appear to throw a far greater load onto the programmer; the complete syntax analysis is not available at any point, special precautions must be taken to remember past data and subsidiary results, and the actions have no parameters. However, in practice these disadvantages turn out to be relatively unimportant, particularly if the actions are able to communicate with one another via a complex data structure (e.g. lists). On the other hand the technique results in an efficient end product which can be tailored to the problem in hand.

The semantically controlled syntax rules introduced in Sections 10, 11 are thought to be a particularly important addition to the SAG approach. They allow a very flexible interaction between syntax and semantics. Particular parts of the syntax can be selected on the basis of semantics. This allows tight syntactic definitions to be applied in particular circumstances; if no semantics are used then the syntax always has to cater for the general case, and some degree of checking and control is lost. In fact the semantically controlled rules turn out to be complementary to the normal syntax rules, since many awkward syntactic clashes arise from using syntactically similar structures for semantically different categories of data.

13. Acknowledgements

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Book Review

Computers in Humanistic Research. Edited by E. A. Bowles, 1967; 264 pages. (Prentice-Hall, Inc., £3 0s. 0d.)

Some of the papers and discussions at a series of IBM-supported conferences on the role of the computer in humanistic research are here printed in somewhat abridged form. The purpose of the exercise seems to have been to assuage computer-phobia among those humanists who weren't already hopeless cases; but the diagnosis is hasty and superficial, and I doubt that the therapy adopted can have produced many lasting cures.

The sugar-coating, to begin with, is laid on suspiciously thick: 'To have done this with a desk calculator would have taken one man 105 years working constantly day and night without any breaks whatsoever. When performed on an IBM 7094 computer, the task required only 55 minutes at a total cost of about $350!'

His suspicions roused by that 'whatsoever', the patient begins to entertain systematic doubts, and soon finds it easy to believe the opposite of what he's told: 'A welcome by-product is the computer's complete dependability. . . . One ideal area for computers is inquiring into the way problems are solved. . . . The computer is frequently able to bring to light hitherto unsuspected relationships or meanings. . . . The necessity of providing an extremely lucid explanation of *what* he hopes to achieve compels the scholar to face the questions *why* he wants to do it.'

Nor is it good tactics to blame resistance on 'unreasoning abhorrence' of the computer, 'suspicion, fear, and ignorance . . . an almost prehistoric mentality'. The patient finds himself reversing roles and diagnosing in his turn that the inability to make out a fair case for the opponent must itself indicate some deep and all-too-well-founded unconfidence.

Two proposals for large-scale computerised multivariate analysis—of archaeological records in one case and historical in the other—report meeting resistance barely explicable on rational grounds. But these projects were presumably open, like any others, to objections on any of a number of grounds—their feasibility, cost-effectiveness, statistical clarity, conceptual novelty, and so on. To give the impression that opposition to computerised projects can only be attributable to machine-phobia is to betray just the kind of epistemological naïveté best calculated to nourish that phobia.

This naïveté also takes the form of fantasies of exhaustivity. Several contributors talk of collecting 'all relevant material, . . . every bit of data, . . . every measurable feature'; of 'standardising the concepts' and establishing 'extremely detailed' 'universal codes', with 'provision for infinite subdivision' of 'every descriptive variable'. Symptomatically, one author mentions with what I take to be pride only lightly touched with guilty embarrassment—like the father of a 15-pound baby—his 'sheets of matrix which, when glued together, extended for over 10 ft.' It seems urgent to repeat that something more recalcitrant stands in the way of exhaustivity than mere 'practical limitations' of channel-capacity, whether of the machine or its user.

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save about 0·5 hour when compared with the use of the computer off-line. If errors are detected in the results, the saving can be much greater because there is no need to initiate the work on the next stage until the results have been checked—any repeat measurements may be performed immediately.

(*b*) Apart from other work, the APG link is used for the examination of activity measurements from foils irradiated in a reactor facility. It is desirable to have the results available as soon as possible to determine whether or not to repeat the experiment before changing the configuration for the next experiment. Normally the results would have been available about half a day after the completion of the measurements: using the link, results are available within about 30 minutes.

Conclusions

The Windscale system provides on-line access for the analysis of experimental data and other purposes at modest cost. The experience of users is that such facilities are valuable and that substantial savings in time (and hence operating costs) can result. Although simple in concept, the system readily lends itself to modification for special requirements and has demonstrated that on-line multiple access to a general purpose computer of modest size can be achieved without significant interference with normal work. The terminal equipment is used on a routine basis by personnel with no scientific qualifications and no computing experience, and it seems likely that a similar system could be useful in other fields such as stock and production control, logging of production records, etc. In one case such a scheme has been introduced on a pilot scale.

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Another author thinks that 'properly to describe English fictional prose style we should study *all* novels written in English'. As this is 'still impossible', a trial run, counting a few grammatical features in 10,000-word samples from half-a-dozen novels shows, for example, that 17% of Jane Austen's and 31% of Virginia Woolf's verbs are in the simple present. The 'preliminary wastefulness' involved in using a machine to get such results is excused by the expectation of a large-scale repetition. But then it turns out that 'neither syntax, vocabulary, or word choice' is actually much help in characterising style; what is needed is 'identification of macrosyntactic systems'; fortunately 'we are developing a program which will [do this]'. A specimen follows, not indeed of the program, but of its 'Basic Categories', e.g. 'Noncontinuously operative elements, 1. Characters, 2. Subjects'. What can one say to this, except to ask whether the assurance of future refinement can be held to justify *any* degree of initial imprecision? Yet the claims made for a not dissimilar project are cosmic: 'Who will follow Mrs. Sedelow with personal opinions about the properties of style'!

What this kind of style-indicator shows when applied to the authors themselves is an intriguingly high proportion of futures: 'As soon as funds become available', they 'anticipate . . ., propose to experiment . . ., plan to compare costs . . ., hope to be surprised . . .' 'Without giving away everything in advance, I feel confident that . . .' 'Eventually, any problem that can be posed today will be possible of actualisation by a computer'. 'To sum up this prognosis, the ending is happy, in true American tradition.'

Query: what mass survey could improve the suggestiveness of *that* statistic (such as it is)?

Occasionally a contributor envisages the possibility that his project may have negative results, but thinks to justify it nevertheless on the ground that his material will be available for others. But in survey-analysis the experimenter's theory or hypothesis (or what passes for such) is already expressed in his choice of variate, and will not survive reconceptualisation.

Resistance to computers rests partly on fear of the devaluation of the theoretical, and this crux is nowhere frankly discussed. This fact alone cannot but increase the resistance, not to mention direct contributions to devaluation such as this: 'The computer extends the ability of historians to solve problems by enlarging the whole theoretical framework; *that is*, by ordering, classifying and correlating larger masses of data.' In another chapter a literary critic proposes to categorise his texts by criteria borrowed from two other disciplines, linguistics and psychiatry, and then, aided by a friendly statistician and 'all sorts of factor and regression analyses', to go trawling for correlations; the notoriously irreconcilable disagreements among these specialists he proposes to by-pass by the simple device of 'being as eclectic as we wish'. One can catch the very word 'theoretical' in the act of being debased: 'Leaving aside such theoretical questions as the method of syntactic analysis and the psychiatric classification system . . . this project obviously demands a great deal of labour. . . . This implies the need for external financial support.' Elsewhere this last point is erected into a principle: 'It isn't our business to be concerned with how much it costs.'

Chapter 21, a modest proposal by a man from the Smithsonian, deserves the penultimate word: 'There is really no difference between the scholar who uses a computer to test an elegant hypothesis . . . and the professor who simply feeds an enormous number of variables into a computer and instructs it to tell him whether there are any patterns or correlations among them. Indeed we must admit that the latter may well be a more fruitful procedure. . . . If we remain true to the belief that college teachers in the humanities should engage in some form of research or scholarship, the time will very soon arrive—if indeed it is not already here—when we will be thankful for the existence of great numbers of useful and productive tasks that can be performed perfectly well without any very great imagination or scholarly skills.'

The index was 'prepared by computer'; but the machine didn't notice that (in my copy at least) pp. 126–7 are from some different book (which I don't recommend either).

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