Structure and Oxidation of Nitrogenous Substances

IT has been reported elsewhere[1] that organic nitrogen in plant materials, soil organic matter and extracted proteins undergoes partial oxidation to nitrate on treatment with a mixture of sulphuric and chromic acids. It has since been found that the proportion of total nitrogen recovered as ammonia is constant for each substance, provided the oxidation is completed under conditions of reduced pressure and moderate temperature[1], and sufficient of the substance be taken to contain more than 20 mgm. of nitrogen. Of the fraction not recovered as ammonia, a portion is oxidised to nitrate and the rest is lost in gaseous form, probably as nitrogen or nitrous oxide. The 'oxidation constants' bear definite relationship to the structure of the compound.

While, in the case of compounds having nitrogen atoms attached to different carbon atoms, full recovery of nitrogen is obtained in the form of ammonia and nitrate, a definite portion is lost in gaseous form with compounds having two or more nitrogen atoms linked to the same carbon atom. The proportion of ammonia recovered from some typical groupings are as follows: –NH–CO–NH– group, 2/3 of total nitrogen; $CH\lessgtr^{N<}_{N-}$ group, 4/5; guanidine group, 4/11; creatine group, 2/3. The hydroxylamine derivatives are almost quantitatively oxidised to nitrate, while the nitrogen in hydrazine derivatives is almost completely lost in gaseous form.

Chlorides present as impurity in commercial samples and as hydrochlorides of bases tend to increase the proportion of nitrate formed at the cost of ammonia, and should be removed by precipitation with Ag_2SO_4. The possible significance of these 'oxidation' constants in relation to the structure of complex substances, for example, proteins, is under examination.

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[1] *Proc. Biochem. Soc., J. Soc. Chem. Ind.*, **54**, 596; 1935.

Phonemes

THE terminological confusion which has long plagued linguistic study has latterly been particularly acute in the matter of the phoneme. The recent communication[1] of Prof. E. W. Scripture does not appear likely to improve the situation.

Prof. Scripture proposes to apply the term 'phoneme' to "one of a group of similar sounds". Hitherto, the term has been used as referring to the group itself, as including the various similar (that is, only slightly different) sounds which were regarded then as 'members of a phoneme'. Prof. Scripture's proposal leaves unspecified the group itself; and it is precisely the inclusive, aggregational property which is most important. Prof. Scripture would call the *t* of *tip* a phoneme, and the *t* of *pit* another phoneme; but he has no name to apply to the group which includes these and all other *t*'s.

This departure from the small measure of agreement which has been reached on the phoneme might be justified, of course, if Prof. Scripture could adduce valid evidence of the usefulness of this innovation. But there is patently no advantage in shifting the application of a term from a group to an individual member of the group. The essential problem is the determination of the group[2]. Only if Prof. Scripture has some new and more successful procedure for sorting all the sounds of a language into definite and mutually exclusive categories can his proposal be considered seriously.

Prof. Scripture believes "that phonemes do exist", and thus takes his stand with those who hold that a phoneme is (or corresponds to) an observable physical reality of some order. This reality Prof. Scripture finds in sound-track recordings. His position thus corresponds in certain essential respects to that which Bloomfield developed more fully in his "Language". But Prof. Scripture does not indicate how the "group of sounds" are to be determined, aside from a casual assurance that "On comparing the records we find that groups of similar speech sounds can be formed". Thus far, I know of no evidence from the laboratory that records of *tip* and *pit* will show physical peculiarities to justify grouping together the *t*s or the *p*s on the basis of positive similarity. For to group together the *t*s on this basis presupposes not only the discovery of positive similarities as among various kinds of *t*s but also the determination of some physical peculiarities associated only with *t*s. The group can be established on a laboratory basis only by the discovery of characteristics which are constantly present for this group, and never present for any other group.

Prof. Scripture cannot be unaware of the objections raised to Bloomfield's essentially similar proposal, and it is impossible that his suggestion in NATURE should have been made jocosely or irresponsibly. One can only conclude that he has discovered a method for the determination of positive, exclusive physical properties of the various members of a phoneme (in his terminology, the various phonemes of a group). The announcement of his discovery will be welcomed as a partial solution of this vexing phonetic-phonological problem.

Still unsolved, however, will be the problem of differing phonemic distributions of similar sounds in different languages. Recordings of an American pronouncing *battle* and an Englishman pronouncing *barrel* would show a high order of similarity in the intervocalic consonant, which belongs definitely in a *t*-group for the American and in an *r*-group for the Englishman.

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[1] NATURE, **136**, 261, Aug. 17, 1935.
[2] Cf. *Language Monograph*, **16**, 17–32.

IN a collection of sound film registrations I find quite a number of regions that resemble the one reproduced in Fig. 1. Such a region consists of a series of bits of vibration with many peaks of different heights and periods of repetition and several vibratory movements of less sharp character, all of them beginning strong and fading to zero. Each bit of vibration can be characterised by its duration and by the systems of peaks and less sharp movements with their heights, periodicities and decrements. An entire region will be characterised not only by all the measurements for the individual bits but also by the numbers for their differences and order of sequence. Every region will have a more or less similar, but yet different, set of numbers for each of its characteristics.