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Articulatory Phonetics

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This book provides an in-depth description of the basic anatomy and physiology of speech articulation. The aim of the editors is “to provide a short, non-technical introduction to articulatory phonetics” (p. xxi). This is NOT yet another book on Articulatory Phonetics, but rather one of the best books on Articulatory Phonetics. The book “sets out to give students the basic content and conceptual grounding ... to understand how articulation works and to navigate the kinds of research conducted by practitioners in the field of articulatory phonetics” (p. xxii).

The book is divided into two parts: “Getting to Sounds” comprising 5 chapters and “Articulating Sounds” comprising 6 chapters. By following a feed-forward model, the editors focus on providing a description of the different aspects related to the speech chain, the available tools to quantify these aspects and the most up-to-date theories in Articulatory Phonetics. At the end of each chapter, a series of exercises are provided with the aim of insuring sufficient understanding of the jargon used, and to deepen the knowledge acquired. Practical assignments are proposed at the end of each chapter in order for the reader to “practice” analysis of real physiological data and to gain an understanding of the anatomy of the vocal tract, e.g. constructing a paper larynx (chapter 5) or building a modelling-clay tongue (chapter 9). Many grey boxes are scattered throughout the book and “contain the most interesting [additional] material in the book” (p. xxii). A handy legend at the beginning of each chapter points the reader to the location investigated, being the brain, the lungs or the velum.

After an introduction to the book, chapter 1 focuses on introducing the speech chain and the background anatomical basics needed to understand speech sounds, starting from the “hard parts” (the bones and cartilages) to the “moving parts” (the muscles), followed by a summary of the basic concepts used in the following chapters.

Chapter 2 focuses on the Central Nervous System and its role in controlling speech articulators. An introduction to the basic units of the central nervous system prepares the reader to locate speech areas in the brain, and introduces different techniques used to measure brain activity, such as *fMRI*, *PET*, *EEG*, *MEG*, *TMS*.

Chapter 3 describes the Peripheral Nervous System and its role in transmitting brain signals to the moving parts of the body via several cranial and spinal nerves. These nerves facilitate transforming the electrochemical energy into movement, which is in turn important for speech articulation. *Electromyography (EMG)* is evaluated as a tool to measure muscle activation from the beginning of a thought to the actual muscle movement.

Chapter 4 discusses muscle movements that control speech respiration. Starting from the basic principles of respirations, the chapter offers a detailed account of the anatomy of breathing conditioned by the hard parts and the lungs that affect the amount of air available for speech breathing. *Pneumotachograph* is described as a tool used to estimate airflow and air pressure levels.

Chapter 5 describes the anatomy of the larynx and its role in basic phonation and pitch control, by examining the cartilages and the laryngeal muscles. Grey boxes give the reader the chance to practice Bernoulli principle and to evaluate the links between air pressure below and above the glottis and their effects on phonation. *Electroglottography (EEG)* is examined as a tool for measuring vocal fold closure.

Chapter 6 is concerned with articulating laryngeal sounds. A detailed account of the hard parts in the skull and the hyoid bone and their role in controlling laryngeal muscles is provided. Non-modal phonation and glottalic airstream mechanisms are described in detail. *Endoscopy*, *X-Ray*, or *Ultrasound* are described as tools to measure the larynx activity.

Chapter 7 deals with the articulation of velic sounds. A detailed description of the anatomy of the velum is provided, with more focus on the hard and the moving parts of the velum, and their role in shaping velic contrasts. *X-Ray* is presented as a tool to measure the velum activity.

Chapter 8 is concerned with vowel articulation. Starting with a description of the role of the jaw in controlling tongue movements, the chapter provides an account of how different vowel

categories are articulated. *Ultrasound* is used as a method enabling direct evaluation of tongue position while articulating vowels.

Chapter 9 deals with how lingual consonants are articulated, with a description of all intrinsic tongue muscles and shows how the flexibility of these muscles can affect the articulation of lingual consonants. *(Electro-)Palatography* is described as a tool that enables identification of the contact location between the tongue and the palate and *Linguography* that can be used to show the patterns of contact on the tongue.

Chapter 10 discusses how labial sounds are articulated and the role of visual and tactile feedback in facilitating communication between speakers. An examination of all lips and face muscles responsible for articulating labial sounds is provided. A description of the different methods used to track lips movements is provided, such as *Video Imaging* and *Point-Tracking methods*, e.g. *Infrared*, *X-ray Microbeam*, *Electromagnetic Articulometer (EMA)*.

Chapter 11 concludes the book with a discussion on how articulation of speech is achieved by examining coordination of movements of complex articulations. Coarticulation is evaluated and the chapter shows how modelling vocal tract movements can explain articulatory conflicts in different languages. *Tomography (CT scans)* is described as a tool that enables direct observation of the whole vocal tract.

This book is the perfect companion for all students in phonetics, speech sciences and speech pathologies and complements Johnson's "Acoustic and Auditory Phonetics" as introductory books to phonetic sciences.

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