mosquitoes include, as one component, a 'depletion curve' of the type described. The more distinctive features of such cycles are presumably effects of other components, such as the cycles of activation to flight and feeding activity.

My thanks are due to the Singapore Turf Club for assistance when making the above catches, and to Mr. R. Guy for mathematical advice.

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Speech Production and Language Statistics

THE purpose of the experiment reported here was to examine the function of hesitation pauses in speech. Pauses were conceived of as serving the selection processes which direct the course of verbal sequences, and as involving acts of choice. They were expected to occur where linguistic solutions fitting the speech intentions are not readily available, or where automatic verbalization is rejected in favour of 'newer', more specifically selected verbal expression.

Speech being a Markoff process, that is, a sequence of symbols the selection of which is determined by previous choices, each successive symbol is chosen according to the transitional probabilities, which depend at any stage on preceding choices as well as on the particular symbols themselves. At such stages where the probability of choice is less dependent on the previous choices, the speaker is said to have greater freedom of choice. Pauses in speech (within sentences) were expected to occur at these stages. The words following pauses were therefore expected to show a decrease in transitional probability, or predictability, and in that sense carry an increase of information.

This hypothesis was tested by relating the incidence of pauses interrupting the smooth utterance of sentences in spontaneous speech to the transition probabilities of the words constituting them. Estimates of these probabilities were obtained experimentally by an adaptation of Shannon's[2] technique used in the prediction of printed English. Instead of guessing sequences of letters, subjects were asked to guess each successive word in a sentence which had been uttered in recorded spontaneous speech. The details of the experiment will be described elsewhere.

There were two series of experiments. In the first, subjects were asked to start guessing the first word and continue one by one to the last. Seven sentences containing 212 words and 34 pauses were predicted in this way.

In the second set of experiments a new set of sentences (136 words and 26 pauses) was subjected to predictions in reverse direction, starting with the last word and working backward, as well as those in the forward direction. The validity of the transitional probabilities was considerably increased by estimating them on the basis of the combined and averaged forward and reverse guesses.

Fig. 1 (summarizing the results of the second series of experiments) shows the probability distributions for the 26 words which followed pauses and for the 110 words which were uttered without a break.

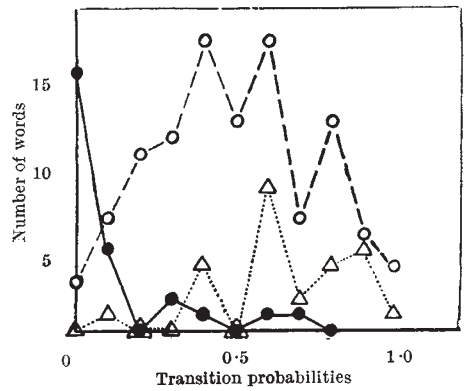

Fig. 1. O---O, words uttered fluently; ●——●, words following pauses: Δ·····Δ, words preceding pauses

The probability distribution for the words which preceded pauses is also shown. The differences are highly significant ($P < 0{\cdot}001$) and the relationship between pauses and transitional probabilities shows that redundancy in language is as closely associated with fluency of utterance as uncertainty of prediction with hesitancy. The hypothesis that pauses in speech function as precursors of sudden increases of information has been borne out by the facts. A measurable link seems thus to be established between objective language on one hand and the subjective aspects of speech behaviour on the other.

This research is being carried out at the Phonetics Department, University College, London, under a grant from the Medical Research Council. I am indebted to Dr. B. B. Fry and the staff of the Phonetics Department for their collaboration in the experiments and for much stimulating discussion.

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Duration of Spermatogenesis in the Mouse

I AM glad that the major points of my communication[1] apparently have been accepted by Sirlin and Edwards[2], and especially that they now state "that preleptotene spermatocytes were initially labelled by adenine" instead of their original statement[3] that "The initial labelling of deoxyribonucleic acid with adenine takes place only in spermatogonia . . .". Thus the labelling is now placed at the initiation of meiosis. This confusion is another example of the result of misclassification of the products of the fifth spermatogonial division as spermatogonia. As emphasized in my communication[1], such errors in classification can be avoided by using the techniques developed by Leblond and Clermont[4] and extended by me to the mouse[5].

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