Fluency Disorders

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Contents

Introduction

The purpose of this brief introduction is to provide readers with a sense of the basic structure and content of the book. With regard to physical organization, *Fluency Disorders* is divided into four main sections that follow a progression from normal to impaired functioning and from assessment to treatment. Each of the chapters concludes with a brief summary, which functions as an abstract of the main concepts that were presented. The terms *client* and *patient* are used in instances when the discussion focuses on clinical interactions and activities.

Section I deals with the nature of fluency: what fluent speech is, how typical speakers accomplish fluent speech, how disfluent speech arises, and what "normal fluency" is. A key point to be taken from this section is that "fluent speech" is by no means perfectly smooth. Thus, in a speaker who exhibits "typical fluency," speech is *mostly*, but not entirely, continuous, and the interruptions in fluency that do occur generally have little effect on the speaker's ability to communicate. Another key point is that fluency is more than just continuous speech. Rather, it is manifested in multiple ways, including speaking rate, rhythm, and effort; speech naturalness and talkativeness; as well as the stability of performance across situations and over time.

Section II deals mainly with the nature and characteristics of fluency disorders. The primary focus in this section is on developmental stuttering, which is the most common type of fluency disorder. Cluttering and acquired forms of fluency impairment are discussed at length in this section, as well. Also included in Section II is information about disfluency patterns observed in people who have concomitant disorders that affect language and/or cognition functioning. The disfluency patterns observed in these instances sometimes can be quite severe, but in many cases, they are relatively mild in terms of their impact on communication and, thus, are not likely to be the person's primary area of disability. Still in other cases, the disfluency patterns may be relatively mild in terms of frequency of occurrence but quite unusual in form and thus quite noticeable to listeners. The section offers discussion of the scope of fluency difficulties that exist, along with their associated etiologies and characteristics.

In Sections III and IV, the focus shifts toward practical matters associated with assessment and treatment. Section III deals with issues associated with assessing individuals who have fluency-related concerns. Topics in this section include basic assessment concepts, methods for collecting data about clients' fluency-related performance, details associated with analyzing aspects of fluency within a speech sample, as well as issues related to diagnosis, severity rating, prognosis, and clinical recommendations. Section IV deals with issues related to improving fluency functioning. The latter section begins with a detailed discussion of how to establish treatment goals, define treatment success, and select treatment approaches. The discussion then shifts toward general treatment principles. Basic properties of six general principles are outlined, and the evidence base associ-

ated with each of the principles is summarized. It is argued that a principle-based approach to intervention provides clinicians with a mechanism for integrating research-based treatments with data from clinical practice and the client's unique problem profile and treatment values. This is not a prescriptive, one-size-fits-all approach to intervention but rather one that is intended to promote individualized intervention within an evidence-based context. The focus on treatment principles also leads naturally to discussion about the *commonalities* that exist among the numerous treatment strategies that have been described in the treatment literature. As a consequence, traditional dichotomies between "fluency shaping approaches" and "stuttering modification approaches" are downplayed, while the similarities that exist across intervention approaches (e.g., regulation of speech motor movements) are emphasized.

The book concludes with an overview of the treatment literature, with particular emphasis on outcome studies conducted with speakers who stutter. Studies are organized according to the particular treatment principles that the researchers in a particular study emphasized most. Many of the treatment protocols in these studies incorporate more than one of the six treatment principles we have outlined. Still, in most of these cases, one or two treatment principles are emphasized to a much greater extent than the others. Review of these studies will provide readers with examples of how clinical scientists have implemented treatment principles within a research context. General summaries of these treatments are presented in this text. Readers are advised to consult the original sources for specific details on the implementation of a particular treatment. Summaries of the research literatures on altered auditory feedback and drug-based intervention are presented as well, so that readers will have a sense for the status of these approaches to intervention. The book ends with a brief discussion of approaches to evaluating treatment outcomes. A multidimensional framework to outcome assessment is described, wherein progress can be examined from both clinician and client perspectives and within skill-building contexts as well as real-world settings.

SECTION I

Foundational Concepts

1

Conceptualizing Fluency

The term *fluency* has several connotations, one of which is to characterize the way in which people perform tasks that require sequenced movements. Consider, for example, the seamless twists and turns that a gymnast makes while performing a routine on the parallel bars or the sweeping finger movements that a pianist makes while playing a classical music piece. The notion of fluency has relevance in the domain of human communication as well, where one can describe the fluency with which people read, write, sign, and speak. Our primary focus in this text is on *speech fluency*; that is, the fluency that people exhibit when speaking. That said, we also touch on fluency as it pertains to other domains of communication such as oral reading.

Demonstrations of highly fluent speech are commonplace and, at times, truly impressive. Consider the carefully measured sentences of a woman who is delivering a eulogy for a lifelong friend, the rapid-fire remarks of an auctioneer who attempts to entice a roomful of bargain hunters to purchase items at a favorable price, or the fiery rhetoric of a politician who seeks the support of voters in an upcoming election. Instances of highly fluent speech are evident in many mundane activities as well—ordering a cup a coffee, for example, or scheduling a medical appointment. Indeed, fluent speech is so commonplace during daily activities that most people take very little notice of this aspect of communication. When an individual's speech fluency deviates significantly from the norm, however, it can literally turn heads. It seems as if everyone wants a glimpse of the disfluent speaker.

The word *fluency* derives from the Latin word *fluere*, which means *fluid*. Not surprisingly, the notion of fluidity figures prominently in both academic and nonacademic definitions of fluency. Dictionary definitions for fluency typically list descriptors such as *ease*, *effort*, and *proficiency*. These same terms appear in academic discussions of fluency, as well. Although ease, effort, and proficiency are integral to understanding the construct of fluency, there also are other aspects of fluency that warrant consideration. These issues are discussed in the next section.

Dimensions of Fluency

In one sense, descriptors such as *ease*, *effort*, and *proficiency* capture some of what is most important in speech fluency, but, in another sense, they only scratch the surface in describing the nature of speech fluency and its relationship to verbal communication. As a general rule, the study of any subject area can be enriched by the use of a conceptual framework or model. A model provides interested parties with a "roadmap" of the territory that is to be examined along with a sense for the number and types of variables that should be considered when studying the subject area (Bernstein Ratner, 2005; Friel-Patti, 1994). The use of a conceptual model also helps focus the kinds of questions that one asks about the subject area, and it leads to predictions about the kinds of answers one expects to get in response to the questions.

It is against this backdrop, that we introduce the concept of *fluency dimensions*; that is, the perspectives from which one can study fluency. As we will see, fluency is a multidimensional construct, and it is important to clarify what these dimensions are prior to discussing a comprehensive model of fluency. We begin our discussion of fluency dimensions with an overview of influential work by Fillmore (1979) and Starkweather (1987), each of whom proposed multidimensional frameworks that one can use to study fluency. Fillmore (1979) approached the concept of fluency as it pertains both to the general population and to individual differences in performance. Fillmore primarily viewed fluency competence as a reflection of a speaker's language abilities. Accordingly, his thoughts on fluency overlap to some extent with what speech-language pathologists now regard as *pragmatic functioning*. Fillmore (1979) noted that it is important to differentiate . . . between "*how* people speak (a) language and *how well* people speak (a) language." He then went on to argue that fluency is one measure of how well people speak their language.

Fillmore (1979) proposed four dimensions through which one can measure a speaker's fluency competence:

- "The ability to talk at length with few pauses" (which we will term *talkativeness*);
- "The ability to talk in coherent, reasoned, and 'semantically dense' sentences" (which we will term *succinctness*);
- "The ability to have appropriate things to say in a wide range of contexts" (which we will term *flexibility*); and
- "The ability . . . to be creative and imaginative in . . . language use" (which we will term *creativity*).

In the following sections, we explore the relevance of Fillmore's fluency dimensions to the assessment, diagnosis, and treatment of speakers who exhibit impaired fluency.

Starkweather (1987) extended Fillmore's (1979) work by proposing additional dimensions of fluency that pertained more directly to physical aspects of speech production. Starkweather defined speech fluency as "a normal level of skill in the production of speech" (p. 12). Like Fillmore, he proposed four primary dimensions of fluency:

- *Continuity* (i.e., the connectedness of sounds, syllables, and words within a spoken message);

- *Rate* (i.e., the speed at which a spoken message is delivered);
- *Rhythm* (i.e., prosodic patterns within a spoken message); and
- *Effort* (i.e., the amount of energy a speaker expends when speaking).

Starkweather noted that continuity, rate, and rhythm are associated with aspects of speech timing, and he argued that each is subordinate to effort. In other words, utterances[1] that a listener perceives to be highly effortful are those that feature deviations in the continuity, rate, and/or rhythm of what a speaker has said.

We have flagged two additional aspects of speech production that merit consideration as fluency dimensions. One of these is *speech naturalness* (Nichols, 1966; Parrish, 1951), a construct that researchers began to study in earnest during the 1970s to 1980s. Traditionally, researchers have used naturalness as a means of evaluating the quality of speech in individuals who are attempting to manage stuttering through application of various stuttering management strategies (e.g., Ingham & Packman, 1978; Martin, Haroldson, & Triden, 1984; Runyan, Bell, & Prosek, 1990). In most studies of speech naturalness, researchers have been interested in comparing the post-treatment speech of treated individuals to that of typical speakers to determine whether the speech of the two groups sounds similar. Measures of speech naturalness have become increasingly common in studies of treatment efficacy with speakers who stutter (e.g., Riley & Ingham, 2000; Teshima, Langevin, Hagler, & Kully, 2010), and they are recommended for use as a standard treatment outcome measure (Ingham & Riley, 1998). We suspect that naturalness, like effort, functions as a superordinate dimension of fluency and that it reflects the combined effects of other fluency dimensions, particularly those associated with continuity, rate, rhythm, and effort.

The other aspect of speech production that warrants consideration as a fluency dimension is *stability*, a construct that pertains to speech consistency (e.g., Kleinow & Smith, 2000; Smith & Goffman, 1998; Van Riper, 1971; Yaruss, 1997). Stability differs from other fluency dimensions because it reflects *repeated measurements* of speech performance; that is, how a person performs over time. Normally, the speech production system functions in a relatively stable manner. That is, a typical speaker exhibits essentially the same degree of fluency when asked to say a particular utterance 10 times in succession or when asked to speak in the same situation day after day. *Variability* is a construct that is closely associated with stability. An unstable speech system yields more variable results than a stable speech system does.

With the addition of naturalness and stability, the number of prospective fluency dimensions swells to 10. At present, we are unsure if each of the 10 fluency dimensions is equally important to advancing our understanding of fluency and fluency disorders, or if all 10 dimensions are even necessary to include in a fluency model. For now, however, we will include all of them in our working model of fluency. We present an overview of these prospective fluency dimensions (Table 1–1) and other details in

[1]An *utterance* is a string of words or clauses that communicates an idea and is bound by a single intonational contour (e.g., Logan & Conture, 1995, 1997; Meyers & Freeman, 1985). Utterances often are set apart by pauses, as well. An utterance can consist of a single word (e.g., *me*) or multiple words (e.g., *In the morning.*). All sentences are utterances, but not all utterances are sentences.

Table 1–1. Overview of the Primary Dimensions of Fluency

Dimension	Description
Continuity	The extent to which spoken utterances are free from unexpected or unintended interruptions that are related to errors in speech planning or execution.
Rate	The speed at linguistic information is expressed (includes the promptness with which a spoken utterance is initiated or terminated).
Rhythm	Variations in the duration of syllables (and their associated speech sound segments) during the course of a spoken utterance; prosodic patterns in utterances.
Effort	The amount of physical or mental energy used to produce an utterance. (Related issues include physiological [e.g., muscle activation] and cognitive [e.g., allocation of attention and memory] variables.)
Naturalness	The extent to which spoken utterances sound like those of typical speakers in terms of continuity, rate, rhythm, and/or effort.
Talkativeness	Overall verbal output; the ability to fill time with talk; the extent to which a speaker verbally participates in daily activities (includes issues related to verbal participation).
Communicative flexibility	The ability to generate appropriate verbal remarks across a range of communicative settings and conversational partners (includes issues related to conversational pragmatics).
Succinctness	The organization and semantic density of utterances; the ability to speak in a compact way, with minimal use of meaningless "filler."
Creativity	The ability to produce novel, clever, or distinctive utterances spontaneously during discourse (includes issues related to producing performative speech acts).
Stability	Pertains to the variability of fluency and/or speech-related movements across successive iterations of a particular utterance; the ability to say a particular utterance in the same way time after time.

the remainder of this section. We discuss interrelationships among the fluency dimensions near the end of this chapter through presentation of a working model of fluency.

Continuity

Continuity refers to the connectedness with which a person speaks. More specifically, continuity concerns the extent to which a speaker articulates the sounds within syllables, the syllables within words, and the words within utterances in a seamless, ongoing manner. In another sense, we can view continuity as the extent to which spoken utterances are free from interruption. Continuity is perhaps the most extensively researched fluency dimension, and it is a basic component of most, if not all, fluency assessment protocols. Thus, we devote a relatively

large amount of space to continuity in this chapter.

Interruptions in the continuity of speech are common, even for speakers who have "normal" levels of speech fluency. As we explain below, many factors can precipitate such interruptions. However, some forms of continuity interruption are more relevant than others are to the assessment of speech fluency and to the clinical management of fluency disorders.

Nonspeech Physiological Events

Many nonspeech physiological events have the potential to trigger interruptions in speech continuity. Examples of these include the following: *breathing*, *sneezing*, *yawning*, *hiccupping*, *burping*, and *coughing*. When these events occur during the course of speech production, breaks in speech continuity are likely. Continuity interruptions that result from speech breathing are commonplace; however, continuity interruptions that result from other nonspeech physiological events are not.

Because continuity interruptions of this sort do not directly reflect a speaker's communicative competence, a clinician usually will *not* note them during a fluency assessment. Exceptions to this rule include instances in which a speech-language pathologist judges that a speaker produces such behaviors deliberately to conceal or postpone symptoms of fluency impairment. For example, a speaker who stutters may anticipate difficulty in saying an upcoming word fluently. The speaker is uncomfortable with letting other people see or hear the fluency problem and consequently delays the initiation of the word by pretending to yawn.

Prosodic Structure

The term *prosody* is a phonological concept that refers to the rhythmic and intonational properties of a spoken utterance (Kent & Read, 1992). As such, the term encompasses the temporal properties of spoken utterances, including phenomena such as segment duration, word duration, and pause duration (Ferreira, 1993, 2007; Selkirk, 1984). The classic view is that a speaker specifies the durational properties associated with individual words within a metrical plan for an utterance (see, for example, Selkirk, 1984). Speech scientists and psycholinguists regard metrical planning as a primary source of the *final syllable lengthening* phenomenon; that is, the tendency for a syllable to be longer in duration when it occurs within an utterance-final context than it is when it occurs within a nonfinal utterance context (Ferreira, 1993; Fon, Johnson, & Chen, 2011; Klatt, 1974, 1975; Snow, 1994, 1997). Others, however, have argued that the motor system contributes to word duration. For example, final syllable lengthening has been noted in normally hearing 3-month-old infants as well as in infants and preschoolers who are deaf (Nathani, Oller, & Cobo-Lewis, 2003).

Other aspects of speech that have a prosodic basis include the syllable stress and segment lengthening associated with the conveyance of certain communicative intentions. For example, a speaker can convey equivocation through vowel lengthening, as in the lengthening of the vowel [ɛː] in the word "well" (*Well, it's complicated.*) Pausing is another aspect of prosody that is relevant to both verbal communication and the assessment of speech continuity. Speakers use pauses for a variety of purposes. Chief among these is to mark syntactic boundaries (e.g., *Our*