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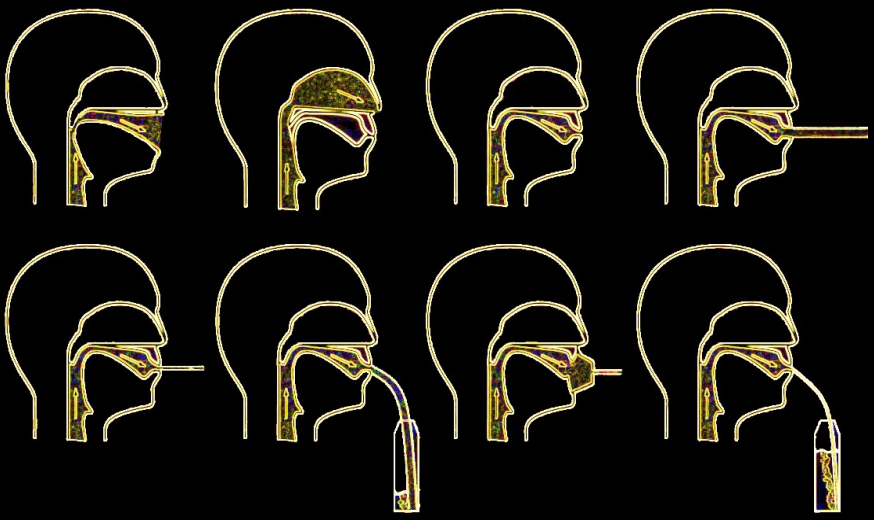

SOVT

Karin Titze Cox
Ingo R. Titze

National Center for Voice and Speech

NCVS

Semi-Occluded Vocal Tract

Principles, Methods, and Training

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DEDICATION

This book is dedicated to our esteemed colleagues, Marco Guzman in Chile and Anne-Maria Laukkanen in Finland. Together and independently, they have pioneered studies on semi-occluded vocal tract principles, methods, and history. It is rare that two people on different continents sustain a collaboration for several decades. We have attempted to cite most of their work and their colleagues' work. It is with deep gratitude that we were able to merge our discoveries with theirs. We invite all readers to go to the original sources and follow future developments.

We are also profoundly grateful to our family, clients, patients and trusted colleagues, who come to us with clinical and research questions that drive and inspire further work in this area. Our motivation comes from an innate desire to love those who surround us, and to love God, who grants us a small measure of His intelligence and wisdom.

FOREWORD

Semi-Occluded Vocal Tract Principles, Methods, and Training

This book is intended to be an introduction to the science and practice of semi-occluded vocal tract (SOVT) methods for voice training, rehabilitation, and general voice care. Karin and Ingo have been a team for nearly 40 years, first singing together at home, then in church and school, and now helping others fulfill their life's dreams with effective and efficient speech and song. It has been a labor of love.

In Chapter 1 we introduce some of the history of SOVT as a springboard for the many contributions to these methods. Chapters 2 and 3 provide an in-depth overview of the science underlying vocalization with a semi-occlusion in the upper vocal tract. Chapter 4 summarizes the successes with SOVT methods being used in clinics and studios. An extensive bibliography is provided at the end. In the Appendix, Karin offers a holistic description of her clinical philosophy, gained from her academic training, love of scientific principle and research, and primarily from her experience in private settings with patients and friends.

We recognize that SOVT methods are changing so rapidly that any book will from its origin be out of date. An apology is offered for lack of inclusion or credit to some of the many contributors. While we lay no claim to the origin or invention of any specific method, an attempt was made in 2006 to give them a common identity with a scientific label,

vocalization with a semi-occluded vocal tract (SOVT). Others have later extended the acronym from SOVT as a scientific phenomenon to SOVTE as a set of exercises. As of this writing, clinicians and voice trainers are increasingly seeking core principles of efficiency that can be incorporated into many effective habilitative and rehabilitative methods for freedom in vocalization.

Karin Titze Cox
Ingo R. Titze

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CHAPTER 1

A LONG HISTORY OF SOVT VOCALIZATION

Vocal communication involves one or more sound sources embedded in an airway. The sound sources can be tissues in vibration or turbulent air escaping from a constricted region. The airway can be open-ended, occluded, or semi-occluded. Airflow and sound production are regulated with these occlusions or semi-occlusions. We begin with nature's solutions as a launching pad toward human adaptations for improving vocalization with a semi-occluded vocal tract (SOVT).

SOVT in Animal Vocalization and Musical Instruments

In animal vocalization, the airway differs greatly across species for respiratory and alimentary needs, which makes the location of the sound sources and the location of sound emission (radiation) also variable across species. Nature provides multiple options and some trend in opposite directions in design (Figure 1.1). Doves and frogs widen the airway and occlude (or partially occlude) the mouth or beak, radiating sound from puffed-up neck surfaces (Gridi-Papp, 2008; Nikol'skii, 2014; Riede et al, 2016). To the contrary, long-range calling by birds and mammals requires extreme mouth or beak openings (Theberge and Falls, 1967; McCarley, 1975; Sekulic,

Figure 1.1. Airway configurations in frogs, mammals, and birds for vocalization.

1982; Mitani and Nishida, 1993; Whitehead, 1995; Zuberbühler et al., 1999; Feighny et al., 2006; Titze and Palaparthi, 2018). In terms of the optimal location of the sound source within the airway, a recent investigation by Riede et al. (2019) showed that a sound source deep within the airway (closer to the lungs, with most of the airway in front of the sound source) produces sound more efficiently than a source in close proximity to the mouth or beak (with most of the airway behind the source). Aerodynamic and acoustic interactions between the source and the airway appear to play a major role in getting maximal sound to the listener.

Musical wind instruments have been shown to exhibit the same source-airway interaction phenomena (Backus, 1969; Benade, 1979), but here, the biological airway is augmented with extra tubes or horns. The main difference between vocalization and playing wind instruments is the nature and location of the sound source (a reed or lips instead of vocal folds) and the artificial extension of the airway. In vocalization, it is now beginning to be understood that an extension of the vocal tract with a tube, a straw, or a megaphone can be beneficial in "training" the sound source for optimal production (Titze and Verdolini Abbott, 2012). Within the airway, a narrow canal downstream from the sound source produces a steady supra-laryngeal airway pressure that can lead to an optimal airway configuration and optimal posturing and shaping of the vocal folds for vibration. This has led to exercises conducted with a semi-occluded vocal tract (Stemple et al., 1994; Verdolini Abbott et al., 2012; Kapsner-Smith et al., 2015), perhaps capitalizing on the source-airway interaction routinely experienced by doves and frogs. Source-airway interaction is also experienced by brass instrument players who either mute

the instrument at the bell, or practice with the mouthpiece in isolation (Figure 1.2).

Figure 1.2. Mouthpiece and mute at the bell in trumpet playing.

It is now understood that interactions exist between movement of the vibrator (vocal folds, lips, or reeds) and the acoustic pressures propagating above and below the vibrator (Titze, 1988; Fletcher, 1992). Movement of the oscillating structure can be smooth (nearly sinusoidal) while movement of the air through the vibrator can be very abrupt (square or sawtooth-like with sharp corners). The peak of the airflow is often delayed relative to the peak of the vibrator movement (Rothenberg, 1981; Ananthapadmanabha and Fant, 1982; Fant, 1986; Titze, 2004); a direct result of source-airway interaction. It has also been shown that vocal tract pressures can lower the oscillation threshold pressure of the vibrator, defined as the minimum lung pressure required to set the vibrator into motion (Chan et al., 1997; Titze, 2009).

About the Authors

Karin Titze Cox is a certified Speech Language Pathologist (SLP-CCC) specializing in vocology, the science and practice of voice habilitation. She received her BA degree from Brigham Young University and her MA from the University of Iowa. She spent her early career in research and practicing in university hospital clinics. Over the last few decades, she has enjoyed private practice and serving as voice clinic director for several clinics within ENT Specialists in Salt Lake City, Utah. Karin served as a board member of the Pan American Vocology Association for three years and currently serves on the National Center of Voice and Speech executive board while engaging in teaching, research, and outreach opportunities. She finds joy in service to her patients, family, community, church, and friends. She also finds joy in singing and performing on occasion.

Ingo R. Titze is called the father of vocology because he coined the word with George Gates in 1989 and established the original curricula in vocology in 1990. He has held appointments at BYU, California Polytechnic University, University of Petroleum and Minerals in Saudi Arabia, Gallaudet University in Washington DC, Bell Telephone Laboratories, the University of Iowa, the Denver Center for the Performing Arts, and the University of Utah. He has written over 500 publications and six books in voice production. He is currently Senior Scientist at the University of Utah Center for Vocology and Chairman of the Board of the National Center for Voice and Speech.

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