interconnections would be very great and it was difficult to see how a versatile parallel device could be made economically. Further, problems of registration appeared when a parallel two-dimensional array was proposed, which greatly increased the complexity.

He did not deny that a parallel device was the ultimate aim, the human eye and brain presumably working in this manner.

Mr. W. E. Norman (*IBM*) said he would like to hear some discussion on the registration of documents.

Was it not time to consider the comparable problems of uniformity of documents, the registration of documents, and type faces for the composition of a document?

Dr. Grimsdale said he thought the eye and brain should be considered as a parallel device because signals from a vast number of retinal cells were processed simultaneously.

The problem of registration was an important one. He would like to distinguish between coarse and fine registration. Coarse registration was the positioning of the character somewhere in the field of view of the recognition machine. Fine registration, which was unnecessary in the scheme he had described, was a precise positioning of the character. He considered the problem of coarse registration to be very difficult, and that no satisfactory practical solution had yet been demonstrated.

Mr. Norman asked if Dr. Grimsdale could answer his question about the material. If they tried to get accurate registration of a quarto-size sheet of paper, was it not likely to shrink and expand or be distorted by fading? I.C.I. was working on coatings. Had Dr. Grimsdale considered these dimensional difficulties?

Dr. Grimsdale did not think that the problem of paper shrinkage was very important. He did not think the coarse registration problem should be tackled by locating characters at, say, the top left-hand and right-hand corners of a page and then expecting all the other characters on the page to be correctly positioned. The method he proposed would be to search for each line of print by the flying-spot scanner.

Mr. H. McG. Ross (*Ferranti Ltd*) wished to draw attention to a point on the economics of the process. It was often suggested that one of the particular values of character recognition was that it provided a cheap means of getting data into a computer, but he wondered whether adequate consideration had been given to the costs resulting from any errors in that data. Erroneous data caused far more trouble in computer systems than in manual data-processing procedures, partly because it was very difficult to write programs to deal with incorrect data, and partly because such errors were likely to hold up the working of the whole installation.

Mention had been made of the problems of reading documents automatically and of distinguishing one character from another. But are there not much more severe difficulties (and hence greater cost) in ensuring that every character is read correctly? And is it not possible that, to attain error-free reading, the characters will have to be very well printed? Would this require much higher quality printers to be attached to cash registers, for example, with consequent increase in cost?

This matter was closely related to the point made earlier by Mr. Newman, that the document reading machine should interpret characters in the same way as did a human being. He felt strongly that this was a most important point which was directly related to the need to minimize errors; this in turn affected the complexity and cost of the document reading system and the cost of the whole character-recognition and data-gathering process.

The Chairman said that the last speaker had put forward some problems which would, he was sure, be solved before long. The Conference had heard during the day of the problem of recognizing a printed fount which the engineer could choose for himself and change to suit his purpose. A chosen fount might, however, be badly printed. He would call that stage 1. Stage 2 was to recognize a given fount which was not chosen by the engineer; this was not beyond the horizon. The further stages of recognizing many founts and of recognizing hand-printed letters and numerals were beyond the present horizon but within the next decade these problems would be solved economically.

Data Processing Society of the Netherlands

Stichting Studiecentrum voor Administratieve Automatisering

The Netherlands Automatic Data Processing Research Centre and The Netherlands Data Processing Society

The Netherlands A.D.P. Research Centre is a non-profit organization, founded 15 July 1958 on the initiative of the College of Economic Sciences of Amsterdam University in co-operation with the Netherlands Institute of Accountants. Its funds are provided by industrial and commercial companies within the Netherlands and by government and other organizations. The Centre's objects are to study the possibilities and limitations of automatic data processing by electronic and other integrating equipment, and to spread the knowledge thus acquired amongst its sponsoring bodies and among students of the co-operating universities. It seeks to co-operate with all persons and establishments at home and abroad, whose objectives concur with its aims.

The studies of this Centre do not involve technical or scientific calculations, but cover automatic data processing in the field of administration, in the fullest sense of the word.

The activities of the Centre imply courses, publications such as *Informatie* and a monthly bulletin *Review of Literature on A.D.P.*, study groups and committees, documentation and a comprehensive library. Subscriptions to the *Review* will be accepted through the British Computer Society from members of the B.C.S. at the special price of £2 per annum. A specimen copy may be obtained from The Assistant Secretary at Finsbury Court, London, E.C.2.

Apart from the centre, the Netherlands Data Processing Society was founded 18 March 1960. Members of the Society are private persons who are interested in automatic data processing. The Society has the specific aim of giving support to the activities of the Centre and to enable private persons to participate in its activities through courses, publications of library. The N.D.P. Society also organizes lectures, courses, discussions, etc., for its members. Furthermore, it aims at increasing international co-operation in the field of data processing. The ties between the Centre and the Society are very close, which appears from the fact that three members of the Board of Governors of the Centre serve also on the Council of the N.D.P. Society.