

## 近代における音響音声学に 関する一研究ノート

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### Recent Development in Acoustic Phonetics

The study of sounds is acoustics, that of speech sound is phonetics (which is therefore a branch of acoustics), and that of the systematic use of sound in language is phonology.

A distinction is usually made in phonetics between auditory phonetics, articulatory phonetics and acoustic phonetics. Acoustic phonetics focuses on the sound waves generated by speaking and their transmission through the air.

It was not till almost the middle of this century that the tools were created that make direct observation in the field of acoustic phonetics possible.

Phonetics provides us with a tool, a set of descriptive terms, by which we can describe, as minutely as is necessary for the task in hand, a particular physical sound and the gestures which produce it. It is a tool which is particularly useful in teaching pronunciation.

It is important for the teacher of English as a foreign language to know phonetics because it enables him to diagnose errors in the pronunciation of a given sound and to teach the student to correct his pronunciation in a controlled and explicit way.

The difficulty for the teacher who does not know phonetics is that there is no intermediate point between the “right” sound and the “wrong” sound. He has no way of detecting or of encouraging progress. He has no way of deciding, when a student changes one “wrong”

pronunciation for another, whether the change constitutes a step in the right direction, which should be consolidated, or whether the student has quite arbitrarily shifted a position which was in fact reasonably correct to begin with.

Phonetics offers us a tool with which, in a controlled and systematic way, he can diagnose errors in pronunciation and devise strategies of correction. Some of these pedagogical problems can be solved by using an articulatory system of phonetics which says about *how* speech happens.

Articulatory phonetics is concerned with the activity of the speaker in terms of the articulatory organs and processes involved. And thirdly, auditory phonetics emphasizes the study of perception of sound waves by the hearer's ears, both in terms of the physiology of the ear and associated organs of hearing, and in terms of the psychology of perception.

### *Outline of acoustic phonetics*

Acoustic phonetics is the proper object of the initial study of the speaking process in general linguistics.

Noise of whatever source or origin consists physically of displacements in the air involving rapid increases and decreases of pressure moving outwards from the source and gradually decreasing to the vanishing point.

In speech, the vocal cords (when vibrating in voicing), the various places and processes of articulation, and different shapes of the whole supraglottal cavity in the production of consonant and vowel sounds generate sound waves at specific frequencies, which when added together, constitute the sound waves of speech.

In the acoustic analysis of speech sound waves generate at different areas or 'bands' of frequency.

Bolinger (1975) points out that the organs of articulation are visible. The sound wave is not. Eye-minded scientists have to see things, and until that was possible, not much progress was made in acoustic phonetics.

The sound spectrogram machine, unveiled shortly after the Second World War, gave phoneticians what they needed for their leap forward. It made clearly visible those components of sound that are dispensable in the coding of speech. It also opened the way to producing artificial speech of high quality, which led to a new phase in the experimental phonetics: by varying each component of the signal separately, phoneticians have been able to determine what each one contributes to the intelligibility of speech.

Other machines have been of similar value in more specialized ways. An example is the melodic analyzer at the University of Toronto, a computer that displays intonation curves from either live or recorded speech on a television screen.

According to Robins (1978), from the point of view of the study of language, there are good reasons for paying prime attention to articulatory phonetics as part of general linguistics.

The principal parts of the body responsible for the production and differentiation of speech sounds, the vocal organs or organs of speech are fairly easily accessible to visual observation, either directly or by means of various devices such as laryngoscopes and x-ray photography. Several of them such as the lips, teeth, and tongue are familiar to everyone, and almost all of them can be described as far as concerns the part they play in speaking by the use of terms not unfamiliar to the non-specialist.

For the purpose of accuracy in phonetic detail, phoneticians have developed systems of transcribing using symbols whose only purpose is to indicate precisely on paper the sounds or sound features of an utterance in articulatory terms.

Such transcriptions, whose sole aim is accuracy of phonetic detail, are called 'narrow' transcriptions, to be distinguished from 'broad', sometimes called 'reading' transcriptions, which make use of fewer different symbols but rely on some further linguistic analysis.

The International Phonetic Association has been responsible for a set of symbols for narrow transcriptions that are widely used in Great

Britain and modification marks, expressing finer shades of phonetic detail, have been brought together in a system known as the International Phonetic Alphabet (I. P. A.); It is revised periodically in the light of progress in phonetic research.

### *Technological Developments*

Spectrographic readings contain some information which can be incorporated into articulatory phonetics. And x-ray photographs show how vocal organs move.

Parametric phonetics is to capture the dynamic nature of speech and shows how fluent speech occurs rather than segmental.

In summary, we can say that in order to give students a deep understanding of the nature of connected speech, a useful course in phonetics should include acoustic, articulatory, auditory and parametric phonetics. The development in all these phonetic fields is relevant to the understanding of how speech happens.

### **Bibliography**

Bolinger, D.L. (1975):

Robins, R.H. (1978): *General Linguistics, An Introductory Survey*, Longman.