being achieved by the aid of learning-machines, using general circuits not specifically related to the types of character which had to be recognized, adapting itself to the recognition of any group of characters with which it was presented in its experience, intended to be able to recognize any type of character so presented to it. How far had that type of device been useful in the recognition of numerals and letters?

Mr. Newman said if one could devise the perfect learning machine, learning in the same way as human beings learned how to recognize characters, that would be good; but it had to be accepted that all devices were far from being able to do that. It was necessary to work one stage removed and find—not how much one could gain by using very complicated learning techniques in machines, but whether there was any advantage in using smaller-scale learning techniques. There was much to be said for human beings using their own learning facilities, to pre-judge and determine, from what they had learned, how best to recognize characters.

If it were suggested that on a limited scale a machine might modify its criteria according to its results, he believed much could be done to produce gradual adaptation in a system. While in principle this was difficult, the fact that it could be done had been shown at a National Physical Laboratory Symposium at which Mr. Chairman had devised a program which improved its ability to recognize characters by such a means.

The Chairman said he regretted having to cut short a dis-cussion when it was just beginning to warm up, but time limitations made it necessary to do so.

Everyone present would wish to show their appreciation of Mr. Newman's interesting comments by his applause.

Mr. H. McG. Ross (*Ferranti Ltd.*) (*in a subsequent written contribution*): Mr. Newman has stressed the need that any automatic character-recognition system should be based on a process similar to that of human character-recognition. An example of the application of this principle (which, in fact, violates the principle), is that the response of the human eye to light and shade is essentially of a logarithmic nature, whereas most electro-optical processes, and almost all electronic processes, are essentially of a linear nature; it is quite difficult to make electronic circuits to give a logarithmic response. In another field, all the essential stages in the photographic process are basically logarithmic, and this is a prime reason for its success.

Mr. Merry showed a most impressive lantern slide (Fig. 9, p. 142) giving a 3-dimensional representation of the electrical signals obtained with an electro-optical system when reading a poorly-printed letter H. This emphasized the major achievement which has been attained in developing an automatic system which is capable of interpreting such a record. However, if this representation had been made on the appropriate logarithmic basis, it would have displayed in an even more startling manner the problems which have to be faced in such a system.

Correspondence

To the Editor,
The Computer Journal.

Dear Sir,

"Prime Number Coding for Information Retrieval"

Having much enjoyed reading Cockayne and Hyde's article in your JOURNAL (Vol. 3, p. 21), I was surprised to read Mr. Fairthorne's criticism of it in Vol. 4, p. 85, as also his even more severe review in *Computing Reviews*, No. 341, December 1960.

Mr. Fairthorne attacks the article on three main counts.

(1) That this is not "Information Retrieval," as understood by Mr. Fairthorne. But, I submit, in the absence of an Académie Anglaise the majority of the informed users of a phrase is always right, so that the meanings of phrases evolve and the limits imposed by the original definition are not always relevant. Perhaps the article is concerned with a simple case of Information Retrieval as understood by most workers in data processing today, even if the problem described lacks some of the features which Mr. Fairthorne has to worry about.

(2) That the authors provide no bibliography and have probably not read up their subject adequately. I am particularly shocked by this criticism, for it implies that Mr. Fairthorne believes that duplication of work is a prime evil and that the first thing to do if one has an idea is to make absolutely certain that no one else has thought of it already. Obviously skill in finding one's way through the jungle of technical literature is a most valuable asset, but is it essential? I suggest that often the right thing to do to a good idea is to try it, and if it works, pass it on. If one has a problem of this sort and is considering spending thousands of pounds in setting up a system to deal with it, of course one would be wise to consult the literature first, but that is not the point.

(3) That the method described is uneconomic and technically incompetent. I believe that Cockayne and Hyde, like many others, use a computer which was acquired to do certain routine work which does not take up all of its time. If this is so, the additional cost incurred by leaving it switched on for a few more minutes each day is trivial. If one has a computer one may as well use it; Mr. Fairthorne may call this sentiment "a determination to use automatic machinery at all cost," but most people would regard it as good sense. We do not know the full technical and administrative background; but neither Mr. Fairthorne's own valuable article in your JOURNAL (Vol. 1, p. 36), which also I re-read with much enjoyment, nor his present contributions suggest any method which is obviously more economical and would not require substantial additional equipment, labour or organization.

It is the referee's job to decide whether an article is sufficiently interesting, useful, original or important to be worth publishing. I do not think he has failed us here. It is unfortunately somewhat unusual that interesting points of detailed practical experience in the field of commercial data processing are written up in a manner understood by the non-specialist, as Cockayne and Hyde have done. If they are mad, one wishes they would bite some other potential contributors!

Yours sincerely,
Colin R. Merton.

26A, N. Audley Street,
London, W.1.
24 May 1961