

**VOWEL-SOUND,  
PP. 157-201**

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649271535

Vowel-sound, pp. 157-201 by Anonymous

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# VOWEL-SOUND.



*Thesis presented to the University of London,  
by R. J. LLOYD, M.A., Candidate for the degree  
of Doctor of Literature, 1890.*

LIVERPOOL:  
TURNER AND DUNNETT, PRINTERS, 17A, FENWICK STREET.

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## SOME RESEARCHES INTO THE NATURE OF VOWEL-SOUND.

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The treatise on "Phonetic Attraction," which I had the honour of submitting to the University two years ago, was the firstfruit of an investigation into the laws of form, and of the rise and change of forms, in language, which I have continued to prosecute until the present time. That treatise had been essentially prompted by a dissatisfaction with the crude system of doctrine which passes at present under the name of Phonetics, and which attempts to settle everything in language and in the history of language upon merely mechanical grounds. Encouraged by the conditional approval which was then accorded to me by the Examiners, I next applied myself to a minute critical examination of the science of Phonetics, as at present taught in England, and came to the conclusion that it was radically defective, even from its own mechanical point of view. I therefore proceeded to devote myself to a series of further enquiries and experiments whose aim it has been to re-construct Phonetics as a physical science upon new and sounder bases. I need hardly say that I am still a long way from the completion of this task. But I have perhaps gone far enough to justify me in reporting to the University, in the form of a Thesis, the chief results which I believe to have been already attained.

The prime question in every system of Phonetics is that relating to the nature of vowels. What is the difference between the vowels and the other elements of speech? What again are the essential differences of the vowels between each other? Contemporary English phoneticians generally answer these questions by saying that the difference lies in the method of ~~their~~

articulation: and substantially identical answers are given by some of the most eminent Continental investigators, such as Sievers and Storm. These all employ for the purposes of phonetic discourse and discussion a system of classification, nomenclature, and conventional signs, which with slight modifications is the Visible Speech alphabet, invented some three or four and twenty years ago by the eminent elocutionist, A. M. Bell. In this system every vowel has a name, and also a symbol, which embodies in itself an indication and rude instruction how the vowel is to be articulated.

But this system is not accepted by all Continental phoneticians. Victor, Trautmann, Winteler, and other eminent writers, either discard it absolutely or use other modes of classification and nomenclature by preference. A similarity of principle underlies all these other systems: they all classify the vowel according to its sound and not according to its articulation. And certainly, if it is equally possible, it is far more natural to do so. If we were classifying colours or smells we should arrange them according to their shade or their aroma, not according to the shape of the plant or flower from which they happened to proceed. So also it seems at first sight a strange sort of *ὑστερον πρότερον* to name and classify vowels according to the shape of the cavity from which they proceed, rather than according to their heard quality and proved acoustic affinities.

But it is not really quite so strange as it looks. The quality of a vowel depends upon, and is in fact created by, the shape of the cavity through which it comes. And in the existing state of our resources it has been much easier to indicate in words the various shades of difference in the shape of articulate configurations than to give names which would call up instantly and unmistakably certain definite shades of sound. For this reason the science of speech-sounds, as such, continues to be in a very backward condition, and is in fact largely superseded and hidden by the science of articulations, which in England at any rate monopolizes the title of Phonetics.



It is evident, however, that such a state of things can only be temporary, that in fact we shall never continue to classify sounds according to the accidents of their origin when once we are able to arrange them after the essentials of their nature. Not indeed that we should slacken our study of articulations. Quite the reverse. But we ought to know why certain articulations produce certain sounds, and what is the intimate acoustic nature of the sounds thus produced. When that is done we shall certainly learn first to know the sounds *per se*, and then to know the reasons why certain articulations produce them. Until then we shall always be in danger of viewing the subject in an inverted perspective, hardly seeing that which ought to be the chief object of our view. Phonetics is defined to be the "science of speech-sounds." Now the first thing we want to know about a sound is its acoustic nature; our interest in its mode of production is only of a secondary kind.

It follows then that in the phonetic science of the future speech-sounds will certainly be classed not according to their articulation, but according to their acoustic essence; and the study of articulations will be the first handmaid of Phonetics, but will stand no risk of being mistaken, as it now is, for Phonetics itself. This being so, it seems clear that the path of greatest usefulness at present in phonetic investigation is to enquire further into the acoustic nature of speech-sounds, and especially of vowels. This has been done already to a certain extent, but not to anything like a sufficient degree. Nearly every phonetician of the acoustic school has his own scheme or diagram of classification, wherein the vowels are duly arranged in an order which seems suitably to represent their relative affinities of sound; and some physicists also, notably Willis and Helmholtz, have made partially successful attempts to analyze the different vowels into their acoustic elements, and also to construct artificial vowels. But the latter attempt seems only to have succeeded well with the graver vowels, such as *u* and *o*: the attempt to produce *i* (English *ee*) was a failure altogether.

Under these circumstances it seemed desirable to investigate the vowels afresh, beginning if possible from the acute or *i* end of the scale, where previous investigation had left fewer tangible traces. The mere discrimination of certain standard vowels by ear is palpably insufficient for scientific purposes. Such standards must necessarily be wanting in fixity, in definiteness, in communicability; there is no possible security that everybody would always use them in the same exact sense. We must get down to some objective and permanent criterion of the differences of vowel-sounds before we can even begin to talk quite scientifically about them.

Such an attempt had been not long ago made by one of the authorities already mentioned, Professor Trautmann of Bonn. That scholar, after a very large and laborious experimentation, chiefly with tuning-forks, arrived at the conclusion that each vowel-configuration has a pitch of its own, which is identical, for that vowel, in all persons, young or old, large or small, male or female. In whisper, this note is heard almost pure; in loud speech it is crossed by the strong vibrations issuing from the glottis or vocal chords. But in both cases the heard sound possesses the same vowel quality, and in both cases it is conferred, says he, by the concomitance of the tones of one certain definite pitch which are created by the resonance of the given vowel-configuration. He recommends the study of these resonances in the *whispered* vowels, because the other elements are therein feebler; and the aim of his experiments with the tuning-forks is then to discover what note each vowel-configuration will most readily and loudly resound to. This note he takes to be identical in pitch with the resonance which by its added presence creates the vowel, and he considers that by these means he has determined the absolute pitch of this resonance for every vowel.

After carefully examining these doctrines, I found myself unable to subscribe to them. They seemed indeed to me to be based upon a misapprehension of some of Helmholtz's teaching, and to run counter to most of his facts. I began an independent

investigation of my own, and the results thereof have appeared from time to time in a series of articles entitled "*Speech Sounds: their Nature and Causation*," which I am contributing to the specialist organ, the *Phonetische Studien*, edited by Professor Viëtor of Marburg. Two articles of that series which have already appeared, and one which is in the press, accompany this Thesis. They lead up to, but do not contain, that general theory of vowel-sound which it is my chief object to unfold in the present discourse. They will therefore need to be frequently referred to, and reference will be most conveniently made to the *sections* into which they are divided. The considerations which induced me to reject Professor Trautmann's doctrine of absolute single pitch will be found chiefly in § 3 and § 9; they will also partly appear in the further portion of this paper.

But I found in Helmholtz (Ellis' edition, London, 1885, p. 107), a hint which seemed to be of a fruitful nature. "When a bottle," says he, "with a long narrow neck, is used as a resonance chamber, two simple tones are readily discovered, of which one can be regarded as the proper tone of the *belly*, and the other as that of the *neck* of the bottle." My previous study of articulations led me at once to recognise that the principle here announced was probably applicable to certain vowel articulations, and in fact to those of the very vowels which seemed to stand most in need of further physical investigation. What we really do when we articulate an *i* vowel is to create a *neck*, of a certain proportionate size, to the vocal cavity. The tongue is so presented to the opposing surface of the hard palate as to leave a narrow channel between them, which is for the time being a veritable neck to the inner cavity. It is true that this inner cavity is of a shape very much more irregular than that of a bottle; but a suggestive observation of Liscovius, recorded by Lord Rayleigh in his "*Theory of Sound*," (Ed. 1, Vol. II., p. 173) led me to infer that these irregularities had little, if any, influence upon the pitch of resonance produced.