



a Pelican Original

Phonetics

J.D. O'Connor

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J. D. O'Connor

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Phonetics

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Foreword

The sounds of speech are all around us. We use them, we hear them, we enjoy and suffer from them, and in general we know remarkably little about them. Not from lack of interest or percipience, since we are in many ways fascinated by the sounds that we and others utter and immensely skilful at discriminating and interpreting them, but rather from the inherent difficulty of coming to grips with anything so transient. It seems worthwhile, therefore, to attempt to explain how speech sounds can to some extent be pinned down, so that we may have a firmer foundation for understanding how sounds contribute to the process of communication.

I have tried in this book to give a simple and practical introduction to the nature and use of sound in language. If I have succeeded it will be mainly due to the tradition of pragmatism which characterizes the Department of Phonetics at University College London. I have been associated with that department for more than thirty years as student and teacher; its tradition has largely shaped my attitudes, and I recognize very clearly the great debt I owe both to my predecessors and to my past and present colleagues. In so close-knit a community views are shaped by daily contact, so that a great deal of what this book contains is a product of their interest and expertise, and I thank them warmly for their contribution.

In phonetics, as in any other subject, there are various schools of thought whose views sometimes conflict and sometimes coincide. I have made occasional reference to these, but have not

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attempted to set out all possible current approaches to the theory of pronunciation because this book does not seem to me the place for that. Yet I do not mean to imply any inferiority in other views; I simply believe that the traditional approach which I have used provides the simplest introduction to the subject.

I have relied heavily upon published work in the field, and to all the authors cited in the list of publications consulted I make grateful acknowledgement for the information and enlightenment they have provided. It is customary to associate one's co-workers with any merit a book may have whilst assuming responsibility for its defects. I do this, too, but in no routine spirit: without them this book could not have been written.

1. The Role of Sound in Communication

When one person wants to convey a message to another he can use a variety of means. He may write it down on a piece of paper (parchment, wood, bone, clay, wax, stone) and hand it over; he may transmit it in sign language, as deaf mutes do; he may stand on one alp and wave or drape flags in a pre-arranged way to the recipient standing on another; or he may prefer to flash a mirror. All these are visual means. On the other hand the message may be passed by audible means, by fog-horn, morse-key or drum; or it may simply be spoken: transmitted by word of mouth.

In all ages, even the most literate, the vast majority of messages have been spoken: transmitted by means of sound generated by certain of the bodily organs available to every normal human being. The spoken word is, and is likely to remain, by far the most frequent medium of communication between man and his neighbour and it is, to this extent at least, the most important such medium. But since other media are also available – flags, drums, gestures, writing – and since the same message may be passed by any of these media, it would be wrong to argue that speech is at the centre of communication. Whilst the medium may vary, the message does not, and it is therefore the message itself, independent of the means of transmission, which is the heart of the matter. In this sense at least the medium is precisely *not* the message.

It is necessary to acknowledge the centrality of ‘the message’ in order to be able to place phonetics – the study of the sounds of spoken language – in the context of linguistic studies generally. Phonetics is concerned with the human noises by which ‘the

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message' is actualized or given audible shape: the nature of those noises, their combinations, and their functions in relation to the message. Figure 1 may help to clarify our ideas about the domain of phonetics in the communication process; it is a simple model of a single act of communication, the passing of one message from a speaker to a listener.

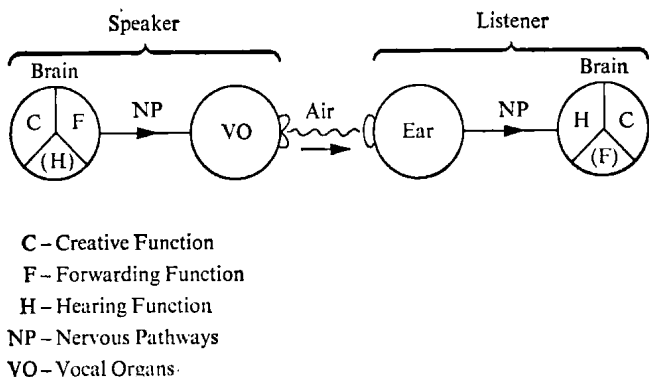


Figure 1: Stages in the passing of a spoken message

The act of communication starts in the brain of the speaker and we may think of the speaker's brain as having two distinct functions for our purposes: a creative function and a forwarding function.

Creative function. This is the central function and it is through it that the message is conceived and formed. Stored in the brain is a profound knowledge of the way in which the language operates, the rules of the game, as it were: this knowledge is of many kinds, all derived from our experience of operating the language as both speaker and listener from earliest childhood. We know the permissible grammatical patterns and the vocabulary items which can be used to fill out those patterns; we know what the voices of a man, a woman, a child sound like; we know what a good many individuals sound like; we have at least some knowledge of

dialects other than our own; we know what the general probabilities are of one word or expression following another; and so on. This does not mean that each of us is capable of codifying all this stored information – that is the business of writers of grammars, dictionaries, etc. – but we are able to make use of it. Nor does it mean that each of us has exactly the same information stored away: almost certainly every individual's store is to a greater or lesser extent different from everyone else's. But if we are to communicate efficiently there must be a sufficient stock of common information at our disposal.

There are three distinguishable phases of the creative function. First, a need to communicate arises; this may be in response to some outside event or entirely to some inner thought process. Suppose that a wife sees her husband finish his first cup of tea at the tea-table. She may simply take his cup and refill it, or she may decide to initiate a message which will lead to that happening. If she decides on a message, she must then decide, secondly, what medium to use, speech, writing, sign language, etc.; this will often be determined by the circumstances of the case, but notice our frequent hesitation between telephone and letter. Thirdly, a decision must be made as to the form the message will take. Is it to be imperative (*Have another cup*)? Or interrogative (*Would you like another cup?*) If imperative, should it be: *Pass your cup*, or *Have some more*? And so on. We make these decisions of form very rapidly and indeed without consciously thinking of them at all in most cases, and the message is ready formed. The forwarding function of the brain now takes over.

Forwarding function. The part of the brain which is concerned with controlling muscular movement now sends out patterned instructions in the form of nervous impulses along the nervous pathways connecting the brain to the muscles of the organs responsible for speech sounds, the lungs, larynx, tongue, etc. These instructions call upon the muscles concerned to perform various delicate combinations and sequences of movement

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which will result in the 'right' sounds being emitted in the 'right' order.

Vocal organs. At this stage the neurological activity which has been taking place in the brain and along the nervous pathways is transformed into muscular activity: the lungs are contracted, the vocal cords vibrate, the tongue wags, the jaw goes up or down, the lips part or come together and so on. All these actions are most beautifully and accurately controlled – learning the coordination of movement required for the emission of speech is probably the most stupendous feat of muscular skill any one of us will ever perform. The result of these movements is to set air in motion, air from the lungs which is acted upon, impeded, obstructed, released by the vocal organs so that it comes out from the mouth in a sequence of complex waves of pressure. A second transformation has now taken place, from movement of muscles to movement of air. The movement of the lung air is now transferred in the same form to the outer air and the waves of varying air pressure spread out in every direction around us, gradually growing weaker as the distance increases and their original energy is absorbed. This moving air eventually impinges on the ear of the listener, if he is near enough.

The ear. The ear-drum is sufficiently sensitive for the air pressure waves to cause it to move in and out in a way closely related to the movement of the air itself. This further transformation – from air movement back to the organic movement of the ear-drum – is now followed by a final transformation, in the inner ear, of this organic movement back to neurological activity, which results in nerve impulses being sent along the nervous pathways connecting the ear to the listener's brain. The listener's brain may also be thought of as having two functions, a hearing function and again a creative function.

Hearing function. The impulses coming from the ear are accepted as sound sequences of constantly changing quality and characteristic length, pitch, loudness. The listener *hears* the mes-

sage but does not yet *understand* it. This is what happens when we listen to a foreign language that we don't know: we hear the sounds but we do not receive the message. To understand the message the listener must interpret the sounds he hears in the light of the stored knowledge in his brain; he not only hears the sounds but recognizes them and matches them up with what he knows to be possible in the language at various levels, and finally selects the most likely meaning in all the circumstances; and this genuinely creative process is another part of the creative function of the brain discussed earlier.

The process of matching starts with the sounds themselves. If, at the stage of simple reception by the brain, I hear a sound or a combination of sounds which my stored knowledge tells me is not permitted in the language, I immediately reject the data and look around for something similar which is permitted. For example, if what I actually hear is this: *His name is Stveet*, I reject the *v* because I know from previous experience that *stv* is not a sequence used at the beginning of English words and I either replace it by something – probably *r* – which makes the sequence acceptable or I request a repetition. Until the brain has arrived at a satisfactory interpretation of the incoming sounds – satisfactory in the limited sense that they are at least English sounds in English sequences – no progress can be made, but since we are very ingenious at this game of matching and interpreting we very quickly go through the necessary processes, and allow the result to go forward to be matched at other levels. We may of course err in the match we make, but this will not be because we accept a non-English possibility; it will be because we select the wrong English one. There is a London pronunciation of the name Poole which makes it sound like what I would say in pronouncing the name Paul. If, because of this pronunciation, I wrongly accept the name as Paul, my error stems from using the wrong, but possible, dialectal frame of reference and not from accepting a non-permitted item. Exactly the same is true if an English pronunciation of *ballet dancer* is

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misinterpreted by an American listener as *belly dancer*; given an American pronunciation framework *belly dancer* is the more likely solution.

The accepted sound train must now be repeatedly matched with the possibilities at other levels. If what we hear (or what we think we hear) is: *The man are on strike*, we cannot accept it on the grammatical level: it is not a permitted form; and we therefore reconstruct it, probably as: *The men are on strike*, possibly as: *The man is on strike*, both being equally acceptable grammatically. It should be noticed that this is a grammatical decision and not a decision about sounds – the sound sequence represented by *man are* is perfectly acceptable: it is the grammar which is not. Equally, matching at the level of vocabulary is independent both of sound and grammar. If we hear: *He swallowed it hook, line and tinker*, we reject and reconstruct it because of our knowledge of what words are likely to go with what, not for grammatical or phonetic reasons.

Even when matching has been carried out satisfactorily at the different levels within the language itself, there is still more to be done. The utterance, which is now linguistically acceptable, must now be matched first against the situation in which it is functioning, and second against the general cultural background. The situation or context may be purely verbal or it may be a matter of surrounding things, people, events. There is nothing wrong linguistically with: *Come and see me at three o'clock*, but in the context: *I can't see you at three o'clock, so . . .*, there is a mismatch between the two parts, and the utterance must therefore be rejected. Similarly, if it is a question of an appointment the same day, and the time at the moment of speaking is 3.30, there is a lack of match between: *Come and see me at three o'clock* and the non-verbal situation. Finally, if the linguistically unexceptionable utterance, *My wives just told me about it*, occurs in a generally monogamous culture it will be rejected – or queried – because of failure to match cultural expectations.

The passing of a spoken message, then, involves a great deal of activity beyond the production, transmission and reception of sound. The sound is not the message, but it is what gives the message shape in spoken communication, and it is worth study simply for that reason; in speech we rely very heavily upon sound to make plain the significant distinctions of meaning which can be made by the more central operations of grammar and vocabulary. A word, when it is pronounced, must have a particular sound-shape if it is to be recognized, just as it must have a particular letter-shape when written. The spoken word *dog* must have a recognizable *d*-sound at the beginning, *o*-sound in the middle, and *g*-sound at the end, and if we use a different sound at any of these places the word will lose its shape and not be recognized; replace the *d*-sound by a *b*-sound and we hear *bog*, which is different in meaning, or replace the final *g*-sound by a *v*-sound and we hear *dov*, which we do not recognize at all. Furthermore, the constituent sounds must be in a particular order: *dog* is not *god* and still less *ogd* or *dgo*. In a language like English, stress too may help to give the word its individual shape: the word *forebear* is distinguished in pronunciation from *forbear* by the former having its first syllable stressed and the latter its second. Stress may also distinguish a word functioning as a noun, like *incense*, from an otherwise similar word functioning as a verb, like *incense* (anger).

Differences of pronunciation also allow us to distinguish longer forms such as *grey tape* from *great ape*; or *my tight shoes* from *might I choose*. And at the level of whole sentences, patterns of pitch (or intonation) permit distinctions which are not usually made in writing, such as: *I thought it was going to rain*, (but it didn't) and: *I thought it was going to rain*, (and it did).

It should be noticed at this point that not *all* the distinctions of grammar and vocabulary are reflected in sound: *taut* and *taught* (and for some people *tort*) are identical, as are *by*, *buy* and *bye*, and the noun *intent* and the adjective *intent*. Equally *a tack* and *attack* are rarely distinguished in pronunciation any more than

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ambiguous sentences such as *Buy me a present* (Buy it to give me or buy it as my agent). Yet by the nature of things *most* of the meaningful distinctions of the language must be capable of being given distinctive shape in sound, and it is this close dependence of sound and meaning which justifies the study of speech sounds, i.e. phonetics.

If we now return to Figure 1 (p. 10) we can delimit the areas of interest to the phonetician.

He is interested in the way in which the air is set in motion, in the movements of the speech organs and the coordination of these movements in the production of single sounds and trains of sounds. His interest at this point borders upon the study of anatomy and physiology, and his tools for investigating just what the speech organs do are tools which are used in these fields: direct observation, where possible, e.g. of lip-movement, jaw-movement and some tongue-movement; X-ray photography, either still or moving, for recording positions and movements of the tongue, soft palate and vocal cords; observation and/or photography through mirrors, as in the laryngoscopic investigation of vocal cord movement; and electromyography, or the detection and measurement of the small electrical potentials associated with muscle contraction at relevant points in the vocal tract. This whole area of interest is generally known as *articulatory phonetics* (see Chapter 2).

He is interested in the way in which the air vibrates between the mouth of the speaker and the ear of the listener. In this he is close to the physicist studying acoustics, and the tools he uses are such as will enable him to measure and analyse the movement of air in the terms of physics. This generally means introducing a microphone into the communication chain, converting the air movement into corresponding electrical activity and analysing the result in terms of frequency of vibration and amplitude of vibration in relation to time. This is the domain of *acoustic phonetics* (see Chapter 3).