culture, and clinical subpopulations (e.g., those with hearing loss), has direct implications for understanding the magnitude of the problem, as well as its causes and dynamics. Beyond the theoretical significance, it also provides essential guidance in clinical decision making related to prognosis, counseling, and treatment recommendations. Because incidence estimates reflect the rate of new stuttering cases, they are especially important to studies concerned with the prevention of the disorder. Similarly, because prevalence estimates reflect the rate of currently existing cases, they are especially important to clinical processes of evaluation and treatment of the disorder. Incidence and prevalence data are vital in regard to research, professional training, clinical service delivery, public awareness, and funding of both clinical services and research.

Implications for Research and Theory

Incidence and prevalence data are crucial factors in designing research studies, evaluating their findings, and testing theoretical propositions. This is because the distribution of gender, age, skill domains (e.g., phonology), and natural recovery (without clinical intervention) among the sample of a study’s participants (“subjects”) can easily affect its outcome. For example, to be representative, sampled experimental groups need to include more males than females to reflect the gender ratio in the stuttering population. This gender disparity, however, changes with the ages of participants. Therefore, a representative sample of adults who stutter should include proportionately more males than a sample of preschool children. Consider another situation: a study of the language skills of young children who stutter. As explained, more boys than girls should be included in the samples. This, however, may yield inaccurate findings that children who stutter are below the norms because, as we know, boys may lag behind girls in typical speech and language development. It is essential in this situation to have a similarly gender-balanced control group.
Changes in the prevalence of stuttering with age and gender, and the influence of the rate and timing of natural recovery from stuttering, must be considered when interpreting results of clinical efficacy studies conducted with preschool children. If the natural recovery is overlooked, its effects may be confused and misinterpreted as being the outcome of treatment. If the different rates of recovery across genders are not considered in sample populations that have uneven proportions of males and females, there may similarly be misinterpretations of treatment outcomes.

Incidence and prevalence information are of immense importance to the theoretical foundations of stuttering. From an etiological perspective, gender distribution and percentage of natural recovery are essential for testing which of several genetic models best supports the notion that stuttering is hereditary. Furthermore, large deviations from the typical stuttering incidence found in certain subpopulations may provide relevant clues for making hypotheses about the nature of stuttering. For example, the low incidence of stuttering among deaf people draws attention to the role of auditory processes in stuttering. Similarly, a low or high incidence in certain cultures may suggest the influence of environmental factors, such as a high or low value placed on speaking skills affecting the level of pressure on children’s speech. A high incidence in clinical subpopulations, such as people with Down syndrome, calls attention to a host of possible influences on stuttering, including chromosomal abnormality, low intelligence level, low muscle tone, and discrepancies in language skills during the critical stages of oral skill development.

**Implications for Professional Training**

Information about the occurrence of stuttering may influence both educational and clinical domains. For example, decisions concerning undergraduate and graduate academic curricula for students aspiring to become speech-language clinicians, as well as the amount of clinical practice required of them, are influenced by the incidence of the various disorders treated by these future professionals. Whereas many academic programs offer a course specifically devoted to language disorders in preschool children and a different course on language disorders in schoolchildren, such age-specific courses in stuttering may not be found. The relatively small size of the stuttering population was a reason the American Speech-Language-Hearing Association (ASHA) and many universities deemphasized academic and clinical training in fluency disorders required of students in speech-language pathology. For a period of several years, ASHA actually cancelled its traditional requirement for a minimum number of clinical practicum hours in the area of stuttering. It is encouraging that this professional-scientific organization resumed those requirements in the form of both knowledge and practical skill competencies so that future clinicians will be prepared to provide appropriate levels of service for individuals who stutter.
Implications for Clinical Service Delivery

Information concerning the occurrence and distribution of stuttering, like that of many other disorders, is a major factor in both the planning of public and private clinical services and the availability of qualified personnel to treat the disorder. Considering the typical age of stuttering onset, which impacts the respective prevalence for that age range, health-care and educational systems should plan on providing more services for young children who stutter in early childhood centers and family community clinics than in clinical facilities where the majority of people served are adults. Additionally, clinicians need to be aware of the gender ratio to be sensitive to cultural aspects of communication for those they serve. For example, in counseling parents from cultures where boys are more highly desired in families, clinicians need to be prepared for the level of disappointment triggered by the parents learning that their son not only stutters but is at greater risk for persistence. This news may be received with more negative parental and societal reactions.

Incidence and prevalence data are also applicable in the interest of risk prediction. It is based on demographic factors such as age, gender, and familial distribution of the disorder. For example, if the lifetime incidence of stuttering is 5%, the risk for stuttering of a newborn infant is, on average, 5 in 100. But, adding our knowledge regarding the gender ratio of stuttering across the life span (about 4:1 in favor of males), and assuming an equal ratio of males and females in the population at large, a newborn boy has a risk of 8 in 100 and a newborn girl has a risk of 2 in 100 for stuttering at some time in life. Now, if the infant is born to a family with a history of stuttering, we know that the estimated risk is, on average, about 4 times higher (depending on the specifics of the history) as compared to a family without history of stuttering. A different prognostic application of incidence and prevalence data is seen in the question of whether a 5-year old boy who does not stutter is at a risk to begin stuttering. The answer: The chance is much smaller. Whereas Andrews (1984) concluded that 75% of the risk is over by age 6, Yairi and Ambrose (1999a) reported that over 90% of the risk for stuttering is over by age 4.

Other practical predictions can be made for children who have begun to stutter. Current data on incidence and prevalence, combined with other epidemiological information on the development of stuttering in early ages, allow us to provide a prognosis regarding a child’s risk to develop chronic stuttering or to exhibit natural recovery.
We know, for example, that soon after onset, the chance for recovery is approximately 75%–80% or higher. After 2 years of stuttering, the recovery chance drops to 47%, and so on. Much more about all this will be offered in later chapters.

Implications for Public Awareness and Funding

Public concern about various health issues has influenced governmental agencies, as well as private foundations, in the distribution of money for research and treatment programs. For example, the sharp increase in the incidence of AIDS during the recent decades combined with increasing public awareness through the work of activists, philanthropic groups, and the media, have led to the consequent increase in financial resources dedicated to detecting and treating this disease. In many ways, inadequate information about stuttering and misconceptions about the size of the stuttering population, namely the prevailing notion that “only” 1%, or even less, of the population stutters, has diminished both public and professional attention to this communication disability. The 1% figure has produced an incorrect impression that stuttering is a “small” problem, although in children the percentage is considerably higher. It has been an important reason why stuttering was temporarily deemphasized by ASHA and affiliated academic training programs, as mentioned earlier.

Research Methodology for Incidence and Prevalence

Speech-language clinicians may serve as both the users and collectors of data related to the occurrence of stuttering cases. When evaluating incidence or prevalence figures related to stuttering, due attention must be given to the research methods employed. The fairly wide range of figures, 0.61% to 4.70% for prevalence, and 0.70% to 17.70% for incidence, reported across many studies (Bloodstein & Bernstein Ratner, 2008; Yairi & Ambrose, 2013) can most likely be attributed to the differences in the respective research methods used, including design, characteristics of the sample investigated, the definition of stuttering, or who identified stuttering and/or counted individuals who stutter.

Approaches to Prevalence Research

What methods are used to collect data about the occurrence of stuttering? By and large, prevalence research has been based on cross-sectional surveys of targeted groups, such as schoolchildren in different grade levels. Recall that in a cross-sectional study, data are collected from population samples at a single point in time. The most common procedure has relied on questionnaires returned by secondhand informers, such as schoolteachers, who are asked to list the children who stutter in their respective classes. Another method employs direct face-to-face evaluation by examiners who listen to participants’ speech to identify stuttering. Although both the number of examiners and their professional experience with stuttering have varied, the face-to-face approach is expected to yield more valid and reliable information. A third approach is seen in several studies that applied multiple procedures, for example, using input from school
personnel as well as individual screening by the investigators. It would be reasonable to assume that multiple inputs contribute to a higher degree of reliability. Ideally, all studies should be conducted in multiple sites to better reflect the broader population, settings, and geographic regions. Simultaneous sampling at the different sites and/or groups being surveyed ensures maximum uniformity in conditions. Still, variations abound. For example, Gillespie and Cooper (1973) obtained data on stuttering from just a single city.

The accuracy of statistics on stuttering is further complicated by the variation among studies in aspects such as their target sample populations. Preschool children, a single, narrow age group, were the focus of study by Proctor, Yairi, Duff et al. (2008). Others studied prevalence in a slightly wider age range of school-age children, such as grades 1 through 4 (Burdin, 1940), or among junior and senior high school students (Gillespie & Cooper, 1973). The most comprehensive studies include the widest age range, from kindergarten to 12th grade (e.g., Brady & Hall, 1976). Generally, these investigations used samples that were convenient to survey instead of randomly selected. An exception can be found in the 2002 Craig, Hancock, Tran et al. study that attempted a cross section of the entire population (all ages) of certain areas in Australia. The variations in target populations just described can be expected to result in a wide range of prevalence figures. In addition to age variability, several investigations have been conducted with specific subpopulations, such as African Americans (Proctor et al., 2008), individuals with cleft palate (Dalston, Martinkosky, & Hinton, 1987), and those with cognitive impairment (Preus, 1973), among others.

Cross-sectional prevalence surveys using questionnaires have made it possible to include large samples of participants. This is attractive because the sheer sample size may compensate for errors resulting from many possible uncontrolled variables. Examples of large-scale studies that used questionnaires and teacher input are Schindler (1955) sampling nearly 23,000 children, Wallin (1916) covering 89,000, and Glogowski (1976) with 875,000 children. Studies employing direct face-to-face observations, although potentially more valid and reliable, have been smaller in scope due to substantially increased costs for personnel, the time required for each interview, and difficulties in gaining entrance to schools and other institutions. Such studies include Gillespie and Cooper (1973), Mills and Streit (1942), and Proctor et al. (2008).

Approaches to Incidence Research
Data for stuttering incidence have been gathered by investigators who pursued one of two approaches: (1) longitudinal or (2) retrospective. With the first, the same group of individuals is followed for a period of time while being observed for newly emerging cases of stuttering. With the second, records are examined or informants surveyed are requested to obtain information about present as well as past cases (this is the retrospective aspect) of stuttering. Unquestionably, the first method holds the best potential for
providing accurate information. It is, however, costly, difficult to execute, and bound to be limited in sample size and the number of years covered by the research. Also, although these investigations pertain to incidence, the researchers could not claim to have investigated the real lifetime incidence because, they included only portions of the life span.

The most famous longitudinal incidence study was carried out by Andrews and Harris (1964), who followed 1,000 children in the English city of Newcastle upon Tyne from birth to their 16th birthday. The children were visited at periodic intervals by health workers who noted when a child began stuttering and when the stuttering ceased. Those identified were also examined by speech therapists. The challenges and high costs involved in this type of study should be apparent. Although the first 16 years of life probably yield most of the information about stuttering incidence, any possible late onsets are missed. Another investigation that is unique was reported by Månsson (2000). His team assessed the incidence of stuttering by screening the entire population of 1,040 children who were born on the Danish island of Bornholm during 2 consecutive years. The children, however, were followed for only 5 years. The team repeated the study several years later (Månsson, 2005).

The retrospective approach to incidence research is illustrated in the 1971 Dickson study in which parents of almost 4,000 children in kindergarten through grade 9 were asked whether their children were stuttering at the time or if they had a history of previous stuttering. In the Craig et al. (2002) investigation, nearly 4,689 families comprising over 12,000 individuals participated in telephone interviews. Whereas it was possible to assess current stuttering (prevalence) via the telephone, identification of past stuttering cases (a major portion of the incidence) depended solely on the recollection of family members or individuals who used to stutter.

Overall, both longitudinal and retrospective studies suffer from flaws related primarily to vague descriptions of procedures, content of questionnaires, referrals, details of the personal examination of participants, and other factors. Surveys that are confined to school-age children can be expected to report a lower stuttering incidence than surveys that are confined to the preschool ages when stuttering typically begins. If human races differ in respect to stuttering, a study conducted in schools where races are not proportionally represented will yield misleading overall figures. In very young ages when the stuttering is often intermittent, some children may be missed in direct examination if they happened to experience a fluent period at the time of the study. Large up-and-down fluctuations in stuttering are common in the early stage of stuttering. Considering all these influences, direct comparisons among many of the studies are difficult. Although their cumulative data are useful in providing a reasonable idea of the range of the magnitude and distribution of the disorder of stuttering, ideally more carefully designed, executed, and reported research will be carried out in the future.

**Defining Stuttering**

As alluded to in Chapter 1, varying definitions of stuttering employed in incidence and prevalence research studies may have had some, or substantial, impact on their outcome and thus on the knowledge base of the profession. Consider the analogy of the
challenges that arise when defining the common cold. There are colds with runny noses and sore throats, and there are colds with congestion and coughs. In turn, there may be differences in the prevalence or incidence of various colds reflected in the differences among cold symptoms. Similarly, not all stuttering is characterized by the same symptoms, and across research studies stuttering was not uniformly defined. Furthermore, in the survey conducted by Louttit and Halls (1936), no guiding definition was provided. It was left open to the individual opinions of the many people who carried out the survey. Louttit and Halls recognized the problem in their honest statement that “the teacher’s judgment is the basis of the raw figures, so our whole analysis must rest on this somewhat insecure foundation” (p. 74).

Gillespie and Cooper (1973) improved on this method by conducting questionnaire surveys supplemented with a face-to-face meeting with each of 5,054 junior and senior high school students. Judgment of a student’s stuttering was based on conversational speech and reading. Other studies defined stuttering more carefully and restricted their counts to cases that met behavioral criteria. Brady and Hall (1976) provided teachers participating in a questionnaire survey with the following definition: “Stuttering is a communication disorder characterized by excessive involuntary disruptions or blocking in the flow of speech, particularly when such disruptions consist of repetitions or prolongations of a sound or syllable and when they are accompanied by avoidance struggle behavior” (p. 76). In yet another study, Dickson (1971) defined stuttering as “repetitions of sounds and words and getting stuck on or between words” (p. 100). The questionnaires he used requested parents to provide specific information about disfluency as well as secondary stuttering characteristics. In the 2002 Craig et al. study, mentioned earlier, stuttering was defined as “repetitions of syllables, part or whole words or phrases; prolongations of speech; or blocking of sounds” (p. 1100). They also included information about secondary physical characteristics and the emotional components, such as embarrassment and anxiety.

Selecting Informants
Informants are people who gather the raw data. They determine who stutters based on their own observations or indirect data provided by other sources, such as a family’s oral history. These have been teachers, health professionals, parents, and/or other family members. The accumulated data about stuttering prevalence or incidence have been gathered by people of different backgrounds and experience. Over the 70-year span between the studies of Louttit and Halls (1936), and Van Borsel, Moeyaert, Rosseel et al., (2006), many investigations relied on schoolteachers, sometimes hundreds and thousands of them (e.g., White House Conference, 1931). Those teachers had no professional training in speech pathology or in identifying stuttering, or even a brief preparatory training for the survey. The combined effect of so many people applying an individual perception of what constitutes stuttering without the benefit of a guiding definition raises doubts about the findings.

In other studies, information was gathered from parents of children (e.g., Reilly et al., 2013) or from other members of the families surveyed (Craig et al., 2002).
this respect, it is interesting to note that parents’ diagnosis of stuttering and rating of its severity was found to align closely with that of experienced speech-language clinicians (McLeod & McKinnon, 2007; Yairi & Ambrose, 2005). One advantage of using parents as informants is that they are in a position to report an eruption of stuttering that lasted for a relatively short period. Such cases, occasionally quite severe, are typically missed by other methods, leading to underestimates of incidence or prevalence.

Another class of informants includes professionals who conduct direct observations of those being surveyed. There are, however, appreciable differences in the qualifications and number of these informants. As early as 1942, Mills and Streit employed 10 examiners to conduct individual testing of children in their school survey. All examiners had at least a year of training in speech pathology, and at least two were present at the testing of each child. The disadvantage: This team managed to screen only 25% of the pupils. In the Andrews and Harris (1964) study, only one of several health-care workers visited each child’s home. Furthermore, in a good number of cases the examiners did not meet with the children but had to rely only on a parent’s report instead of face-to-face evaluation. Proctor et al. (2008) used multiple sources to identify each child, including day-care staff, parental reports, and direct speech screening by a speech-language clinician. Stuttering was confirmed by the judgment of two clinicians. Obviously, corroboration by many informants strengthens the confidence in data validity.

**Prevalence: Findings**

Having reviewed a range of research methodology issues, the question is what has been found? To provide historical perspective, the findings of a good number of studies have been arranged in four groups according to general chronological order. These are presented in Table 2.1.

**Early Investigations**

**Pioneer Reports**

Considering the many experimental hazards we have discussed, it is intriguing to learn that early investigations of the school-age population yielded findings that are similar to better-designed modern studies. More than 100 years ago, four large studies with a total of nearly 660,000 participants, conducted in a variety of geographic regions around the world, revealed remarkably comparable results. In Europe, Lindberg (1900) surveyed 212,000 Danish schoolchildren, finding a stuttering prevalence of 0.90%, whereas von Sarbo (1901) studied 231,468 Hungarian children, reporting a prevalence of 1.02%. In the United States, Hartwell (1895) surveyed 129,060 schoolchildren in the Boston area, reporting a prevalence of 0.77% while Conradi (1904) surveyed approximately 87,440 schoolchildren in six cities, yielding a prevalence of 0.87%. We have calculated the mean prevalence of the four findings to be 0.89% (see Table 2.1).
### Table 2.1 Reports on Stuttering Prevalence*

<table>
<thead>
<tr>
<th>Study</th>
<th>Sample**</th>
<th>Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INITIAL REPORTS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lindberg (1900)</td>
<td>212,000</td>
<td>0.90%</td>
</tr>
<tr>
<td>Von Sarbo (1901)</td>
<td>231,000</td>
<td>1.02%</td>
</tr>
<tr>
<td>Hartwell (1985)</td>
<td>129,000</td>
<td>0.77%</td>
</tr>
<tr>
<td>Conradi (1904)</td>
<td>87,000</td>
<td>0.77%</td>
</tr>
<tr>
<td>Subgroup Mean</td>
<td></td>
<td><strong>0.89%</strong></td>
</tr>
<tr>
<td><strong>EARLY 20TH CENTURY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blanton (1916)</td>
<td>5,000</td>
<td>0.72%</td>
</tr>
<tr>
<td>Wallin (1916)</td>
<td>89,000</td>
<td>0.70%</td>
</tr>
<tr>
<td>Watzl (1924)</td>
<td>136,000</td>
<td>0.60%</td>
</tr>
<tr>
<td>White House (1931)</td>
<td>3,500,000</td>
<td>0.70%</td>
</tr>
<tr>
<td>Louttit &amp; Halls (1936)</td>
<td>200,000</td>
<td>0.77%</td>
</tr>
<tr>
<td>Subgroup Mean</td>
<td></td>
<td><strong>0.70%</strong></td>
</tr>
<tr>
<td><strong>LATE 20TH CENTURY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gillespie &amp; Cooper (1973)</td>
<td>5,000</td>
<td>2.12%</td>
</tr>
<tr>
<td>Leavitt (1974)</td>
<td>10,000</td>
<td>0.84%</td>
</tr>
<tr>
<td>Brady &amp; Hall (1976)</td>
<td>187,000</td>
<td>0.35%</td>
</tr>
<tr>
<td>Hall, Mielke, Willeford et al. (1976)</td>
<td>39,000</td>
<td>0.80%</td>
</tr>
<tr>
<td>Glogowski (1976)</td>
<td>875,000</td>
<td>1.82%</td>
</tr>
<tr>
<td>Subgroup Mean</td>
<td></td>
<td><strong>1.18%</strong></td>
</tr>
<tr>
<td><strong>21ST CENTURY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preschool</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Okalidou &amp; Kampanaros (2001)</td>
<td>1,100</td>
<td>2.20%</td>
</tr>
<tr>
<td>McLeod &amp; Harrison (2009)</td>
<td>5,000</td>
<td>5.60%</td>
</tr>
<tr>
<td>Proctor, Yairi, Duff et al. (2008)</td>
<td>3,200</td>
<td>2.60%</td>
</tr>
<tr>
<td>Subgroup Mean</td>
<td></td>
<td><strong>3.46%</strong></td>
</tr>
<tr>
<td>School</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Van Borsel, Moeyaert, Rosseel et al. (2006)</td>
<td>21,000</td>
<td>0.58%</td>
</tr>
<tr>
<td>McKinnon et al. (2007)</td>
<td>10,000</td>
<td>0.33%</td>
</tr>
<tr>
<td>Boyle, Boulet, Schieve et al. (2011)</td>
<td>119,000</td>
<td>1.60%</td>
</tr>
</tbody>
</table>

(continued)
Early 20th-Century Reports

Information continued to come in during the first third of the 20th century. As can be seen in Table 2.1, five studies conducted between 1916 and 1936 yielded a mean prevalence of 0.70%. This group includes the largest of them all, a part of the White House Conference on Child Health and Protection (1931) where data were obtained for various speech disorders in a whopping sample of 3.5 million children from grade 1 to grade 12. Although many teachers served as informants, the finding of 0.70% prevalence was confirmed through a face-to-face reliability control study of 10,000 pupils.

Current Research

Late 20th-Century Reports

Studies conducted during the last third of the 20th century yielded a wider range of prevalence estimates, extending from a low of 0.35% to a high of 2.12%. The mean of the five studies listed for this period is 1.18%. Not counted in the calculation is an Australian study by Still, Harasty, and Reed (1994) that surveyed only 437 pupils.

21st-Century Reports

A comprehensive review of the literature (Yairi & Ambrose, 2013) has revealed seven prevalence studies published so far during the current century, all but one were relatively small in size compared to many previous investigations. As seen in Table 2.1, these are broken up according to age groups. The first three studies focused on preschoolers with a total of over 9,000 participants and yielded a mean prevalence 3.46% whereas the next three studies that covered over 150,000 school and high school pupils yielded a mean prevalence of 0.84%. The last study listed in the table (Craig et al., 2002) was carried out in Australia via telephone interviews with one person from each of 4,689 families, totalling 12,131 members ranging in age from under 1 year to 99 years. It is the only one that covered the entire age range. As could be expected, the highest prevalence was among the younger children, about 1.4% decreasing to 0.37% for ages 51+. The lifetime

<table>
<thead>
<tr>
<th>Study</th>
<th>Sample**</th>
<th>Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subgroup Mean</td>
<td></td>
<td>0.83%</td>
</tr>
<tr>
<td>Lifetime</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Craig, Hancock, Tran et al. (2002)</td>
<td>12,000</td>
<td>0.72%</td>
</tr>
</tbody>
</table>

* The first three subgroups of studies were conducted with various ranges of school to high school grades.
** Rounded figures.
prevalence was of 0.72%. Overall, comparisons of the findings of the three subcategories within this subgroup also confirm the decline of prevalence with age.

**Incidence: Findings**

Estimates of the incidence of stuttering are likely to be less accurate than estimates of prevalence. The reason is that valid longitudinal or retrospective data are more difficult to obtain than cross-sectional data used in prevalence research. Ideal incidence estimates require prospective longitudinal studies that track large samples of children representative of the population at large, starting from prior to the low end of the age when stuttering onsets occur, approximately 18 months, so as to capture all cases before natural recovery occurs.

To date, ideal longitudinal incidence data encompassing the entire age range, do not exist. Nevertheless, a handful of prospective investigations have provided general estimates. Already mentioned is the Andrews and Harris (1964) study with an initial sample of 1,142 babies, born and resided in a British city, who were tracked from birth to their 16th birthday (end of age 15). Tracking was conducted by health workers and speech clinicians through periodic home visits. No speech samples were recorded, and the evaluators had only brief contact with the child at each visit. As noted earlier, quite often parental reports substituted for the direct contact. Over the 16-year span, 43 children were identified as exhibiting stuttering, amounting to 4.9% of the participants. It appears that more than any other finding, this one has influenced the generally accepted notion (e.g., NIH, 2010) that the lifetime incidence is approximately 5%.

The British study received strong support from another European investigation under the leadership of Hans Månsson (2000). Having a unique access to the birth records of all children born on the Danish island of Bornholm with its 45,000 low-mobility population, the Månsson team conducted direct speech, language, and hearing screenings of nearly the entire population of 1,040 children born during two years: 1991 and 1992. This was done within a month or two following their third birthday. Månsson found that 4.9% of the children exhibited stuttering, a figure identical to that of Andrews and Harris (1964) in a sample of a similar size. By age 8, after two follow-ups, it rose to 5.09%. Månsson (2005) repeated his survey among 928 newly born population during the years 1995 and 1996. Extremely careful procedures were employed, including identical diagnosis by parents and two speech-language clinicians of current cases, and detailed parent reports of past stuttering that could not have been more than 18 months prior to the survey. This time the resultant incidence was a high of 17.7%. Although doubts may be raised, their methods were considerably more direct and verifiable than

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2The 4.9% was calculated for the average size of the group, 875, to account for attrition.
those employed, for example, in the Craig et al.’s 2002 telephone survey to be discussed later. Support for higher than the conventional 5% incidence was recently provided by an ongoing longitudinal investigation of more than 1,600 Australian children, starting at 8 months of age. By age 4, incidence had already reached 11.2%. Here, parents’ diagnosis was confirmed by speech clinicians (Reilly, Onslow, Packman et al., 2013).

An appreciable amount of the available incidence data, however, comes from questionnaires or interview studies using indirect retrospective methods, that is, informants reporting whether members of their family currently stutter or have ever stuttered, or by means of direct retrospective accounts, when informants are asked to report own history. The accuracy of these data may have been compromised by their secondhand nature, informants’ use of different criteria, lost information about the familial history, and lapses in memory. Therefore, the resultant risk estimates tend to suffer from under-reporting. We have selected four studies to present.

Glasner and Rosenthal (1957) interviewed parents of 996 children entering the first grade. The critical question was whether their child had ever stuttered. Of the sample, 153 (15.3%) were so reported. Nearly half had already stopped stuttering and could not have been objectively verified, but more than half (7.9%) of the sample was actively stuttering. A very different outcome was reported by Sheehan and Martyn (1970) whose team of clinicians interviewed 5,000 university students, observing speech and taking history of past speech disorders. Approximately 2.9% either exhibited present or reported past stuttering. Without parental input, however, it is rather likely that a number of these adults were not aware that they stuttered during early childhood.

Indication of incidence higher than 5% was provided by Felsenfeld, Kirk, Zhu et al. (2000), who investigated people listed with the Australian Twin Registry. As many of 3,768 young adults who stuttered (about 60% female and 40% males) responded to mailed questionnaires with the critical question if they had ever stuttered, revealing 8.8% incidence. More recently, a large longitudinal twin study in the United Kingdom used follow-up questionnaires from parents when their children were 2, 3, 4, and 7 years of age. Parents of 12,892 children identified at least 8.4% as having “ever stuttered” (Dworzynski, Remington, Rijsdijk et al., 2007).

Finally, the most inclusive investigation of lifetime incidence of stuttering was carried out by Craig et al. (2002). In a telephone interview with one member from each of 4,689 Australian families, their data totalled 12,131 persons younger than 1 year to 99 years of age. Interviewees were given a description of stuttering and asked if anyone residing in their home stuttered. Stuttering was identified from a recorded speech sample and an affirmative answer to at least one of several questions. To obtain lifetime incidence, interviewees were asked whether anyone in the household had ever stuttered. Adding the number of people who stuttered at the time to the number of those reporting past stuttering yielded an incidence of 2.21%. Table 2.2 summarizes the recent incident studies.

Although estimates of the lifetime incidence of stuttering in the United States, Western Europe, and Australia vary greatly, the 5% figure appears to be holding in
popularity. Reviewing studies published during the current century, Yairi and Ambrose (2013) observed “that four of the six recent incidence studies indicate a trend to up its estimate from the 5% level, with a central figure of 8% or higher. What is important to re-emphasize is that data obtained in early childhood are certainly more valid than data obtained at any other age because of the proximity of observers, both laypersons and professionals, to newly identified cases. Such data constitute minimum estimates because later onsets only add to the reported statistics for early life data” (p. 72).

Bloodstein and Bernstein Ratner (2008, p.91) share this view, concluding that the lifetime incidence is at least 10%. If valid, the higher incidence for early ages contrasted with a lower incidence for older ages adds credence to high levels of natural recovery as will be discussed in Chapter 3.

### Biological Factors in Stuttering Prevalence and Incidence

#### Familiality

Stuttering tends to occur more frequently than average in families whose members stutter or used to do so. A person who stutters is likely to have one, several, or many relatives with a history of stuttering. This pattern has been reported in many studies. In their review, Yairi, Ambrose, and Cox (1996) concluded that the majority of 28 studies reported between 30% to 60% of people who stutter had a familial incidence of the disorder compared with fewer than 10% of normally fluent people. It appears that the risk for a family member of a person who stutters to also stutter is 3 to 4 times higher than the risk for a family member of a person who does not stutter. Although these studies did not account for differences in family size, and contain other methodological problems, the general picture is clear. Note again the implications of these statistics for clinical risk prognosis. Interestingly, male relatives of a person who stutters are more likely to stutter than female relatives. Kay (1964) found that 39% of male relatives stuttered as compared to 15% of the female relatives. Similar findings were reported by later investigators.

<table>
<thead>
<tr>
<th>Study</th>
<th>N</th>
<th>Target</th>
<th>Incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Felsenfeld et al. (2000)</td>
<td>3,768</td>
<td>Twins</td>
<td>8.80%</td>
</tr>
<tr>
<td>Månsson (2000)</td>
<td>1,040</td>
<td>Newly born</td>
<td>5.10%</td>
</tr>
<tr>
<td>Craig et al. (2002)</td>
<td>12,131</td>
<td>Life time</td>
<td>3.20%</td>
</tr>
<tr>
<td>Månsson (2005)</td>
<td>928</td>
<td>Newly born</td>
<td>17.70%</td>
</tr>
<tr>
<td>Dworzynski et al. (2007)</td>
<td>12,892</td>
<td>Young twins</td>
<td>8.40%</td>
</tr>
<tr>
<td>Reilly et al. (2013)</td>
<td>1,619</td>
<td>Preschool</td>
<td>11.20%</td>
</tr>
</tbody>
</table>
In the past, the familiality of stuttering received psychosocial explanations that supported learning theories of stuttering. For example, Johnson (1955b) suggested that families with stuttering histories may have developed concerns about stuttering that affect their reactions to their children’s normal disfluency, reactions that in turn trigger stuttering. Currently, however, ample evidence indicates a strong genetic component to stuttering (see review by Kraft & Yairi, 2012), a topic to be discussed in Chapter 7. The above is a clear example of how incidence data can be, and have been, used to enhance theories of stuttering.

**Age**

Age is among the strongest risk factors for stuttering mainly because in a very large proportion of cases the disorder erupts during the preschool period. The age factor is also seen in the decline of stuttering incidence and prevalence throughout the life span. Therefore, overall prevalence figures, such as the commonly held 1%, or our own estimate of 0.70% or 0.75%, mask important information. This is illustrated by the following examples. Whereas the Craig et al. (2002) investigation estimated the average prevalence across the life span at 0.72%, the data according to age groups indicated a substantial decline from 1.4% in young children to 0.53% in young adults to only 0.37% in older adults. A more recent study in Belgium, confined to the elementary school through high school population, also found prevalence to decline from 0.78% in the 6- to 10-year olds, to 0.53% in the 11- to 15-year olds, to 0.27% in the 16- to 20-year age group (Van Borsel et al., 2006). An even sharper contrast is seen when we compare the average prevalence of 0.75% with the 2.6% prevalence among 2- to 5-year-old children of either African American or European American heritage (Proctor et al., 2008). An obvious implication of these statistics is a call for greater emphasis on preparing clinicians for working with early childhood stuttering (Craig & Tran, 2005).

The decline in stuttering prevalence with age is directly related to two factors on which we further elaborate in Chapter 3. The first is the sharp reduction in new stuttering incidence after age 4. The second is natural recovery that may occur within weeks after onset but for most children within 3–4 years. Therefore, it is not surprising that the prevalence figures are highest among preschool- and school-aged children, decline during adolescence, and are lowest among adults. A point of interest: The high incidence between ages 2 and 4 has caused various speculations about some relationship between rapid speech and language development and stuttering onset.

**Gender**

It has been widely recognized that the prevalence of stuttering differs substantially between the genders, being more prevalent in males than in females. In one of the earliest studies, Conradi (1904) found a male-to-female ratio of 3:1. Thirty years later, Louttit and Halls (1936) reported a 3.1:1 ratio, and, after an additional 40 years,
Brady and Hall’s (1976) survey yielded, according to our calculations, a ratio of 3.63:1. Interestingly, all three studies covered children from kindergarten to grade 12. In their review, Bloodstein and Bernstein Ratner (2008) conclude that the overall gender ratio is approximately 3:1, which seems reasonable to us. Craig et al. (2002) reported a lower overall estimate of 2.3 males to every female who stutters. However, the most recent relevant study (Van Borsel et al., 2006) yielded a male-to-female ratio of 4.6:1 for a school population of up to age 20.

Why does the gender ratio increase with the advance of age? This may be attributed to a tendency for boys to begin stuttering later than girls, an unsupported speculation, as well as the greater occurrence of natural recovery among girls than boys documented by Yairi and Ambrose (2005). There have been, however, a few exceptional reports. Craig et al. (2002) found a gender ratio decline post adolescence. Also Van Borsel and colleagues (2006) found smaller male-to-female ratios in older groups within the age limits of their study.

The gender ratio is particularly interesting because it strongly suggests a genetic contribution to stuttering (Kidd, Kidd, & Records, 1978). A study by the Illinois Stuttering Program (Suresh, Ambrose, Roe et al., 2006) demonstrated that males and females who stutter had different chromosomes on which the strongest signs for the possible presence of genes underlying stuttering were found. There is also increasing evidence for both functional and structural gender brain differences in the general population. For example, substantial differences in gray matter volume and concentration were reported in a large study by Good, Johnsrude, Ashburner et al. (2001). Indeed, research has shown functional brain regions that differ between males and females who stutter (Ingham, Fox, & Ingham, 2004).

It is worth noting that more males than females have been identified in various disabilities, and, generally, also in communication disorders (e.g., Broomfield & Dodd, 2004; Law, Boyle, & Harris, 2000). Other potential factors contributing to gender

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3They mistakenly reported a ratio of 3.9:1
differences could be culturally based, such as different performance expectations for boys and girls, with higher standards and more pressure placed on boys (Schuell, 1946). Also, could there be a tendency for males to be identified and referred to experts at higher rates than females? None of these has received serious attention by research.

**Geography, Race, and Culture**

Readers should understand that the factors of geography, race, and culture tend to be intermingled. Although race per se is biologically determined, most of the black population lives in sub-Saharan Africa, most whites reside in Europe and America, whereas most Mongoloids populate East Asia. Keep in mind, however, that all the races share 99.99% of their genetic materials. Also cultural differences are associated with geography, race, and ethnicity. Hence, our attempt to present each of these factors separately should be viewed with these reservations in mind.

**Geography**

Stuttering is found worldwide. Whereas previous sections in this chapter have focused on data from North America, Europe, and Australia, the professional literature testifies to the presence of the disorder in many geographic locations, including Asia, Africa, and South America. The October 18, 2005, issue of the *ASHA Leader* featured articles written by clinicians and investigators in India, Taiwan, Japan, Cameroon, Brazil, and other countries, describing the local status of the disorder and its treatment. Similarly, research-based data obtained in these and other countries provide additional evidence of the universality of stuttering. Research on incidence and prevalence in Asia, Africa, and South America, however, has been sparse. From what has been done, the results approximate those found in the Western world. For example, a sample of 140,000 Japanese schoolchildren revealed a 0.82% prevalence (Toyoda, 1959); in a much smaller Japanese study it was 0.98% (Ozawa, 1960). In Egypt, prevalence was reported at 0.93% (Okasha, Bishrey, Kamel et al., 1974). In South Africa, 6,581 pupils ages 5–21 yielded prevalence of 1.26% (Aron, 1962). The single study (to our knowledge) reported for the whole of Latin America was carried out in Colombia. Questionnaires were distributed to nearly 1,900 college students, of whom 2% reported stuttering (Ardila, Bateman, & Niño, 1994). The results should be viewed with skepticism due to the many possibilities of errors, including the likelihood that a good number of disinterested normally fluent students did not respond. The equal gender ratio found, quite unlike virtually all past studies on adults, reinforces our concern.

Because of the strong evidence for genetic factors in stuttering, noticeable incidence differences among subpopulations, if found, are not surprising. In particular, small and close groups with high levels of intermarriage, may exhibit a higher percentage of stuttering if the disorder was present in the original founders. The Hutterites, an isolated religious group that left Europe in the late 1800s and settled in the northern Midwest United States is an example (Wittke-Thompson, Ambrose, Yairi et al., 2007).
Alternatively, theoretical perspectives oriented toward learning and environmental explanations of stuttering would also lead to the expectations of marked differences among various cultural and social groups. In addition to the possibility that cultural factors actually influence the occurrence of stuttering, they may contribute artificially to variations in incidence/prevalence data if there is a tendency for community beliefs and values to influence the extent to which people admit that they or others stutter.

**Race**

Only a few published studies have specifically investigated stuttering in African American children (e.g., Carson & Kanter, 1945; Gillespie & Cooper, 1973). Additionally, few master’s and doctoral theses have explored the disorder’s prevalence among African American children (Madding, 1995; Neely, 1960). All of these studies surveyed elementary school children, except for Gillespie and Cooper (1973), who focused on adolescents. Overall, the findings tended to support the belief that stuttering occurs more frequently in African American than in European American children (Cooper & Cooper, 1998). Of course, all weaknesses we have attributed to prevalence research in stuttering in general also apply to research concerned with race: The studies are dated, contain many potential measurement errors, and the range of methodological variability creates difficulties in comparing results. Additionally, studies conducted prior to 1967 took place in racially segregated school systems, and it is highly probable that the children spoke African American English (AAE). In this dialect, several types of disfluencies, such as revisions, repetitions, and prolongations, represent distinct semantic functions that could have been mistakenly regarded as stuttering (Proctor et al., 2008). A similar concern has been raised for studying Spanish-speaking preschool children, because these nonstuttering children exhibit higher frequencies of all types of disfluencies than monolingual English-speaking children (Watson & Anderson, 2001).

Recent years have seen a renewed interest in this area with a study by Proctor et al. (2008), the only study that zeroed in on preschool children, the age when most stuttering cases have their onset. Using a three-pronged approach that included clinician screening of children, teacher identification, and parent identification, data were collected on 3,164 children ages 2 to 5, 2,223 African Americans and 941 European Americans. The prevalence of stuttering was 2.6% for the African American, and 2.44% for the European American children. The difference was not significant. A few years later, however, scientists at the USA Center for Disease Control and Prevention (Boyle, Boulet, Schieve et al., 2011) surveyed parents and guardians of 119,367 children, age 3–17 years, asking if their child had any of several childhood disabilities, including stuttering (during the past 12 months only). For the white group, prevalence was 1.27%; for the black group prevalence was more than double at 2.63%; and for the Hispanic groups it was 1.96%. The difference between the white and black groups was statistically significant. Keep in mind, however, that the main source was parent reports with no firsthand verification. It would appear, therefore, that at the present the race factor in stuttering, limited here to African American, remains open, requiring more carefully planned investigations. A difficult question is the definition of races in the United States in view of the many
individuals presenting various degrees of mixed races. To better examine the contribution of race in stuttering, large, careful incidence and prevalence studies in black Africa would be very helpful (Yairi & Ambrose, 2013).

Culture

For several decades, especially from the 1940s to the 1960s, beliefs that cultural values can significantly influence the incidence of stuttering were popular among speech pathologists and anthropologists. They argued that competitiveness, social pressure, and especially attention to speech skills, increase the incidence and vice versa. These ideas were in line with the influential diagnosogenic theory that assigned the cause of stuttering to parents’ attitudes toward a child’s speech (Johnson & Associates, 1959). Indeed, early reports claimed that certain Native American tribes did not stutter and did not even have a word for stuttering (Snidecor, 1947), whereas other tribes displayed a high incidence of stuttering (Lemert, 1953). Based on his impressions, Lemert (1962) also provided examples of cultural effects on either higher (Japan) or lower (Polynesian islands) occurrence of stuttering. More recently, Ujihira (2011) revisited that line of thinking, suggesting that the incidence/prevalence of stuttering in Japan is low. Unfortunately, his account was not based on hard incidence data.

Evidence eventually emerged for the presence of stuttering, as well as for a word for it, in Native American tribes previously regarded as stuttering-free (Zimmermann, Liljebald, Frank et al., 1983). Furthermore, as mentioned in the previous section, more scientific surveys in several countries did not show markedly different prevalence from American and European studies. These were conducted in countries such as Egypt, Japan, and South Africa, characterized by cultures different from Western cultures.

In the 1940s, Wendell Johnson and John Snidecor claimed they had found a society in which there was no stuttering. Interviews with the Bannock-Shoshone American Indians led them to conclude that the Indians had no word for stuttering and had never seen anything like it (when modeled). Later, in the 1960s, anthropologist Art Frank found conclusive evidence that the tribes had words for stuttering and that there had been people who stuttered present among them. What was the source of the discrepancy? The people in the tribe needed to feel sufficiently safe and trusting of the outsiders before they would admit their knowledge and experience with stuttering. Thus the validity of data collected from cross-cultural interviews depends on investigator rapport with informants.

The cultural domain may also be expanded to include stutterers’ socioeconomic status, a factor that attracted some attention several decades ago. At the time, Morgenstern (1956) reported that among 29,500 Scottish schoolchildren, there was a statistically significant tendency for those coming from lower socioeconomic status groups, especially families of semiskilled workers, to be affected by a higher prevalence of stuttering than...
Chapter 2 / Who and How Many Stutter?

children from the middle or upper classes. A favorite explanation, fitting well within the then-prevailing diagnosogenic theory, was that upward mobility pressure exerted in these social layers, that is, parents pressuring their children to do better than they have done, causes more children to stutter than in higher classes. These findings and interpretations, however, have failed to gather much, if any, support.

**Bilingualism**

The ability to speak colloquially in two languages is another cultural aspect that has received some attention in relation to stuttering. Does the introduction of a second language pose a risk factor for stuttering? The available data are scant and suffer from weaknesses identified earlier. Most of the past findings suggested that stuttering is more prevalent among bilingual than among monolingual speakers. Travis, Johnson, and Shover (1937) reported a prevalence of 2.8% and 1.8%, respectively, in 4,827 schoolchildren. In South Africa, stuttering prevalence among bilingual schoolchildren was 2.16% as compared to 1.66% among monolinguals (Stern, 1948). More recent studies that corroborate this trend are lacking. An Internet survey by Au-Yeung, Howell, Davis et al. (2000) of nearly 800 individuals from 40 countries did not support past reports. The percentage of speakers reporting either current or past stuttering was almost identical among monolingual and bilingual speakers, 21.74% and 21.65%, respectively. The validity of this study is questionable for several reasons, including the fact that the majority of the respondents were females, a very atypical sample of people who stutter. A recent study by Howell, Davis, and Williams (2009) sampled children who stutter, ages 8–12 years, in southeast England. They reported that among 38 bilingual children who stuttered, 36 (95%) stuttered in both languages, and that among 23 children with bilingual development since birth, recovery was lower compared to the monolingual and bilingual children who did not start to acquire the second language until they entered kindergarten. These results should be viewed with caution due to methodological and reporting deficiencies.

**Prevalence in Clinical Subpopulations**

We turn now to very different subpopulations than the ones discussed in the previous section. Each of these is characterized by a certain abnormality. Knowing the incidence and prevalence of stuttering within these subpopulations might contribute relevant information to our understanding of stuttering. In a well-known review of the stuttering literature, Andrews et al. (1983) noted that various disorders, especially obvious neurological conditions such as cerebral palsy, are associated with a higher than expected prevalence of stuttering. Consequently, they entertained the idea that more subtle central nervous system (CNS) dysfunctions may be causative factors of disfluent speech. Taking a different angle, several researchers investigated how many people who stutter also exhibit other disorders. Indeed, they found that stuttering tends to be associated with a host of other disorders (Arndt & Healy, 2001; Blood, Ridenour, Qualls...
et al., 2003). This raises the prospect that stuttering may be either a causative agent or a co-occurring disorder that shares a common cause. Regardless, we have emphasized the value of understanding incidence and prevalence differences in various groups. Either unusually high or unusually low figures could provide clues concerning the causes, precipitating factors, and treatment of stuttering. Several such groups are discussed next.

**Hearing Impairment**

One of the most interesting phenomena within our topic of incidence and prevalence is that people who suffer substantial loss of their hearing sense exhibit little or no stuttering. This could be a form of indirect evidence regarding the nature and cause of stuttering. In other words, if sufficient auditory acuity is needed to stutter, one may infer that processes involving auditory self-monitoring of speech play a role in the disorder.

Two early teacher surveys of schools for the deaf (as these were called), with a total student population of 28,000, yielded only 14 cases, a prevalence of only 0.05%, or a 20th of 1% (Backus, 1938; Harms & Malone, 1939). It is important to point out that only oral communication was considered. Since then, Montgomery and Fitch (1988) carried out the last prevalence study in this population; they also sought information for stuttering in manual communication. Responses to a questionnaire survey from 77 schools for the hearing impaired with a total of 9,930 students revealed only 12 children who stuttered: 3 in the oral mode, 6 in the manual mode, and 3 in both modes. Stuttering in the manual mode occurs as repetitive or prolonged movements of the hands or arms while signing language. The prevalence of 0.12%, is still considerably lower than that in the population at large. Of interest is the finding that the perceived manual disfluency was more prevalent than the oral disfluency. Silverman and Silverman (1971) too reported on the presence of “manual stuttering” among deaf people. According to the experience of one of us (Seery), however, clinicians should not be surprised to encounter people with moderate hearing loss who stutter.

Anecdotal observations by professionals who had extensive contact with this group have supported the conclusion pertaining to the rarity of stuttering in deaf people. Gutzmann (1912) commented that this was a well-known fact, and Bluemel (1913) noted that Gallaudet, a famous educator of the deaf, had stated that in 50 years of experience he could not recall ever encountering a deaf person who stuttered. Thus a connection between stuttering and audition is strongly suspected.

The hypothesis of a stuttering–audition link has been reinforced because high-level masking noise, which in effect reduces hearing, often results in a temporary reduction, or complete suppression, of stuttering, a phenomenon that has been applied in therapy. The theoretical views and recent research of the relation between stuttering and audition and related brain structure and function are discussed in Chapter 7.
Cleft Palate

Another clinical group with an apparently low occurrence of stuttering is that of individuals born with cleft palate and hypernasal speech. Here again, if this finding is upheld, it may have implications for the underlying causal factors of stuttering. The relevant literature, however, is limited. Bloodstein (1981) observed that stuttering in individuals with cleft palate is uncommon but did not provide substantiating data. Schwartz (1976) discussed a single case of a child with cleft palate who stuttered when wearing a corrective appliance. Blood and Seider (1981) reported that in a sample of 1,060 stutterers identified in the caseload of 358 speech-language clinicians, only 1% was composed of cleft palate patients. This finding, however, pertains to the occurrence of cleft palate among people who stutter, not the occurrence of stuttering in people with cleft palate.

The only direct study on this population was conducted by Dalston et al. (1987), employing retrospective examinations of the records of 534 patients, ages 3–66 years, all with structural anomalies that affected the velopharyngeal closure. Only one person in the sample, less than 0.2% of the total, was identified by speech-language clinicians as manifesting stuttering. Such a low occurrence of stuttering in individuals likely to experience considerable parental intrusive behavior and concern about their speech (Long & Dalston, 1983) raises questions about theoretical positions that claim negative environmental reactions to speech cause stuttering (e.g., Johnson & Associates, 1959). The phenomenon, however, gives rise to physiological considerations, for example, the possible relation between the duration of intraoral pressure drop and speaking rate. It is known that the overall speaking rate of people with cleft palate is slower than normal. Slowing down the speaking rate also increases fluency in people who stutter.

Cognitive Impairment

Whereas those with cleft palate and those who with hearing impairments present a lower incidence of stuttering than the general population, on the other end of the spectrum is the population of people with low mental abilities (called “mentally retarded” in past terminology) as classified by intelligence tests and other assessments. Several studies have reported considerably higher than normal incidence in this population. In the general group of cognitive impaired, early studies indicated 14% to 17% prevalence (Gottsleben, 1955; Schlanger & Gottsleben, 1957), whereas later findings suggested lower figures of 2.5% to 7.0% (Chapman & Cooper, 1973; Schaeffer & Shearer, 1968). Apparently the prevalence of stuttering increases with the severity of the impairment. According to Boberg, Ewart, Mason et al. (1978), stuttering was twice as frequent among the trainable mentally retarded (TMR; IQs of 25 to 50) compared to the educable mentally retarded (EMR; IQs of 50 to 70). Similar results were reported by Brady and Hall (1976). They found 1.60% stuttering cases among those with relatively higher IQs; it was twice as high, 3.08%, for students with lower IQs.

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4In a small study of only 74 children, Schlanger (1953) reported that more than 20% exhibited stuttering.
Part 1 / Nature of Stuttering

Most interesting are data pertaining to the Down syndrome subgroup, for whom surveys yielded prevalence estimates ranging from 15% (Schubert, 1966) to an extreme of 53.20% (Preus, 1973). Although some have argued that the high prevalence figures may have resulted from possibly confusing cluttering, hesitation, and expressive language difficulties for stuttering, others have maintained that stuttering characteristics exhibited by this subpopulation are similar to those observed in the population at large. Those with cognitive impairment who stutter, however, show low emotional reactivity to their stuttering (Preus, 1973, 1990). Otto and Yairi (1976) reported that children with Down syndrome, even if they are not regarded as exhibiting stuttering, produce very disfluent speech, including repetitions of syllables and words.

The high prevalence of stuttering in people with Down syndrome calls attention to a host of possible influences on stuttering, for example, chromosomal abnormality and/or motor deficiencies caused by low muscle tone during the critical stages of oral skills development. A genotyping study by Suresh et al. (2006) found the strongest indications for possible genes underlying stuttering was for females who stutter; and that sign was located on chromosome 21, the one that has also been implicated in Down syndrome. At the present, however, whether these two facts are related remains unknown. Additionally, the frequent occurrence of stronger vocabulary skills than expressive language abilities among children with Down syndrome provides clues that differences in the level of skills seen in certain areas of language proficiency may be an important factor in stuttering.

Although much of the data concerning stuttering among the cognitively impaired were collected more than 30 years ago, there has been recent support in a study conducted in Belgium. Among the 1,272 pupils attending special schools, including the so-called mentally handicapped, 2.28% were reported to stutter, 4 times more than in the regular schools surveyed. This group, however, also included children with emotional and physical problems (Van Borsel et al., 2006).

Other Groups
Scattered information has been published about other clinical groups showing either higher or lower prevalence than in the population at large. Higher prevalence was found for people with epilepsy (Gens, 1951), brain damage (Bohme, 1977), and psychosis (Freund, 1955). Lower prevalence was found for people with diabetes (Boldon, 1955). Generally, however, all pertinent surveys are outdated, small, not well documented, and sometimes contradictory.

Summary
We learn about how many and who stutter by studying aspects related to the incidence and prevalence of stuttering. Prevalence and incidence data are very useful for understanding the nature and possible cause(s) of stuttering, guiding the preparation
of clinicians to specific needs of subpopulations, overall planning of clinical services at the national and local levels, and for obtaining financial resources for both research and clinical purposes. Thus they are important to the development of both theory and treatment for stuttering. Key points made in this chapter include:

- **Incidence** is the estimate of the chance of occurrence of any disorder. **Prevalence** is the estimate of how many people exhibit the disorder at a specific time period. Data on these two parameters are essential for designing studies of people who stutter, constructing genetic models of stuttering, and understanding its developmental trends.

- Appropriate interpretations of incidence and prevalence estimates require an appreciation of the varying methods that may have influenced the available data. Target populations have varied widely, and different approaches have been used, including cross-sectional, longitudinal, and retrospective studies.

- Methodological dissimilarities across studies have been related to the definition of stuttering, the specific technique of data collection (e.g., mailed questionnaires; direct examination), and the people providing the information about who stutters.

- Although 5% has been commonly cited as the lifetime incidence of stuttering, more recent findings indicate the possibility that it is as high as 8% or even higher. More research is needed to verify this new estimate.

- The overall prevalence of stuttering appears to be lower than the traditionally accepted 1% level and is probably closer to 0.70%.

- Children who stutter often are born into families that have other members who stutter. The strong familiality of stuttering has given rise to several interpretations of the disorder, among which genetics has prevailed.

- Incidence and prevalence data reveal clear evidence for an age factor in stuttering. With possible slight variations, both incidence and prevalence decline across the life span.

- The age-related diminution in the number of people who stutter reflects the combined factors of (a) declining new incidences in older ages, and (b) the growing number of natural recovery cases.

- Among preschoolers, prevalence may be larger than 2%, nearly three times higher than the average prevalence across the life span. Therefore, it would seem justified to alter the common perception that stuttering is a “small” problem. From a practical point of view, more resources should be directed to the study of stuttering in young children and for the preparation of clinicians to treat them and provide parent counseling.

- Both the incidence and prevalence of stuttering are gender-influenced with males running twice the risk of females to exhibit the disorder initially; the risk for them to sustain stuttering over years or even for life is much greater.

- The male-to-female gender ratio is smallest in very young children, generally increasing with age (small ratio fluctuations between specific age brackets are possible). Overall, older age brackets include fewer stutterers, mostly males.
Part 1 / Nature of Stuttering

- The combined effect of the age and gender factors is to shrink the stuttering population as it matures and to greatly increase its male predominance. Such extensive changes in the composition of people who stutter should be kept in mind prior to reaching conclusions about the “nature of stuttering” when based on observations of a narrow, adult population segment.

- Several clinical groups reveal large deviations, up or down, from the prevalence of stuttering in the population at large. Better understanding of such departures may provide relevant clues about the causes and nature of the disorder.

- Although there have been some indications for differences in the occurrence of stuttering in diverse cultural and racial populations spread over diverse geographic regions, much of the available information or reported impressions have not been adequately substantiated. Furthermore, it is not clear that, even if large differences exist, they are indeed due to cultural factors. Although culture may be a factor, genetic factors underlie incidence in specific groups is a serious alternative.

Study Questions and Discussion Topics

1. Test your knowledge of incidence/prevalence by answering questions about hypothetical data, presented in the table here, from a combined longitudinal and cross-sectional study of children 3 to 5 years of age.

   a. You will notice that one group of children was sampled longitudinally for all 3 years of the study (no attrition). How many children were in that group?

   b. Does this table offer information about incidence or prevalence? Why?

   c. What would you need to know in order to estimate the other kind of information (from Question C)?

   d. How do the estimates change most, according to year or according to age?

<table>
<thead>
<tr>
<th>Year</th>
<th>Age 3 Years</th>
<th>Age 4 Years</th>
<th>Age 5 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stuttering</td>
<td>Pop. Sample</td>
<td>Stuttering</td>
</tr>
<tr>
<td></td>
<td>Cases</td>
<td>%</td>
<td>Cases</td>
</tr>
<tr>
<td>2102</td>
<td>20</td>
<td>400 5.0</td>
<td>15</td>
</tr>
<tr>
<td>2103</td>
<td>28</td>
<td>700 4.0</td>
<td>12</td>
</tr>
<tr>
<td>2104</td>
<td>32</td>
<td>800 4.0</td>
<td>14</td>
</tr>
<tr>
<td>Total</td>
<td>80</td>
<td>1,900 4.21</td>
<td>41</td>
</tr>
</tbody>
</table>

2. What are the advantages and disadvantages of surveying reports of schoolteachers to study the prevalence of stuttering?

3. What is a retrospective study? What are the limitations of retrospective studies in gathering incidence data?
4. Does stuttering vary across populations with the following characteristics? If so, how?
   a. Geographic region
   b. Gender
   c. Age
   d. Hearing impairment
   e. Cleft palate
   f. Cognitive impairment

5. Which figure is apt to be larger, prevalence or lifetime incidence of stuttering?

6. What are the research and clinical implications of incidence and prevalence data for stuttering?

7. What are plausible explanations for the variations in the sex ratio that occur with age in the stuttering population?

8. What factors may account for differences in the incidence of stuttering among cultures and races if, indeed, such differences are confirmed?

Websites


Suggested Readings


