The SAGE Encyclopedia of Human Communication Sciences and Disorders

Speech Naturalness

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Speech naturalness is the term applied to listeners' perception of the degree to which speech meets the typical patterns in terms of intonation, voice quality, rate, rhythm, and intensity, with respect to the syntactic structure of the utterance. When applied to an individual with an acquired speech disorder, the perceived speech naturalness may be assessed with respect to the individual's speech at the premorbid state. Speech naturalness is frequently implemented as an outcome measure in a variety of communication disorders. It can be used as a means of gauging the severity of the disorder, evaluating the degree to which a speech disorder affects an individual's ability to participate in the community or society or estimating the efficacy of interventions.

Speech naturalness is a global descriptor that integrates the effects of numerous perceptual cues of speech into one overarching measure. As a global measure, it captures a wide range of individual features across a broad range of communication disorders. Specifically, *naturalness* is a composite of listeners' interpretations of the function of the respiratory, phonatory, and articulatory systems. Thus, while *highly natural* speech samples may be acoustically quite similar, *unnatural* speech samples may differ with respect to the underlying acoustic features. Judgments of this type of gestalt speech parameter have been suggested to be more reliable than listeners' judgments of the individual, specific acoustic features that lead to changes in speech naturalness. This entry provides an overview of speech naturalness and its relationship to speech intelligibility, as well as measures of speech naturalness and related impairments and treatments.

Because of its multidimensional nature, speech naturalness is similar to speech *intelligibility*, that is, the degree to which a speaker's acoustic signal is correctly received by listeners. However, while these two global parameters can be related, in general, speech intelligibility is thought to be affected largely by articulatory disturbances, whereas speech naturalness is more greatly affected by prosodic deficits. In particular, judgments of speech naturalness have been shown to be related to speech fluency in individuals who stutter; to pitch variability in users of synthetic and alaryngeal (i.e., esophageal and electrolaryngeal) speech and those with hypokinetic dysarthria (i.e., Parkinson's disease); and to voice quality and pitch variability in transgender speakers. However, this is not to say that judgments of naturalness are limited to prosodic features. For instance, nonnative speakers have been shown to exhibit impaired speech naturalness, which is likely not just a result of potential differences in their speech rhythm and stress; impaired speech naturalness in these speakers may additionally be affected by differences in articulatory patterns.

Naturalness of an individual's speech is measured via judgments by multiple listeners. These judgments have been elicited by researchers through a variety of methods: equal-appearing interval scales, visual analog scales, and direct magnitude estimation. Several, yet not all, studies suggest that speech naturalness is metathetic, such that its perceptual continuum is substitutive and qualitative, rather than additive and quantitative. Thus, according to these studies, all of the aforementioned methods to elicit listener judgments are valid means of evaluating naturalness. Studies seeking to measure speech naturalness have utilized a variety of listener cohorts: unfamiliar listeners without experience in communication disorders, with and without special training; graduate students of speech–language pathology; practicing speech–language pathologists; and individuals with communication disorders themselves. As a whole, these studies demonstrate that raters who are more familiar with the speech of individuals with communication disorders tend to rate disordered samples as *more natural* compared with unexperienced raters. Most studies assess speech naturalness using only audio samples since the judgments of listeners may also depend on their knowledge of the speaker's age, gender, race, and regional dialect, as well as linguistic factors and the biases of the listeners. Furthermore, naturalness ratings are reportedly more severe in individuals who stutter when the raters use audiovisual recordings than when the raters only use audio samples. There is also evidence that speakers themselves may be able to reliably rate their own speech naturalness, with some individuals responding to this process as a form of therapeutic intervention. However, the speakers' and listeners' perceptions of naturalness differ; therefore, their judgments should not be directly compared. In general, true measurements of speech naturalness are meant to be strictly auditory.

Impairments in speech naturalness can lead to communication partners perceiving the affected individuals as unhappy, cold, withdrawn, introverted, or bored. These false perceptions can interrupt participation in regular

life roles, leading to loss of employment and independence. Thus, impaired speech naturalness can result in social isolation, reduced quality of life, and depression.

Successful interventions targeted to improve speech naturalness in laryngeal speech have focused on the modification of breathing patterns, singing or music therapy, and fluency promotion. Treatments to control speaking rate (e.g., slowing the speech), while effectively increasing intelligibility, have generally had a negative impact on the perceived naturalness in laryngeal speech. More globally, therapeutic interventions often must prioritize between the need for improvements in intelligibility and improvements in speech naturalness. As a result, treatments seeking to improve intelligibility and naturalness generally proceed in a trial and error manner until an appropriate balance is found for that particular individual. Primary efforts to improve the naturalness of synthetic speech (e.g., for augmentative and alternative communication) or alaryngeal speech (i.e., esophageal and electrolaryngeal speech) have focused on providing pitch variation and other prosodic cues.

See also Intelligibility; Pitch; Prosody

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Further Readings

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