

## IN PURSUIT OF THE TRUTH:

Panta Rhei

## OBITUARY FOR HENDRIK MOL

(1917 - 1980)

The end of the 19th century shows an increasing amount of urbanisation in Europe, even though the actual number of big cities is still small. The Netherlands show only a slight degree of urbanisation albeit that from the Middle Ages onwards it possessed a relatively large amount of small towns, which had come into existence rather through commercial than industrial activities.<sup>1)</sup> Hendrik Mol's family had its roots in one of these small towns in the middle of this country. His grandparents were born in Rhenen where his grandfather, an artisan under contract of a builder, got transferred to Rotterdam where the family settled. The decision to remove to the city was taken on the considerations that a large town gave better chances for regular work and education for the children. The urge for further development can be gleaned from a fragmentary description of the vicissitudes of the family. Hein Mol, the uncle of Hendrik Mol, for whom this obituary is written, published these memories which gives us a clear idea of the hardships suffered by the labouring classes in the beginning of this century.<sup>2)</sup> These memoirs of the man, who started his working life in the docks of Rotterdam and who was to play a leading role in the socialist movement and the dock-unions and who later became town-councillor and journalist, give us an impression of the struggle to keep body and soul together and, what is more, to improve one's social status.

On January 15, 1917, Hendrik Mol became a member of this family, when he was born in Rotterdam. In the middle of the crisis years (from 1928-1933) he received his secondary education with the program that specialises in the exact sciences. From 1933 to 1939 he continued his studies in Delft at a technological University, the period being broken by his military

service from 1937 to 1938. In 1939 he took his electrotechnical degree. These few lines do not do justice to this important episode of his life. It was no small matter in this period of world-wide economical crisis raise children in a family of which the breadwinner held the job of postmaster in a subsidiary post-office. To grab the chance offered so generously by the parents demanded an attitude of the student of great diligence and persistence. With a feeling of admiration one realises that time was found to play the trumpet in a jazzband, to take part in amateur dramatics, and to write columns for a paper. He finished his doctoral thesis in 1949 in a period when he worked for the National Postal, Telephone and Telegraph Services (PTT) where he was to continue until 1959. The war period, the bombing of Rotterdam and the deportation to Germany left their scars, but it was a period of which he was very reticent. Indirectly he alludes to it in a manuscript found among his papers about a subject dear to his heart, Nicolaas Beets' *Camera Obscura*. This well-known author of the 19th century and the above mentioned work are even now a fixture of Dutch secondary school literature curricula. Mol's attention was given to this subject in the very few spare moments he allowed himself. He collected a complete set of editions and the knowledge which he possessed about Beets and his 'Camera' was phenomenal. Apart from the introduction which he wrote for the 1978 edition there is a large collection of notes, part of which is all but ready for publication. Here we give the words Mol used as a heading to his introduction and which will serve as the theme for this obituary: 'Bringing some light in a dark room'.

The above citation brings out two completely different aspects of Mol's work.

On the one hand there was the realization of the inadequacy of contemplations and studies of the terrain of the process of speech and hearing on the other hand it underlines the need he felt to be of service to those who, in one way or another, are handicapped by imperfections of whichever origin in communication processes which for human beings are of primordial importance. The added bibliography which is complete but for a small number of publications of the order of preliminary studies makes this abundantly clear. Both aspects can be clearly recognized.

During the period of his employment at the Central Laboratory of the PTT,

later to be called Dr Neher Laboratory, he addressed himself to telephone connections. For someone deeply involved in his work this had to lead to an interest in the processing of the spoken language by the organ of hearing and of auditive perception generally.

In one of the first publications which comes to hand there is a reference to a number of hearing problems in spoken language, to hearing handicaps and to pathological conditions of speech. Not only aspects of the speech chain appear in this early publication but also references to musical scales.

The title of his dissertation gives but little indication of the preponderant points of interest in it, viz. the function of the organ of hearing and its disfunctions. He extended his field of action when, in 1949, he was asked to become acoustic advisor of the Ear, Nose and Throat Clinic of the University of Leyden. Here he worked jointly with Prof. Dr. P.H.G. van Gilse who had won his spurs in his work on voice- and speech-pathology. Here he got the chance to study the mechanisms of the ear and in particular of the middle ear which had always intrigued him. He held this post until 1954 when he was asked by Leyden University to fulfill a lectureship in phonetic sciences. In 1958 he became associate professor. His inaugural had an unassuming title: Een wandeling door de fonetiek (A Stroll through Phonetics).

In his Leyden years he had come into contact with E.M. Uhlenbeck, the linguist. The rather close collaboration which followed resulted in a number of articles of which the title of the second showed the direction of the way which is going to be pursued. A road which is to involve fully phonetic considerations into linguistics. He felt more confident at first than Louise Kaiser who had been aware all her life of the acute discrepancy between phonetics and linguistics. The nature of the harmony existing between the limitations of the organs of speech on the one side and of the organ of hearing on the other became a starting point for his research activities. From the beginning he never lost sight of the fact that the methods used in the various sciences which are indirectly involved with phonetic problems have their own limitations and do not lead by themselves to a correct insight in the processes of speech and hearing. Mol's own words make this clear. In 1959 he states:

'The communication engineer working on problems related to phonetics is involuntarily greatly influenced by the so-called communication

theory, which came into existence after the war as an off-spring of telephone-techniques'.

And elsewhere he states on the same subject: 'However we run the risk of thoughtless extrapolation without taking into account the proper character of a certain field. The field of linguistics is infinitely much wider than the field of the pure communication-theory. It should be well realized that the communication-theory can be applied only to part of the linguistic phenomena. In the first instance for this purpose use can be made of only those elements of the communication path between speaker and hearer which can be calculated by means of laws holding in physics. A physicist has the responsibility to draw attention to the limitations of the mathematical and physical tools which he offers the phonetician.'

The spectrograph is one of the limitations he has in mind. Fourier-analysis and the pseudo-Fourier analysis of the spectrograph are to him incompatible with the working of the organ of hearing.

In 1958 Mol also obtained a part-time professorship in Amsterdam. He kept his professorship at Leyden and continued to be advisor to the Dr Neher Research Laboratory mentioned above. In Amsterdam he succeeded Louise Kaiser who had been the first to hold a chair in phonetics in the Netherlands from 1926 onward. In that year electronics was still in its infancy but in 1958 a tremendous leap had been made to the era of transistors. Right from the start phonetics was physiologically biased. This was also the case in Amsterdam. But in the period when Mol started his work as a phonetician a more physical approach was being aimed at. This becomes clear from the inaugural delivered by Mol in 1960: *Geloof en bijgeloof in de fonetiek* (Belief and Prejudice in Phonetics). He discarded theories which appeared to him to be untenable and held forth on what seemed to him phonetic truths. He was quite aware of the fact that some people might pigeon-hole his opinions as prejudice too. The laboratory that was at his disposal in Amsterdam was far from up to date. The building in which the laboratory was situated was scheduled to be demolished because of reorganizations. In 1966 a new building came at his disposal which was equipped according to the requirements of that period.

In 1967 Mol obtained a full professorship in Amsterdam. From then on he was

able to devote all his time to the work in Amsterdam. In his opening speech he said:

'Here in Amsterdam we are fortunate in being able to continue a tradition which has come about in very difficult circumstances of various nature in a period of economic crisis (The Institute as such had been founded by Louise Kaiser in 1932 G.M.). The first steps in electro-acoustics had only just been taken. The making of a gramophone record was still an adventure. The physics of speech and hearing were even then in a nebulous state. The explosive development of electro-acoustics started after 1945 promoted by the coming of age of magnetic sound registration and the discovery of the transistor, two famous fortuitous events. Not until the fifties was any headway made in the acoustic calculating of our organs of speech. For those who know how to look at visual registration of sound an oscillogram can be an important aid when studying the processes of speech and hearing. For the making of oscillograms this Institute has extensive resources. But, he continues, in the thirties oscillograms were already made with a cathode ray tube which seems to us quite primitive, but these oscillograms can still easily pass muster.' (The first oscillograms were made in a period when Gemelli's publication appeared which forms a starting point of the use of oscillograms in the study of phonetics. G.M.).

The exponential growth of the universities in the Netherlands and the demand for a more democratic management at the end of the sixties took up much of his energy as this was a point of great concern to him. These circumstances notwithstanding he managed to get a team together more or less as he deemed necessary for fundamental research of the mechanism of speech and hearing. He thought phonetics was the meeting ground for linguists, speech pathologists, physiologists, mathematicians, statisticians, physicists, psychologists and technicians. The effort to keep such a motley crew together increasingly charged his physique.

His indifferent health never stopped him from putting his knowledge and insight at the disposal where the need arose. The number of committees and quangos (quasi-autonomous national government organization) of which he was a member makes this clear.

- Advisor to Werkgroep Standaardisatie Phonocardiografie;
- Member of the Acoustics Committee of the International Organization for Standardization;
- Member of the Ministerial Committee 'Spoken Books and other Texts for the Blind';
- Member of the advisory board for science of the Institute for Perception Research. He was active from its conception;
- Member of the Technical Advisory Council for the Physically Handicapped;
- One of the founders of the Huygens-Fokker Foundation (musicology);
- One of the founders of the Studio for Electronic Instrumental Music (STEIM);
- He stood at the cradle of the Dutch Association for Audiology. For many years he was on the board of the
  - Dutch Association of Phonetic Sciences;
  - Dutch Association of Speech pathology and Phoniatics;
  - and last but not least of the
  - Foundation for the training of Speech pathologists.

In Mol's view the alphabet constituted the pitfall for phoneticians. A theme he was to return to time and time again, even if we don't find overt evidence of this in the titles of his articles. These titles on phonetical subjects range from the analysis of the phoneme in distinctive features and the process of hearing, the search for the correlation between production and interpretation of speech sound and then again hearing and the concept of the phoneme, the phonetic description of the phoneme, the question whether phonemes are really realized to one of the last articles he was to publish; the writing on the wall for phoneticians.

We must be aware, he states over and over, that:

'The alphabet is Man's biggest invention; it is merely wishful thinking, however, to assume that the alphabet (be it phonemic or not G.M.) is an only recently direct manifestation of a hitherto underlying alphabetic system of storage and transport of code elements.'<sup>3)</sup>

Speech, rather than writing being the foremost invention of Man, one cannot but underline Mol's opinions as stated also further on in the same article,

'whatever speech may be, it is being transported over a transmission

channel (perhaps 'pathway' would be more appropriate in this sense G.M.) linking the brain of the speaker with that of the hearer.

Modern experimental as well as medical evidence shows that the alphabetical model is unable to explain what goes on in that channel.' ...

'One of the tasks I have set myself is to construct a model that can be applied to the transmission channel (pathway! G.M.) and that at the same time includes the possibility of alphabetic writing (phonemization G.M.) and explains the latter's success.'

He refers to the labelling of the acoustic code elements. And in the very last of Mol's articles a new road is being taken albeit making use of the fundamental ideas he had gathered: Gesture Phonetics.

A great deal of Mol's time was dedicated to the simulation of speech and hearing: viz. an electronic model of the organ of hearing, the development of a physical model of the vocal tract and one of the glottis. The first model named took shape because of his criticism of Fourier-analysis and his preference for the 'Hermann'-model of vowel production. This too can be found in several places in his work. This opinion led to controversies which were a burden to him, but which came to a kind of solution and more or less dissolved themselves at the end of his life.

The model of the vocal tract came into being, as might be expected in the first place from a transmission engineer, in an electronic analogue, which led to a four pole solution. A purely mathematical model would have led to a similar result but without the difficulties of this model.

The vowel siren and twin-tube model built as a physical model gave, on the contrary, an almost perfect insight into the production of vowels and diphthongs. It would have gladdened him if he had been able to see how one of his co-workers succeeded in calculating, working backwards from acoustic measurements, the possible physiological production models. It took a long time - however short it might have been in actual time, it was too long for him - to arrive at the results of his co-workers.

The turning point in Mol's ideas can be shown in his article on Gesture Phonetics.<sup>4)</sup> There he states:

'The primary purpose of this paper is to divert the attention of the investigator from the purely acoustic domain and to re-focus it on the underlying articulatory movements (gestures). Among other things we

are convinced of the fact that the speakers of a language are united by the character of their articulatory gestures rather than by their 'common' acoustic behaviour.

The articulatory movements do not only provide a better platform from which we may study the process of speech and hearing; we may even go as far as saying that these movements of the articulators form the very backbone of the mechanism of speech and hearing and that much of what has been done in the domain of speech research needs re-thinking in terms of the articulatory gestures.'

The gist of this article came into being through the years in discourses with his co-workers. Speech perception is tied up by Mol to a series of illusions of the listener of the articulatory gestures of the speaker. Mol felt confident that the future development of phonetic sciences needed new avenues of thought whereby unjustly blocked avenues were to be reopened rather than continuing along a dead alley. This conviction is contained in an article of his: *Movement is All*. It calls for more than a *Camera Obscura* or even for such a thing as the apparatus for drawing pictures, enlarging or reducing the image of the outside world known as: *Camera Lucida*.

G.L. Meinsma



## NOTES

- 1) J. Romein;  
Op het breukvlak van twee eeuwen. Leiden, Amsterdam, 1967 2 dln.
- 2) Hein Mol;  
Memoires van een havenarbeider. Nijmegen, 1980. [2e dr. verm. met inleiding, nawoord en aantekeningen]
- 3) H. Mol;  
[Review of] Proceedings of the Sixth International Congress of Phonetic Sciences, Prague 1967 etc.  
Linguistics, 80, 1972, p. 111-121
- 4) H. Mol;  
Gesture Phonetics. [In:]  
Linguistic Studies offered to Berthe Siertsema. Amsterdam, 1980.