Abstract: In the thirty six years that I have been involved in phonetic research, experimental methods used in the research on speech production and perception have changed and developed dramatically. The field of phonetics is varied and researchers have their own agenda and questions to answer. While one's goals may be practical or theoretical, the answers we all ask help us understand the incredible unique ability of the human animal to communicate in a special, linguistic way. Whether studying normal or abnormal speech (speech errors and aphasia), child language, or language decay, we gain insights into the complexities of the process. In recent years, due to new technological tools in physiological and acoustic research as well as brain research technology such as CAT, MRI, fMRI, PET, ERPs, etc, we have the chance to ask new questions. But one major goal of phonetic research remains the same - the understanding of the relationship between the mental grammar which represents our knowledge of language and our ability to speak and understand.

A Little History

In 1962 I entered my first class in Phonetics and Phonology at UCLA taught by Peter Ladefoged, the newly arrived phonetician from Edinburgh. That course, and Peter, himself, set my goals which have lasted all these years - the understanding of the relationship between the cognitive knowledge that is somehow represented in the brain/mind and our ability to speak and understand. While Peter may not agree with this ‘mentalist’ approach to language and speech, his concerns over the years leading to his theory of phonetics (7, 8) have followed the views of the British school of phonetics as stated by Henry Sweet in a letter to the Vice Chancellor of Oxford University in 1902: “My own subject, Phonetics, is one which is useless by itself, while at the same time it is the foundation of all study of language whether theoretical or practical.” (4) I don’t know whether Peter would go along with the ‘useless’ remark, but that first course convinced me that Bloomfield’s view that “the physiologic and acoustic description of acts of speech belongs to other sciences than ours (linguistics)” (1) must be rejected as well as the sharp contrast Bloomfield set between phonetics and phonology when he stated that phonetics “gives us a purely acoustic or physiologic description (revealing ) the gross acoustic features” of speech whereas phonology “pays no heed to the acoustic nature of the phonemes, but merely accepts them as distinct units.” (1). Despite these stated views, Bloomfield’s work shows a reliance on phonetic data, as does the work of every phonologist past and present, including those who today adhere to a rule-based theory (2), or Optimality Theory (10).

Thirty six years ago the experimental methods available for phonetic research were limited compared to what is available today. But even then, in the place of the ‘good’ or ‘bad’ ear of the phonetician (which earlier scholars had to depend on), there was a battery of equipment including, of course, the sound spectrograph for (non-computerized) acoustic analysis, cineradiography which yielded X-ray moving pictures of the speech organs in action, the camera for still or high speed speech photographs, pressure and airflow measuring devices, the palatograph (I can still taste that chocolate charcoal), and electromyography used to measures the electrical activity of various muscles during the speech process. The latter technique is responsible for my being here today, for it was this methodology I used for my doctoral dissertation (5). But those early days of EMG research were not as sophisticated then as they are now. The plaster cast of my face, divided into a grid with holes in each cell so that each time the suction electrodes could be set in the same place brought me great sympathy as I walked around the UCLA campus with blue and red spots all over looking like I had some terrible tropical disease. But note, the goal of my research then, as it is today, was the relationship between phonetics and phonology, between language and speech. The fifties and sixties saw the development of various attempts to develop speech synthesizers, acoustic or physiologically based. While there were practical concerns, the major aim was to model the actual speech production and perception systems. We were ‘God’s Truth’ linguists, wanting to know why and how, interested in finding a truly viable phonetic and linguistic theory rather than simply trying to get a synthesizer that simply sounded good, or a ‘recognition’ system that worked, however it did so.
The Present

I do not need to summarize the incredible developments that have occurred in phonetic research. I am told that at least two software programs for speech recognition actually work, we are constantly barraged by synthesized 'menus' on the telephone, dynamic palatography gives more information on the timing and coordination of articulatory movements, aerodynamic variables can be entered directly to a computer in the lab or 'in the bush', electroglottography as well as narrowband spectrograms provide information on fundamental frequency, A-D computer analysis of speech is commonplace, etc. etc etc.

In addition, new technologies in brain research, such as CAT, MRT, fMRI, MEG, PET, ERP permit us to ask new questions. In this 'decade of the brain', the new technologies permit us to raise new questions concerning possible specific cerebral regions involved in speech production and comprehension, as well as the timing and stages of both processes of the 'speech chain' (3) In this research as in all other phonetic research, one goal remains – understanding the relationship between the abstract linguistic system and the processing mechanisms which result in speech and understanding.

While these are tremendously exciting developments, as Poeppel (9) has pointed out, these new relatively non-invasive cerebral imaging techniques such as PET, are not without their own problems. We continue to have many more questions than answers.

In trying to model and test proposed models of the speech production system as well as of the phonetic/phonological/morphological/semantic representation and processing of words in our mental dictionary, old methods around for many years, for example, the collection and analysis of normal and abnormal (aphasic) speech errors, still provide important evidence. (6). Many individual collections are now in existence consisting of over 40,000 errors. Until the development of a computerized database program called UCLASEC (funded by NSF), except for published examples, there has been no way of sharing these data. The program permits coding of all the kinds of errors phonological errors which involve simple sound segments, word substitutions, word structure and grammatical errors. The inclusion of German, Spanish, Italian, French, Thai, and Japanese will permit a comparison across languages which can provide deeper insights into speech production and processing.

The Future

The title of this paper – 'Language and Speech Research: The More It changes the More It Stays the Same'—refers obviously to the aims of such research. And it refers to the aims as posed by linguists concerned with phonetics as part of the genetically based human ability to speak and understand. There are of course others involved in more practical aspects of speech research but we believe that understanding language, and its biological basis, which we are still far from understanding, will contribute both practically and theoretically to answering this question.

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