

follow from the fact that this specialization of the aortic arches is not found in the mammals nor, by inference, in their synapsid ancestors. Unfortunately, Reig does not even mention this difficulty. He also believes that the proterosuchians are the direct ancestors of both the crocodiles and the saurpod dinosaurs, whereas most other workers believe that these groups evolved from the Pseudosuchia. Whether right or wrong, Reig's views will stimulate further discussion and argument.

COMPUTERS

Human Needs are What Matter

A NEW way of teaching children how to think with a computer was described by Professor Seymour Papert of the Massachusetts Institute of Technology at a conference on man-computer interaction held at Teddington, London, from September 2 to 4. His idea is that by letting children re-invent the rules of geometry or grammar through a computer program they will become instilled with the same sense of excitement experienced by scientists and technologists.

One of the evils of the present educational system, according to Professor Papert, is that it classifies children as failures if they cannot master quickly a desired subject and this causes despair and disenchantment. In his system children are taught to write their own computer programs in a very simple computer language called LOGO, and are made aware from the outset of the art of debugging a program. Professor Papert cited a simple program to design a man from a choice of geometrical operations on a set of matchsticks: by displaying the drawing on a cathode ray screen the child may retrace his steps and discover, if need be, where his geometry went wrong. Although the novelty of the scheme may have induced special interest, Professor Papert is greatly encouraged with the results of his first class of eight year olds and next year he hopes to maintain his first year-long course with a class of forty children.

However much medical practitioners may flinch at the thought, computers seem to be endowed with a charming bedside manner. This was the conclusion presented by Dr C. H. Evans of the National Physical Laboratory and Professor W. I. Card of the University of Glasgow who have been investigating how patients with suspected ulcers react to question and answer sessions with a computer. Once familiar with the button pushing routine, patients seemed to warm to the chatty program devised by Dr Evans to get patients to divulge their symptoms. Dr Evans and his colleagues are still working on how factors like response time could be related to the intuitive side of a doctor's interrogation, but Dr Evans pointed out that there seem to be some important advantages in using computers, apart from saving hospital time. A difference in class between doctor and patient can seriously inhibit communication, he said, and doctors are sometimes also irritable and tired. Computers are cool and classless, on the other hand.

It may soon be possible to translate mechanical shorthand into normal English on a computer, according to Dr W. L. Price of the National Physical Laboratory, which would provide barristers with on-the-spot transcripts of evidence and speed up the production of

official documents such as Hansard. Several major hurdles still have to be overcome to transpose the twenty-nine symbols of palantype, the British form of mechanical shorthand, into proper English. The computer operates by comparing the incoming sounds with a dictionary of words, and difficulties arise with homophonic words like "insight" and "incite". The group at NPL have programmed in a limited amount of syntax analysis by allowing for the scanning of adjacent words when an ambiguous word appears, and although the system is still too imperfect for satisfactory usage, Dr Price is hopeful that a viable version can be produced.

Work is also in progress at NPL on speech recognition by computers, a yet more hazardous task. Professor C. Longuet-Higgins of the Machine Intelligence Unit at the University of Edinburgh maintained indeed that the chasm between the inconsistencies of natural language and the cold logic of computers was so wide that it was wiser not to try to bridge the gap. "Computers are ideal tools for studying natural language," he said, "but not for understanding it." He stressed that comprehension of English rests on an immense fund of common knowledge between conversants, and he mocked the computer's innocence in the face of the two statements, "Nothing is better than a good square meal", and "A sandwich is better than nothing".

SEISMOLOGY

Numerical Earth

from our Geophysics Correspondent

THE International Symposia on Geophysical Theory and Computers have, since their inception, been fairly small affairs, rarely attracting more than a hundred geophysicists, unlike the preposterous jamborees that most international meetings have become. The reason for the relative smallness is the highly specialized subject that is being dealt with, but out of this modesty in size comes also a quite remarkable camaraderie. The atmosphere is such that it is really true that coffee table conversations get converted into research effort and next year's papers.

This year's meeting, the seventh in the series, was held in Stockholm from August 17 to 28. Most aspects of geophysics were covered, but as usual seismology was strongly dominant. Problems of data inversion, wave propagation and array processing received most attention. A notable exception was a paper by T. Dahlen (Cambridge) on excitation of the Chandler wobble by earthquakes. This controversial topic draws on the whole range of applied mathematics, before anything meaningful can be said. Dahlen dealt with a "realistic" Earth model and showed that the changes in products of inertia arising from displacements caused by large earthquakes are compatible with the amplitudes of renewal of Eulerian nutation (a few metres shift in the North Pole) frequently observed. Dahlen remarked, however, that there are still difficulties of analysis and interpretation which need more refined study of the data on which these ideas are founded.

Another paper which attracted much attention was by R. Burridge (Cambridge) on the form of radiation from earthquake faults. This problem is at best