Opening address

Some Aspects of the 'Phonetic Sciences', Past and Present

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Dames en heren,

Het is voor mij een grote eer en een bijzonder plezier hier in Nederland als eerste te spreken. Ik ben kort na de oorlog een half jaar in Nederland geweest, en die tijd behoort tot mijn beste herinneringen. Ik heb sindsdien een bijzondere sympathie bewaard voor het nederlandse landschap, de nederlandse kunst en de nederlandse mensen.

Mr. President, dear Colleagues,

I first want to thank the Committee for inviting me to give this talk. I feel it as a great honour, in fact as *too* great an honour. I know of various collegues who could have done it better, and I am somewhat ashamed that I accepted it. But, as I just mentioned, I have a soft spot in my heart for Holland. Moreover, that was two years ago, when I had just retired and thought that I would have plenty of time for reading and writing; perhaps I might even become more intelligent – who knows? But that was, of course, a vain hope. – Anyhow there are a few things I should like to say.

This is a sort of jubilee. It is the tenth International Congress of Phonetic Sciences, and it is approximately 50 years (more exactly 51 years) since the first congress took place in 1932, also in Holland.

It is true that on various occasions (1965 and 1982) Eberhard Zwirner has pointed to the fact that the congress in Amsterdam in 1932 was not really the first International Congress of Phonetics: there was one in 1914 (but due to the war no proceedings were ever published), and there was one again in 1930 in Bonn. That is correct, but these were congresses of experimental phonetics, whereas the congress in Amsterdam was the first congress of what was called 'the phonetic sciences', and that makes a difference.

It was not by chance that Holland was chosen as the place for the congress in 1932. Holland has a long and rich tradition in phonetics. One of the most impressive older works is the book by Petrus Montanus van Delft in 1635: 'Bericht van een nieuw konst genaemt de spreeckonst', a remarkable and very original work, which has rarely met with the appreciation it deserves, perhaps because it was written in Dutch and, moreover, used a forbidding terminology. In the first decades of this century, thus in the years before the

congress in Amsterdam, Holland had become an important centre of phonetic research with a number of very competent phoneticians, for instance Zwaardemaker, Eijkman, van Ginneken, and Louise Kaiser. Zwaardemaker and Eijkman had published an excellent textbook – or rather handbook – of phonetics in 1928 with original contributions on many points. The new phonological theories had also been quickly – but not uncritically – accepted in Holland, for instance by De Groot and Van Wijk. A few years later (1932) Van Wijk published an introduction to phonology which was less dogmatic and much easier to read than Trubetzkoy's Grundzüge, and which might have made phonology more popular if it had been written in e.g. English. As early as 1914 a Dutch society for experimental phonetics had been founded, which in 1931 was transformed into a Society for Phonetics. Dutch phoneticians also published a periodical, 'Archives néerlandaises de phonétique expérimentale' (from 1927) which in the first years exclusively, and later to a large extent was based on contributions from Dutch phoneticians, and the University of Amsterdam had a lecturer in phonetics (Louise Kaiser) from 1926.

This brilliant tradition has continued to the present day with phonetic research centers and excellent phoneticians at various universities and at the Institute for Perception Research in Eindhoven. Their contributions are well known. I will therefore only mention that, although several Dutch phoneticians must have been very busy organizing this congress, there are more than forty section papers by Dutch phoneticians. It is thus not simply for sentimental reasons that this tenth congress is also being held in Holland. It is scientifically very well motivated.

The congress in Amsterdam in 1932 was originally – like those in 1914 and 1930 – planned as a congress on experimental phonetics. But the Dutch committee widened its scope on the initiative of its chairman, the psychologist Van Ginneken. Van Ginneken was an impressive personality, and his appearance was impressive too (for instance, he had long hair long before its time); and he was a man of vision. Some of them were rather wild, but some were fruitful. One of them was that all those who were interested in any aspect of speech sounds should meet and work together. Therefore invitations were sent out to a broad spectrum of scholars from different sciences, and the name of the congress changed to 'congress of phonetic sciences'. The topics of the congress were announced to be: physiology of speech and voice, the development of speech and voice in the individual and in mankind, anthropology of speech and voice, phonology, linguistic psychology, pathology of speech and voice, comparative physiology of the sounds of animals, and musicology; and the congress program included a meeting of the so-called 'Internationale phonologische Arbeitsgemeinschaft'. But shortly after the invitations had been sent out, the International Society of Experimental Phonetics which had taken the original initiative gave up participating as a society because its president, E. Scripture, was afraid that the economic crisis would prevent too many members from coming. The committee, however, continued its work with Louise Kaiser as general secretary.

I do not think that the name 'phonetic sciences' is good terminology but it may be viewed as shorthand for 'disciplines' (like phonetics and phonology) which have the speech sound as their main object, plus various sciences which among other objects include some aspects of the speech sound, like physiology, acoustics, psychology, etc. And at least it was clear what the committee intended, and since both title and intention have been kept since then, it was a very important decision. It was also a very good idea to bring various groups of people together just at that time. In the thirties there was not much contact between different sciences interested in speech sounds, and between the more closely related approaches there was even suspicion and antagonism. The adherents of classical phonetics regarded the use of instruments with pronounced scepticism and, on the other hand some experimental phoneticians, like Scripture, rejected everything that was not expressed in figures. He considered non-experimental phonetics an illusion and 'the investigator', he said, 'might be, and preferably should be, congenitally deaf and totally ignorant of any notions concerning sound and speech' (1936). Panconcelli-Calzia had also emphasized that the language spoken by the subject was irrelevant. The phonetician was only interested in their vocal tracts. He considered phonetics as belonging to the natural sciences.

The Prague phonologists accepted this view of phonetics, describing it as a science which investigated sounds, irrespective of their function, whereas phonology described the functional aspect of sounds and belonged to the humanities. By this claim and also by emphasizing that phonology was something quite new they succeeded in offending both the adherents of classical phonetics, who had always, more or less explicitly, taken the communicative function of speech sounds into account, and the more linguistically orientated experimental phoneticians.

The congress in Amsterdam, which, like the next two congresses, had only plenary sessions, managed to bring people together, but you still feel a certain tension in the reports of the discussions. I think it was not until the third congress in Ghent, which was the first congress I attended, that there was a real breakthrough in the understanding between phonologists and phoneticians, owing particularly to the contributions by Zwirner, Roman Jakobson and Van Wijk. Nowadays, these old antagonisms are forgotten. Everybody recognizes that phoneticians must use instruments and that speech sounds must be studied from both a material and a functional point of view (although this mutual recognition does not always include close cooperation). But as late as in the fifties there were still linguistic centers in Europe where phonology (and structural linguistics on the whole) was regarded as a new and dangerous heresy, where you saw smiles fade away and faces getting a very rigid expression of you dared to admit that you found these trends interesting, and where young linguists who were interested in them had to hold clandestine meetings.

In America the development was much more harmonious because it was for many years dominated by Bloomfield, for whom phonetics and phonology were complementary approaches.

It is a good thing that the wide scientific scope of the congresses has been retained. But of course they have changed in character during these fifty years.

In the first place there has been an enormous increase in the number of participants and of papers. At the first congress there were 136 participants. During the following congresses the number increased slowly to almost 300, with a sudden jump up to about 550 at the fifth congress in Prague in 1967, followed by a more steady increase to the approximately 650 members of this congress, five times as many as at the first congress. The number of papers has increased even more: from 40 in 1932 to about 100 at the fourth congress and then growing rapidly to the almost 400 section papers of this congress, apart from symposia and plenary lectures; and the number of authors has grown even more, since now one third of the papers are the result of team work, whereas in 1932 all papers had only a single author.

The large number of members and papers of course causes various inconveniences. You can only attend a small fraction of the meetings you find interesting; and it may be difficult to get into contact with the people you want to meet. On the other hand, I find that these big open congresses serve a useful purpose. It is important to have a forum where people from different fields can meet, and it is important to have congresses that are open to everybody interested. The smaller conferences may give more scientific output, but generally only established scholars are invited. The big open congresses offer the only possibility for young phoneticians from various countries to meet each other and older colleagues.

The enormous increase of papers reflects a general explosive growth in phonetic publications. Thirty years ago it was still possible to read the more important publications in the whole field. Now it is not even possible to keep up with the literature within one's own special field of interest. I think the moment has come where it would be extremely useful to start a journal of abstracts in phonetics and phonology with competent contributors, who could tell what is new and valuable in a paper. And it could also be useful if the phonetic journals would include surveys of specific areas at regular intervals perhaps dividing the work among themselves.

There has, of course, also been a change in emphasis as far as the subjects treated are concerned. A good deal of the change can be ascribed to technological progress. There was from the start an interest in the acoustic and perceptual aspects, but the possibilities of research were modest. At the beginning of the century it could take hours to analyse a single cycle. Nevertheless, there were patient scholars who undertook this work, but not many. At the first congress there were only two papers on acoustics and none on perception. At this congress there is a very large number of papers dealing with both these subjects. I had not expected the increase in papers on acoustic phonetics to have taken place until the first congress that was held after the war, in 1961. As a matter of fact, the increase took place at the congress in 1938 in Ghent, where about 17 percent of the papers dealt with acoustic phonetics compared to 5 percent in 1935.

The explanation is probably that in the mid thirties a number of instruments for acoustic investigation were constructed, mostly by German engineers, and most of them were demonstrated in Ghent. But then the war broke out, and after the war new instruments were built, mostly by Swedish and American engineers, partly according to the same principles, but much handier and easier to use, and one may tend to forget the achievements of the thirties.

The progress in acoustic phonetics, and particularly the possibility of speech synthesis, gave a new impetus to the study of speech perception and a better basis for the study of prosodic phenomena, and this is reflected in the congress papers after the war. At the same time there was an obvious decrease in the study of speech production, reflected in a small number of papers within this field at the first congresses after the war. In the beginning of the seventies this changed again. I do not think this was simply a consequence of the invention of new transducers and a better EMG-technique. It may have been the other way round . It had become possible, particularly due to the work of Fant, Stevens and others, to relate details of production to the acoustic results, and thus production came into focus again as a very important step in the communication chain. The causal relations within this chain are now central topics in phonetic research, including the discussion of models for both production and perception. The brain is still a missing link in this chain, although we know more than we did a few years ago. We may at least hope that neurophonetics may be a central topic at the next congress.

The fact that the proceedings of the first congresses contain a number of papers treating phonetics from a biological point of view probably had a rather specific explanation, namely the interests of the first president of the international council, Van Ginneken. There is, for instance, at the first congress an informative paper by Negus describing the larynx of various species of animals, ending with the human larynx and Van Ginneken himself developed one of his more fantastic theories about the heredity of speech sounds. He believed, and even considered it as proven, that all phonological systems and moreover the relative frequency of speech sounds can be explained by Mendel's laws of heredity, according to the pattern: a man sho has **k** as only consonant marries a woman who has **m** as only consonant, and each of their children will then inherit one of the sounds **k,m,p,ŋ** distributed according to Mendel's laws, and learn the others from their sisters and brothers. This theory was not pursued, and biological considerations did not play any role at later congresses. They have come up again at this congress, but in a quite different form.

Other changes during the 50 years were rather conditioned by the shift in dominating trends in linguistics as part of shifts in the general cultural pattern and philosophical approach of the period. These shifts were, of course, in the first place influential for phonology (and up till the ninth congress about 20 percent of the papers dealt with phonological problems), but also for the relations between phonology and phonetics.

During the first thirty years the dominant linguistic trend was structuralism. In Europe it was mainly represented by Prague phonology with its emphasis on phonological oppositions and phonological systems, aiming at a general typology and involving the demonstration of universal tendencies. Roman Jakobson's distinctive feature theory was a further development of this trend. Prague phonology was dominant on the European continent in the beginning of the period; later the extreme formalism of glossematics had a certain influence but never gained many real adherents. In Great Britain most phoneticians adhered to Daniel Jones' practical approach, or else to Firth's prosodic phonology.

Whereas Prague phonology was accused (by Doroszweski at the first congress) of 'platonism with 2400 centuries' delay', this could not be said of American structuralism, which was deeply rooted in behaviourism and was principally interested in finding waterproof methods for setting up the phonemes of a language and stating their possibility of combination, but not in systems or universal tendencies. Transformational grammar including generative phonology was in the first place a reaction against American structuralism, a widening of the perspective by taking account of the cognitive functions of the human mind and attempting to set up an explanatory theory. But the exclusively morphophonemic approach of generative phonology with underlying forms and derivation by explicit, ordered rules and with abolition of a separate phoneme level had a sweeping success, also in Europe.

At the moment there is no dominating school of phonology, but a number of new, partly more concrete and surface oriented trends: natural phonology, metrical phonology, lexical phonology, autosegmental phonology, dependency phonology, etc. Some may find that this is a deplorable disintegration. But it may also be seen as a sign of more independent thinking, and these approaches may all contribute to a deepening of our insight into the function of language. They are, to a large extent, complementary descriptions of the same linguistic data.

A feature common to American structuralism and generative phonology was that the role ascribed to general phonetics was rather modest, its main task being to deliver the phonetic categories used to identify the contrastive segments and features. For this purpose auditory identification was generally considered sufficient. Phonetics was not asked to contribute to the explanation of phonological systems or developments. American structuralism was, on the whole, suspicious of explanations, and the explanatory procedure of generative phonology was extremely abstract, based on notational conventions implying that fewer symbols were used for natural rules. Glossematics accepted only purely formal explanations, whereas the Prague School looked for explanation in an interplay between formal and phonetic factors. But structural explanations were preferred.

Once the phonological structure of the individual language was set up, the primary task of the phonetician was to analyze the phonetic manifestation of the contrastive segments and features, which were supposed to contain invariant properties.

This assumption proved fruitful in giving rise to a whole trend in phonetic research – the search for the invariant. It was clear from the very start of the period, at least after Menzerath's studies of coarticulation, that it could not be found in speech production. Then it was looked for in acoustics, and some still hope to find it there, but at least it was not very obvious. The next hope was the invariant motor command, and this hope contributed to the renewed interest in speech production and particularly in EMG, and gave rise to the motor theory of speech perception. Unfortunately, however, the electromyographic recordings generally showed different innervations for different variants. We must look higher up for invariants. Perhaps Martin Joos (1948) was right in assuming that we have stored invariant phonemes in the brain, but in the production of a concrete word the overlapping innervation waves are combined already in the cerebellum or perhaps at a still higher level. We still do not know that. Perhaps we may also store dyads or words. – Anyhow, as emphasized recently by Lindblom (1982), one should not look for invariance, only for what he calls 'perceptual equivalence', since the speaker is aware of the fact that listening is an active process and that the listener does not need all the cues for individual phonemes in order to identify a word. This is also confirmed by various papers on word recognition at this congress.

Other papers point to the enormous variability of speech. Different languages use different production processes to attain almost identical sounds, different individuals use different muscles to produce the same acoustic results, and different perceptual strategies to analyse the acoustic stimuli. Moreover, modern phonological and sociophonetic studies emphasize the heterogeneous character of the speech community and the possibility of individual speakers having different norms. This is an important condition for sound change, which was stressed – in the fifties – by Fónagy and now, combined with the idea of natural selection, by Lindblom.

On the whole, there is at present an increasing reaction to a purely formal approach, a renewed interest in the concrete speech performance, in the biological and social embedding of language, and in language history. The isolationism of structural and transformational grammar was perhaps a necessary step in the development of linguistics, but in the long run it was detrimental to progress.

This sets new tasks for general phonetics, in particular the contribution to a better understanding of the structure of phonological systems and their development. Lindblom, who has emphasized this repeatedly, has taken up the old idea, expressed explicitly by Passy and Jespersen, and in more elaborate terms by Martinet, of an intended balance between articulatory economy and sufficient perceptual contrast. What is new and exciting in his approach is the attempt to obtain a quantitative formulation of this balance, based on extensive research. This will certainly lead to a better understanding of universal tendencies, but I do not believe that it is possible to reach exhaustive causal explanations, not to speak of predictions, of concrete

changes, which are always due to an intricate interplay of physical, physiological, communitive, and social factors.

Phonetics is, according to its subject (the speech sounds, that is: sounds with a communicative function) part of linguistics. The deductive nomological causal explanation as used in natural sciences can, as far as I can see, only be applied to limited areas of phonetic research, for instance the relation between articulation and its acoustic results, not to typology or phonological change. Here we must be content with statistical and teleological explanations.

The task of explanation requires close cooperation between phonetics and phonology. It is therefore deplorable that the participation of phonologists has decreased so drastically at the present congress. The phonetician describing a concrete language does not need to know the subtleties of different phonological theories, but at least the basic principles, and particularly for the description of prosodic facts quite a bit of linguistic insight is required. The phonetician who wants to explain things must also know a good deal about language typology. On the other hand, phonology needs phonetics, not only for identifying sounds but also for the purpose of explanation.

Lastly let me point to a similarity between the first congress and the tenth, a similarity in the conditions for research. Both congresses take place in a time of economic crisis and in a very tense and threatening political situation. The two things may not be unrelated. There is an old English saying: 'When poverty comes in at the door, love flies out at the window'. The economic crisis is oppressive, but it is not yet as bad as in the thirties. In a paper from the first congress it is said, for instance, that no normal phonetics laboratory can afford buying and using an oscillograph. A phonetic crisis may hamper research, - it cannot stop it. I cannot help thinking of Marguerite Durand, who did excellent phonetic research using on old kymograph which would only start moving when you had thrown a pail of water on the rope connecting it to the motor. We can do with poverty, but we cannot do without love.

The political situation is still more threatening than it was in the thirties, and I think some of us now and then ask ourselves if it really makes sense doing phonetic research if our whole civilisation is doomed, - whether it is not a more urgent task to try to improve mutual understanding and confidence among people. Perhaps it is. However: Man is certainly the most destructive of animals, and perhaps he does not deserve to survive. On the other hand, he is also the most constructive animal, the most creative; and if we give up creating art and seeking truth, do we not then betray just that which gives us a sort of moral right to survive? That which makes us human?

Therefore, let us leave these gloomy thoughts and start our discussions. And an international congress has, after all, not only the purpose of promoting science, but also the purpose of promoting mutual understanding. I wish the tenth congress of phonetic sciences much success in both respects!

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(References are only given for a few more concrete points in the talk)

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