



National Center for Voice and Speech

A Cross-institutional consortium of voice and speech professionals

Ingo R. Titze, Executive Director

Fact Sheet

Approximately 7.6 million people in the United States have trouble using their voices.

Disorders of the voice involve problems with pitch, loudness and quality.

By the first grade roughly 5 percent of children have noticeable speech disorders; the majority of these speech disorders have no known cause.

One category of speech disorder is fluency disorder, or stuttering, which is characterized by a disruption in the flow of speech. More than 15 million individuals in the world stutter.

Between 6 and 8 million individuals in the United States have some form of language impairment.

Disorders of language effect children and adults differently.

For children who do not use language normally from birth, or who acquire an impairment during childhood, language may not be fully developed or acquired.

Many adults acquire disorders of language because of stroke, head injury, dementia or brain tumors. Language disorders also are found in adults who have failed to develop normal language skills because of mental retardation, autism, hearing impairment or other congenital or acquired disorders of brain development

Speech is produced by precisely coordinated muscle actions in the head, neck, chest and abdomen. Speech development is a gradual process that requires years of practice. During this process, a child learns how to regulate these muscles to produce understandable speech.

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SCIENTIFIC INVESTIGATIONS

At the core of the NCVS are scientific investigations with the over-arching theme of fully understanding and promoting healthy and effective human vocalization. Eight research perspectives contribute toward this sizeable goal. The NCVS has been highly successful in funding its research through grants, primarily from the National Institutes of Health, totaling more than \$25 million.

Safety in Occupational Voice Use

A set of studies addresses an important public need: the protection of an estimated 10 million workers in the United States who rely heavily on their voices as their primary tools of trade. In field experiments, schoolteacher volunteers wear specialized devices called doimeters to measure and collect vocal vibrations. This information will eventually lead to standards to be set for safe voice use, not unlike OSHA's standards for safe noise levels in the workplace.

Voice Simulation

Computer models of vocalization take into account movements of the soft tissues of the vocal folds, laryngeal cartilages, and airflow during speech and singing. Once the models can accurately simulate the human voice, they can be used by medical personnel to better understand voice injury and disease and to predict outcomes of vocal surgeries. In clinics and vocal studios, these simulators will someday help vocalists predict outcomes of various therapies and singing techniques.

Bioengineering Vocal Fold Tissues

Speaking and singing expose vocal fold tissues to vibration. Yet, scientists don't completely know what levels of vibration are healthy and what the effects on vocal fold cells are when this threshold is passed. To study this methodically, investigators seed cells into synthetic materials in a bioreactor, grow them, and simulate vibrational forces. In this way, cells and their protein products can be exposed to rather violent vibratory forces, not unlike those experienced in the human vocal cords during shouting, coughing or talking for a long time. The ultimate objective of the research is to determine the underlying molecular causes for voice disorders related to excessive use of the voice.

Neurologic Disorders of the Voice

Much of speaking and singing requires precise management and coordination of the breath, vocal fold movements and movement of articulators. When disease, trauma or age affects the nervous system, symptoms often appear in the voice. Researchers are studying the effects of behavioral, surgical and pharmaceutical interventions on speech and voice disorders in Parkinson's disease and other neurologic disorders.

Biomechanics of Airflow and Tissues for Speech and Hearing

In simple terms, air can be considered the fuel of vocalization. Thus models of airflow through the vocal system and the effect on surrounding tissues within them can lead to a better understanding of voice

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production. In the lab, a large physical model allows researchers to study such phenomena as steady and pulsatile flow; effects of vocal fold asymmetry, and abrupt and smooth phonatory transitions. New research collaborations are planned with audiology investigators. The partnership is unique, yet complementary, as the human sound production organ (the larynx) is in many ways analogous to the major sound-receiving organ (the ear).

Voice Forensics

The study of evidence gathering from sound recordings is used to identify and label voices. In addition to “CSI” categories of utility, these comparisons allow researchers to understand the subtle (and sometimes not so subtle) differences in voices. A voice identify numeric, like a bar code, is a research goal.

Vocalizations of Non-Humans

A new direction in our research looks at the sounds that mammals and birds produce. The mechanisms of human vocalization – such as acoustics, physiology, and neural control – are similar to those of non-human mammals and birds. Comparative analysis of living animals provides a useful tool for the understanding of the mechanisms of the human voice and the evolution of human speech.

The Voices of Actors and Singers

Control of loudness, sound quality and vocal efficiency are not well understood. Studying the strategies of highly-trained vocalists, such as singers and actors, can provide important clues for improving the effectiveness of voice rehabilitation and training.

COLLABORATING ORGANIZATIONS

For nearly two decades, the National Center for Voice and Speech (NCVS) has utilized an interdisciplinary and multi-site approach to understanding and enhancing vocal communication.

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Experts in the vocal sciences and arts bring rich perspective on this endeavor. NCVS investigators have long understood that a consortium of institutions is best able to acquire and maintain resources to fulfill these missions than a single organization.

The University of Utah is the lead institution in a consortium of research institutions dedicated to studying the protection, enhancement and rehabilitation of the human voice and speech. Other collaborating institutions include:

The University of Iowa,

The University of Colorado- Boulder,

The University of Wisconsin,

New York University,

University of Texas Southwestern Medical Center at Dallas, and

Brigham Young University

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BACKGROUND

The National Center for Voice & Speech undertakes research and provides referral services in order to help people around the world to enjoy healthy and effective vocal communication.

The National Center for Voice & Speech is a non-profit organization dedicated to scientific research related to human and animal vocalizations, artistic voice production, and prevention and treatment of voice disorders. The National Center for Voice & Speech also conducts seminars, briefings, and other public education and advocacy efforts to inform the general public about better voice use.

The National Center for Voice & Speech is the largest research and education entity about the human voice in the world. It has a collaborative team of more than 50 scientists, educators, clinicians, volunteers, students and support staff from all over the world.

The national headquarters offices are located in Salt Lake City with the University of Utah acting as the lead academic institution.

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