

ROBERT M. W. DIXON

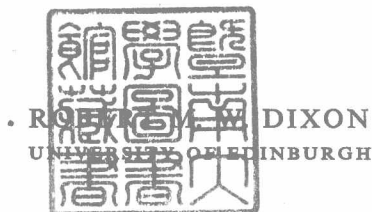
Linguistic Science and Logic

LINGUISTIC SCIENCE AND LOGIC

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JANUA LINGUARUM

STUDIA MEMORIAE
NICOLAI VAN WIJK DEDICATA

edenda curat

CORNELIS H. VAN SCHOONEVELD
STANFORD UNIVERSITY

SERIES MINOR

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which is discussed in section 2.1 is essentially a statement of the neo-Firthian linguistics which has been made definitive by M. A. K. Halliday and others at Edinburgh. I have gained much from discussions with Halliday, J. O. Ellis, J. McH. Sinclair, Angus McIntosh and J. C. Catford during the preparation of this essay.² But despite this, and the fact that 2.1 and certain parts of other sections are merely my restatements of accepted Edinburgh opinions, as I understand them, the full responsibility for the present discussion must, of course, rest squarely with me.

Part A can stand on its own as a discussion of the scientific nature of linguistics. But it is included here solely as prolegomena to the examination of the basic interrelations between logic and linguistics in Part B. Section 3.2 is devoted to a discussion of the work of the Chomsky school within the terms of reference of the Edinburgh approach; this group has attracted much attention in recent years and, more latterly, some pointed criticisms.³ Chomsky's approach differs from ours and we do not throw doubts upon the merits of his own theory relative to its aims: the linguistics described in section 2.1 would come off badly if discussed relative to Chomsky's approach. His viewpoint is quite possibly more original than any in the last two thousand years: we examine it with respect to the purposes of 'linguistics' as they were understood before Chomsky applied the designation to his own work, and in particular with respect to our own scientific criteria.

We consider to what extent logical methods can be employed in doing linguistics. Finally, the relevance of linguistics to the establishment of a descriptive, rather than prescriptive, and distributional, rather than conceptual, logic is discussed.

² J. O. Ellis, M. A. K. Halliday, Angus McIntosh and J. McH. Sinclair have read this essay in draft form and made extremely valuable suggestions for improvement.

³ For example: Anton Reichling, "Principles and Method of Syntax: Cryptanalytical Formalism", *Lingua*, X, 1-17 (1961); Dwight D. Bolinger, "Syntactic Blends and Other Matters", *Language*, 37, 366-381 (1961).

PART A

A GENERAL SCHEME OF SCIENCE

1.1 SCIENCE AND OBSERVATION¹

The kind of linguistics which is described in this essay is conceived of as a branch of science. As the term 'science' can cover a fairly wide range of different methods it will probably be useful to state, rather briefly, just what is meant by science in the present context.

We say that the 'raw material' of science consists of *observations*.² The scientist will recognise a certain *pattern* which is common to a number of observations; in other words he will notice that, in some particular way, the observations are similar to each other. Having recognised certain patterns he will then compare and correlate them. *Pattern correlations* can be of several different sorts: the scientist can correlate different patterns all of which are noticed in the same set of observations, or else he can correlate patterns of a similar sort which each occur in one of a number of distinct sets of observations. Generally speaking he will perform

¹ I was able to effect considerable improvements on an earlier draft of Section 1.1 after discussions with J. McH. Sinclair.

² An alternative to this would be to say that the raw material consists of 'objects' or 'material things' which have a 'real' and independent existence. In this case the next step would be to make observation of this 'real' raw material. This approach has the disadvantage of prerequiring an assumption regarding the existence of 'real things', thus raising metaphysical questions of considerable depth. A number of other difficulties can arise if 'objects' rather than 'observations' are taken as raw material but the extra assumption indicated above is in itself thought to be sufficient reason for our present approach. It should be noted that the observation method automatically avoids the traditional dichotomy of '(object) referential' and 'non-referential' meaning; 'referential meaning' involves correspondences being set up between pieces of language material and 'material objects'. The observational approach demands a consistent and homogeneous treatment of meaning: further details of this are given in section 1.4.

pattern correlations of both these kinds. A *theory*³ is obtained by generalisation upon pattern correlations. Thus a theory can be looked upon as an abstraction from a number of observations. What is abstracted from each is that pattern or patterns which is seen to recur in similar form in other observations. And so the first function of a scientific theory is that it should be descriptive. Instead of having to refer to each recognised pattern in each observation individually we can describe these patterns *in toto* by means of the theory: so that a theory is, in other words, a concise and abbreviatory form of statement.

The term 'observation' requires some explanation. It is not thought that observations are any sort of 'entity', either mental or physical. Nor that they are uniquely determined or that they are discrete things. Observations can only initially be considered in relation to one particular person, an observer. We must assume, I think, that an observer observes⁴ continuously. For we can surely never split up his life into a sequence of mutually exclusive, discrete observations. We cannot draw some line in time and say that one observation finishes and another starts here. The observer is aware of what happens on either side of this line and he cannot consider just some time-segmented memory; he may direct his attention to a particular part of his past observation but he cannot ever be sure that he is considering this part to the complete exclusion of all others since some or all of the other parts are always present, to some extent, in the background of his thoughts.

It would thus seem quite in order to say that life is one con-

³ Explicit discussion of the intermediate steps involved in theory construction – such as the setting up and testing of hypotheses – has been omitted from this brief account.

⁴ 'Observe' is here used in a very wide sense (whilst it is not necessarily intended to imply the presence of volition): for example, it includes an observer's awareness of himself. It is thought that most, if not all, of our knowledge and experience is gained by means of some sort of direct or indirect observation. We would appear to observe in somewhat different ways at different times. Whilst we are sleeping we must be observing in some way since a loud noise or a blow on the head will wake us up or promote some action; but we are obviously not observing in the same sort of way as we may be at midday.

tinuous observation. This is our most general statement and it must always be borne in mind that such is the case. But we can of course isolate, to some extent, some part of observation. The 'observations' which we referred to above as making up the raw material of science are just such isolates. It must however be noted that we are never able to clearly define the outer boundaries of an isolate. An isolate from observation can be regarded as the continuum of the observer's observation up to that time with one part of the continuum emphasised and brought into the most immediate consideration. The rest of the continuum is then temporarily pushed into the background: but it must be *present* since the isolate is merely a part of observation and can only have any existence relative to the rest of observation. And again the isolate is not some clearly defined part of observation such that just it is emphasised more than the bulk of the continuum. Some part of the isolate may be emphasised more than some other part of the continuum but the isolate is always a part of the homogeneous whole. The change from emphasis to non-emphasis is a gradual and continuous one rather than being sudden and discontinuous. Thus the isolate can be regarded as a hillock with gently sloping sides set in the field of observation rather than as some sort of tall tower. It will be seen that the process of isolation is to a large extent arbitrary; indeed, the term 'isolate' may be something of a misnomer. Again, since we cannot explicitly separate emphasis from non-emphasis, we are in no position to decide whether any two isolates are mutually exclusive. In the strictest sense, of course, they can never be since they each contain the same foundation of the observer's complete observation up to that time. A set of isolates can usefully be regarded as the observer's observation with a number of different parts emphasised into the forefront of consideration, a field containing a number of hillocks.⁵

⁵ This distinguishes science from mystical experience (on which see "Mysticism and its Language" by C. W. Morris, pp. 179-197 of *Language: An Enquiry into its Meaning and Function*, edited by R. N. Anshen (New York, 1957) - I owe this reference to J. O. Ellis) where, if the mystics' claims are justified, 'observation' is possible in which there is no distinction of 'fields' and 'hillocks'.

It is convenient to recognise two parameters which can be identified within observation. The first one, *length*, can be used as some sort of rough indication of the duration of a part of observation. The second, *width*, will measure synchronic detail of observation. For instance, the width of a part of observation which includes some written language material will also include such things as the paper on which the material is written, the table on which the paper rests, the walls of the room, the trees seen through the window, a car-horn heard in the street, the observer's awareness that he is feeling hot and hungry or that he has a headache, and so on. When we, in a manner of speaking, isolate from observation, the process is performed relative to both these parameters. Thus, when we are looking for material for linguistic science, we may hear a conversation between two people. We shall try to isolate a part of observation to be in our raw material for linguistics. Although we cannot precisely delimit the isolate we can give indications of the sort of length that we wish to emphasise and the parts of the width that are to be given prominence. Thus we shall want the length of the isolate to be such as to include the whole conversation and as little more as possible. As for the width: the main feature to be included is the actual sounds made during the conversation; this is the part of width which is to be most emphasised.

Often we find that not enough information is contained in some part of our raw material. It is then, of course, an easy matter to return to the part of observation near the isolate and extract a larger piece than at first. In many sciences we need some parts of observation to be the nucleus of our raw material and other related parts to be, as it were, the qualification of this nucleus. In the particular case of linguistics we would need to know, in the above example, which part of the conversation was being uttered by which of the participants. Many other factors are also needed in order to determine the full linguistic status of the conversation; we would need to know enough to determine whether the conversation was of a formal or informal nature, what the social role of the conversation was, and so on. The nucleus raw material is

the basic *substance* of the science. Some parts of observation near this substance⁶ are needed in order to determine the contextual meaning of the substance. These parts can in fact be called the *scientific situation* of the substance, the scientific situation being an abstraction from the *general situation* of the piece of substance. 'General situation' is a technical term like 'substance', 'pattern' and 'theory' and it represents the whole of observation as it occurs in relation to the position of the piece of substance. Recognising and abstracting the substance is often fairly straightforward; the scientific situation may well be less evident. But, as already mentioned, we are able to refer back to the whole situation of a piece of substance at any time and extract as much further 'scientific situation' as we need. And so scientific situation is *potentially* the whole most general context, the scientist's complete observation. In practice only certain features of general situation will be relevant in the case of each particular science.

Science is thus always carried on within the wide context of the whole of the scientist-observer's observation although he may superficially appear to be dealing with just a few particular isolated parts of his observation. The way in which the scientist deals with his raw material, his recognition of patterns, is also relative to the same wide context, his observation⁷ up until that time.

It will have been seen that the forming of isolates out of observation is itself an example of pattern recognition. The pattern here is, in the case of linguistics, the presence of what we recognise as written or spoken language material in a part of observation. This is the defining pattern. But along with the language substance we isolate certain external features of the observation which are relevant to linguistic study. We do not of course merely search through random parts of observation until we find some with the

⁶ In the case of linguistics, for example, some of the most relevant scientific situation is often at the same place in length as the substance and differs from it only in width.

⁷ As already mentioned a scientist's observation will to a very large extent define his knowledge and experience. Thus his raw materials are extracted from observation and his methods of working with them are derived from observation.

patterns we require. The gathering of raw material can be directed by the observer; by this is meant that it is possible to focus our attention in such a way that we will have a better than usual chance of observing the necessary patterns. But it remains the case that selection of the raw material is a preliminary application of the pattern-recognition procedure.⁸ Then, in our scientific consideration of the raw material, we will recognise and correlate certain subtler patterns within the isolates that make up the raw material.

It is often possible to provide stated procedures for at least some of the correlations of patterns involved in a scientific investigation. But the actual recognition of the patterns themselves must be, to a far greater extent, intuitive. Which patterns are recognised as belonging to each of a number of isolates may vary from observer to observer and, in the case of a single observer, from time to time. The choice of patterns depends on the point of view of the observer; and this point of view will presumably depend, in turn, on his own experience and knowledge and also on his particular purpose at the time the patterns are recognised.⁹ Thus pattern recognition is itself a subjective operation; recognition of any sort of pattern at all reflects upon the observer rather than upon the observation.¹⁰ We are patently *not* suggesting that isolates from observation 'possess' patterns as some sort of in-

⁸ One aspect of pattern recognition concerns the identification of pieces of language material as alike or partly alike. We would say that we intuitively recognise certain patterns of likeness. Bloomfield (in "A set of postulates for the science of language", *Language*, 2, 153-164) puts this in a rather different way in his: "ASSUMPTION ONE: Within certain communities successive utterances are alike or partly alike." Bloomfield assumes that there is some quality of *likeness* between utterances. We merely remark that certain like patterns can be recognised in an entirely subjective manner.

⁹ As already remarked his experience and knowledge are largely derived from his observation. His purpose however cannot be related to observation in exactly the same way.

¹⁰ This is, in a sense, trivial inasmuch as the observation can only exist relative to the observer in the first instance. It is intended to emphasise the subjective nature of observation: that it cannot have any sort of independent form or existence.