

PHONETICS IN THE NEXT TEN YEARS

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ABSTRACT

This paper deals selectively with a few themes which I think will be of importance. It begins by suggesting that phonetics shows signs of renewed identity as a discipline, and arguing that this has important intellectual consequences. Section 2 deals briefly with the relation between phonetics and phonology, which will continue to become closer. Section 3 predicts increasing interest in the principles of traditional phonetic description as a consequence of developments elsewhere in the phonetic sciences. Next, expected changes in the kind of data which phonetic research focuses on are dealt with in section 4. Finally, it is suggested there will be greater recognition of phonetics as having a wider purview than the phonic realisation of language.

1. A DISCIPLINE AGAIN?

One of the major intellectual attractions of phonetics is its readiness to draw on, and contribute to, other disciplines. At best, this gives the phonetician the opportunity to aspire to be a latter-day "Renaissance man" – or woman – a polymath who is at home in any branch of learning. The reality of this interdisciplinarity may be a little less impressive, according to Peter Ladefoged in his opening address to XIth International Congress of Phonetic Sciences in Tallinn [9]: he cited the camelion-in-reverse behaviour of the phonetician who, when among specialist acousticians, professes to be rather more a kind of psychologist, and when among psychologists, speaks with greatest authority on matters of vocal anatomy – and so on. In the English proverb, "the jack-of-all-trades is master of none", but here I will deal not with problems which

arise from phoneticians' incomplete mastery of other "trades", but rather with whether they lack a trade of their own, and if so, what the consequences are.

One can imagine phonetics lying at the hub of a wheel, with spokes linking to a large number of disciplines on the rim – linguistics, psychology, acoustics, pedagogy, forensics, and others. The question then arises as to whether phonetics constitutes a discipline in its own right, or whether it is merely an umbrella term for those parts of other disciplines which happen to deal with speech, or perhaps a name for a node through which information flows between them – a kind of intellectual telephone exchange. Such existential doubt among phoneticians has been promoted on the one hand by institutional factors – in the UK at least, a process of absorbing the independent phonetics departments of the first half of the century into linguistics, or other, departments, continues today; and on the other hand by scientific factors – it is clear that today's phonetician is crucially dependent on collaboration with those disciplines which develop technology, and experimental methodology.

Disciplinary divisions have no intrinsic merit. Does it matter then if phonetics is merely a handy label for various disciplines' speech work? I think it does. Viewing phonetics as merely the intersection of others' domains can lead to an abdication of responsibility, particularly in the discussion of theories and principles. Phonetics in the recent past has been characterised by the borrowing, albeit often profitably, of theories from elsewhere; and, more

worryingly, perhaps, by a relative lack of concern with questioning and developing its own basic principles, which have changed little in the course of a century. This latter issue I shall deal with in section 3 below; first, I shall consider briefly the borrowing of theories.

In speech production, for instance, the direction of research through the 1980s was strongly influenced by theories taken from the field of motor control – Action Theory and Task Dynamics, for instance [4,7]. In speech perception, the concept of neurophysiological Feature Detectors stimulated much research from 1971 onwards [1]; and, more recently, the philosophy of Direct or Ecological Perception from the visual domain has been adapted for speech (e.g. [3]). Perhaps, too, the relative success in speech technology of general pattern processing strategies such as Hidden Markov Modelling, and to a smaller extent Neural Networks, in tackling the task of speech recognition will lead increasingly to their adoption into the phonetician's conceptual armory. Such borrowing enriches phonetics; but it has to be asked whether it perhaps leads to a neglect of fundamental theoretical development internal to phonetics.

It could be argued that the Motor Theory of speech perception [10,11] provides an instructive alternative model of progress. The search for explanations to puzzling phonetic facts about the absence of invariant acoustic cues to sounds, and to the non-linear relation of perceived phonetic categories to acoustic continua, led to a specifically phonetic hypothesis. I cite this not as a proponent of the Motor Theory; nor to argue for the position it entails that "speech is special". Rather I see it as evidence that the speech researcher, the phonetician, who more than anyone else is the person with the advantage of an all-round (if imperfect) view of the different aspects of speech, can alone contribute a particular kind of theory, a kind without which the phonetic sciences would be impoverished.

What has this to do with the next ten years? There are signs, I think, of an increasing self-confidence, and sense of identity, among phoneticians. The high

level of activity generated by the 1989 IPA Convention in Kiel (of which more in section 3), the renewed vigour of the *Journal of the International Phonetic Association* (which Pat Keating mentions in her paper in this session), the devotion of a wide-ranging theme issue (18/3) of *Journal of Phonetics* to the notion of "phonetic representation", are just a few of the indications that phoneticians have rediscovered a sense of identity, and realised that they need not aspire merely to be "a kind of" engineer, psychologist, or linguist, but that there is an identifiable core of problems, and solutions, to be researched which are specifically "phonetic".

A consequence of renewed intellectual identity will be, I hope, that phoneticians will increasingly seize the initiative in defining research questions, and specifying the criteria which answers must satisfy.

2. PHONETICS & PHONOLOGY

One of the clearest innovations of the last decade has been the emergence of empirical work which blurs, both conceptually and methodologically, the distinction between phonetics and phonology. A range of such work has been brought together under the heading of "Laboratory Phonology" (e.g. [8]).

Some strands remain close in spirit to one aspect of existing experimental phonetics, concentrating on testing in the physical domain the predictions of linguistic phonological models. Others challenge traditional notions of phonological representation: Browman and Goldstein [2], for instance, propose as phonological primes the "gestures" of a dynamic articulatory model. At the same time phonologists are exploring the value of replacing the familiar rules and representations with radical alternatives, which superficially at least look susceptible of direct quantitative phonetic interpretation – for instance Goldsmith [5], who proposes replacing the "metrical grid" with a "connectionist" model in which the "activation levels" of syllables are computed arithmetically from an initial value and lateral inhibition between adjacent syllables.

In one possible view, the interface of phonetics and phonology is where, traditionally, discrete, symbolic, descriptions meet continuous, quantitative models. There, too, are found a range of phenomena (such as coarticulation, microintonation, and incomplete assimilation) whose status as natural consequences of physical mechanisms, or linguistically controlled effects, is ambiguous. This interface will continue to throw up new problems, the solutions to which may be found in radical new types of model.

3. TRADITIONAL PHONETICS

For all the technological advances of recent decades, it is clear that traditional phonetic methodology, based on carefully trained listening (and looking), will remain crucially important in the next decade. This is for two main reasons. First, because in the great majority of practical applications of phonetics this is the only form of analysis available; and second, because the whole framework of phonetic classification generally used is intimately bound up with this methodology.

The purpose of the 1989 IPA Convention in Kiel was to review and update the International Phonetic Alphabet, and hence the descriptive and classificatory principles which it embodies. In many ways the Convention was a great success, stimulating wide debate both in the year or so before it and during the actual meeting, and resulting in a new IPA chart, incorporating a number of rationalisations and improvements.

However, it quickly became clear in the run-up to the Convention that the practical requirement of achieving a revised chart at the end of proceedings would override any desire for extensive debate on the fundamental principles of phonetic description. Although as convener of the "vowel group" I included in my pre-convention survey questionnaire items concerning the principles of vowel classification [12], by the time of the Convention it was clear that no-one wished to embark on a fundamental review of descriptive principle. The same was, I think, generally true of the other groups, and so the Convention ended up approving a revised chart which is based

on the same conceptual framework as previous ones.

Of course change for its own sake is not of value. Phoneticians sometimes look askance at the rapid succession of (equivalently) teddy boys, mods, rockers, hippies, skinheads, punks, and so on who have battled it out on the streets of theoretical phonology; and take pride in the stability of traditional phonetics. But arguably stability is only to be valued where it is the outcome of reasoned evaluation of alternatives. It is far from clear that such evaluation has taken place in traditional phonetics.

Recent developments in phonology should mean that debate over the conceptual framework behind phonetic classification can no longer be postponed. While phonologists argued over features versus segments, phoneticians could remain aloof – the IPA framework implicitly embodies both. While phonologists fought over the abstractness of representations, phoneticians could turn a blind eye – it was merely a matter of how the IPA categories were used or misused. But nowadays "non-linear" phonologists are proclaiming that phonologically relevant properties do not, after all, line up in discrete phoneme-sized segments. This, of course, is not news to phoneticians. Clumsy notational devices like [p^hæ̃n] *pan* and [sɔ:izz] *saws* have been used by phoneticians to highlight the tensions between the phonetic continuum and a segmentation based on phoneme-sized slices. But I suspect any serious qualms phoneticians had about the segmental principle at the very basis of the descriptive phonetic framework could be soothed by the reassuring knowledge that, ultimately, phoneme-sized chunks were what phonologists wanted, and, basically, were what speech was all about.

Not any more. The new phonologies are breaking away from strict segmentation, and it is time to ask whether the phoneme-sized units of IPA phonetic practice have independent justification, or are only a by-product of the phonological world-view with which the IPA grew up. Maybe the debate has already begun. Kelly and Local [6], in examining the data of phonological analysis, push phonetic notation beyond

its usual limits, and, whilst not actually replacing segmental impressionistic phonetic representations and their interpretations, substantially augment them with descriptive mechanisms having domains other than the segment. I expect the next ten years to see a more explicit examination of the principles of IPA description in the light of phonological thinking.

It is not only phonology that has changed since the inception of the IPA. Understanding of the physical events of speech has advanced considerably, much of the progress being enabled by technological developments which have aided the study of speech production and acoustics. But again, there has been little explicit consideration of the impact which this progress might have on the basic descriptive mechanisms of the IPA. A few recent minor changes might be indirectly attributable to technology – for instance, the readiness of the Kiel Convention to accept for the first time the need for symbolisation of “advanced/retracted tongue root” may have been influenced by the existence of x-ray evidence to back up the reality of this dimension. But major issues, such as the possibility of developing a new framework for vowel classification in light of acoustic and articulatory studies, were clearly too massive to even be considered in the time available.

Bloomfield is reported by Twaddell [13] as stating that “the physical (acoustic) definition of each phoneme of any given dialect can be expected to come from the laboratory within the next decades”. The notion of seeking an acoustic definition of an abstract phonological unit may be conceptually flawed (although it still lies behind a lot of experimental work); but how about definitions of phonetic categories? I am of course far too circumspect to predict that the definition of the Cardinal Vowels will emerge from the laboratory in the next ten years; but with the increasing use of computers not only in phonetic analysis, but also in teaching practical phonetics, the possibility of more quantitative phonetic reference values will have to be seriously considered.

The near future may see the first revolution in IPA description. Alternatively, the status quo may continue. But I think the health of traditional phonetics depends on active evaluation of developments elsewhere in the phonetic sciences.

4. WHAT KIND OF SPEECH?

Pat Keating, in her paper to this session, mentions the move away from “laboratory” speech to more natural data. I too believe this will be a continuing trend in the next decade. Part of the reason is practical – technological advances allow much larger stretches of speech to be stored in manipulable form, and liberate phoneticians from the 2.4 s utterance. But more important are the theoretical motivations.

It is not simply, as sometimes implied, that studying phonetically-explicit citation forms is misleading in the way that, if one needed to find out how people drive, it would be misleading to study the both-hands-on-the-wheel, constant-checking-in-the-mirror style used only by driving-test candidates. The problem is more that studying only laboratory speech provides a flat view of a phenomenon which has a third dimension – a dimension of variation. We need to know how much speakers can put in to speech (and for this it may be necessary to push speakers beyond careful speech to see what they do, say in noisy situations, to make their speech super-explicit); but it is equally important, for the understanding both of production and perception, to discover the principles governing what they are prepared to leave out in less explicit styles.

5. WHAT CAN WE TELL?

Given its historical ties to linguistics, phonetics is often seen as dealing with the pronunciation of words, or, in a more sophisticated version, with the phonetic realisation of grammatical strings. Beyond that, it is nowadays widely accepted that related matters of linguistic “performance”, specifically the production and perception of utterances, fall centrally within the scope of phonetics.

But I would argue that phonetics will increasingly find its identity as the

discipline which deals with the broad question "what can we tell when a person speaks?" Thus it is concerned not merely with the encoding of linguistic information, but with information about the speaker (age, sex, health, psychological state, identity, and so on).

One aspect of this is of particular interest to me. Because of the increasing availability of recorded speech samples in connection with crimes (ranging from hoax emergency telephone calls to kidnap and serious fraud) there is a rising demand for expert opinions on speaker identity (and also other factors, such as disputed utterance content and tape tampering). Many phoneticians are rightly cautious about the application of phonetic knowledge to the identification of individuals, when comparatively little is known about how far the association of a speech sample with an individual can be demonstrated under different conditions, and when so much is demanded by those in the forensic arena. However those demands will be satisfied one way or another, sometimes by self-appointed experts who lack the all-round view of the speech event which a true phonetician enjoys. Only if phonetics accepts its responsibility in this area will it be listened to as the discipline which speaks with authority on speech in the forensic context.

6. CONCLUSION

So I hope that the next decade of phonetics will be characterised by an increased sense of identity, a wider acceptance of a broadened scope of the discipline, the development of specifically phonetic theories, and greater concern for the principles underlying the traditional descriptive core of phonetics. If so, phonetics should emerge more clearly as the science of speech. Ten years from now, we should even, perhaps, occasionally hear an engineer, a psychologist, a researcher in motor control, claiming to be "a kind of phonetician".

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