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As a consequence, most computer programs for humanists must be custom-made. Computing centers are naturally reluctant to get involved in such programming, because the time involved cannot be written off economically. A programmer who writes a statistical program, even of a very sophisticated kind, may well expect that it will be used by a number of sociologists and maybe up to half of the new Ed. D's from the education department. This is the kind of thing that directors of computing centers, who are giving service to a large number of people, must keep in mind.

Can the data be properly prepared ? I have heard it said by classicists

bemused by the computer that if we had all the texts in Latin (or Greek) on tape, we could discover many interesting things. I couldn't agree more. But what do you do when you realize that a large number of texts have never been properly edited? Professor Packard's concordance of Livy is a work that I doubt anyone will want to do over in the near future, but we must recognize that we have no thoroughly edited text beyond Book 35, and the orthography of the editions used by Professor Packard varies. To see what differences there are between the text used before Book 36 and that used after the end of Book 35, I took a quick glance at a book for which there are both editions, namely Book 31. I compared the opening lines of that book in McDonald's OCT text of 1965 and Weissenborn-Mueller's Teubner text of 1890 (in the 1930 reprint) and discovered several differences immediately. Orthography: *omnis, tris W-M; omnes, tres McD.* Text Reading: 31.1.4: *octoginta septem W-M, duodenaginta McD.* Weissenborn-Mueller's reading is, of course, not included in Packard's concordance (which leaves out variants). Differences in numbers, as every text-critic knows, are one of the commonest variants in MSS. I wonder if the uniformity of Professor Packard's concordance may not be misleading to students and scholars who are not text-critics. I also find the orthography of *tris/tres* very troublesome. I haven't figured out how many *i*-stem nouns in *-es* exist only in the plural, but I doubt that many of us would remember to look for accusative examples of this sort beyond Book 35 other than under *tres*. Professor Packard did go to the trouble of including all Latin "u"'s under the vocalic symbol (in spite of Weissenborn-Mueller's distinctions). Being a creature of habit (and disliking the lack of distinction of this sort in OCT's in general), I am as disturbed by this in the Livy Concordance as I am to find in the new Oxford Latin Dictionary the words "Baucis, Bauius, Bauli" in that order. I prefer Lewis and Short's "Baucis, Bauli, Bavius."

We are probably worse off in Greek, for it is hard to think of what text to use for a concordance of Euripides. And I leave out of the discussion entirely what kinds of concordances we actually want. I should much prefer to have had Professor Packard's concordance giving full sentence context, but then the text could not have been printed. Still, if one had Professor Packard's tapes of the text, one could write a program to call for the specific words one wanted in full sentence context and suppress all the rest. In concordance making in particular, it seems to me that we are holding to old methods. I hasten to add that I do not hate printed books and I am *not* a McLuhanite. The Livy Concordance is a fine work, but there is a lot of noise in there for someone who wants only to check the meaning of a single verb in Livy.

Should one take the trouble to learn one of the programming languages? I have read up on various projects outlined in *Computers and the Humanities* and have written to the scholar who purports to be in charge to find out exactly what he is doing. Often it turns out that he isn't doing much more than key-punching the text, and hasn't the foggiest notion what "his" programmer is doing with the material. Computing centers by and large have been scientifically oriented since their inception. Most scientists do (and prefer to) write their own programs. Computing centers have usually had consultants who can help you with specific problems in your program, but they aren't very happy about doing all your programming for you.

The greatest difficulty in learning one of the programming languages is that they are so badly taught. Most instructors waste a large amount of time right at the beginning talking about the internal operations of the computer. Instead of exhibiting his talent in the complications of

internal floating point representation and double precision, the teacher might show his students first how to operate a key-punch, a reproducer, an interpreter.

The manuals available for learning programming languages are not much better. Since the author and the publisher know that the book will be out-of-date within a short time, no effort is made to proof-read the book properly or even to set the text in a sensible order. If the book contains problems, you can be sure that some are incorrectly stated, and if the answers are given, ten to one several of them are incorrect, too.

My final topic under this heading may well have belonged under machines and not people, but it seems to me that sort of no-man's land where major trouble often arises. I am thinking of the entire matter of input/output. I have my sincere doubts about the coming of the optical scanner, and, in any case, for medieval MSS with which I work, it would be of no use. I don't think the nature of the input device is all that important anyway. One can always find fault with punch cards, paper tape, magnetic tape, and so on. Rather, the problem for humanists is that they want tricky things that most computing centers can't give them, because these centers are not set up for humanists. For example, the majority of users find the FORTRAN keyboard on the standard key-punch and the FORTRAN chain on the printer sufficient. Yet it would be quite unfair, I think, to ask a computing center to go to the expense of putting a upper-lower case print chain on-line for your two-minute run. Notice that I'm not even talking about more expensive types of output devices. We are just going to have to realize that we shall need to do our printing of tapes somewhere else, just as we do with our books and articles. It is possible that we can find another location on our campuses, but until we can show that we are

major users of computer time, we shall just have to solve our problems by using ingenuity in place of large grants of money.

Lastly, I come to the topic of applications. Americans, and now Europeans are beginning to pick up this idea, have the notion that if something can be done it should be done. This is especially true if it involves any kind of technology.

What kind of projects are suitable for computers ? To my mind, very few humanities projects can be handled by the computer in an efficient and worth-while manner. I add "worth-while" to the sentence, because the computer can do many things, but they are not necessarily *utile* or even *honestum*.

The use of the computer can reveal something about certain kinds of scholarly research. The computer is a merciless instrument. The great German wit of the 18th century, Lichtenberg, once stated the following aphorism : "a book is like a mirror; if an ass peeps in, don't expect an angel to look out." One needs only to revise this slightly to fit the use of computers. The computer is a magnifying mirror : ask the computer a stupid question, it will invariably give you an even stupider answer. The funny thing about it is that sometimes the answer is so stupid people begin to believe it is clever.

The computer is essentially a device that handles quantities. It does have a logic, but it does not yet seem to be the logic that can deal with literary problems. What the scholar needs to keep in mind is not whether the problem *can* be reduced to one involving quantities, but whether once the problem has been so reduced, its very nature is not altered.

As an example of the kind of nonsense that can result from the manipulation of data, I offer the following quotation from the latest issue of *Computers and the Humanities* (3 [1969] 256). The author is discussing the application of “content analytic and statistical techniques” to *Paradise Lost*. “The Fallen Angels and Satan were grouped together consistently across all six sets of data. Since those critics who take the view that Satan is the hero rarely praise the Fallen Angels, evidence is produced which makes their opinion less tenable. In those analyses of the poem representing portions of the text before the Fall, Adam is grouped with God the Son, the Good Angels or God the Father. After the Fall, however, Adam is grouped with Eve. Objective verification of his fall from a state of grace is thus obtained.” The paragraph goes on, but I shall spare you the rest. Notice the scholarly *hubris* of this unfortunate : *objective verification* of Adam’s fall is obtained – by the use of a computer !

Computer studies which quantify literature without regard to meaning present a false view of that literature. For example a scholar who develops a binary-octal code for the scansion of Latin hexameters and then works up some statistics on the frequency of fourth-foot dactyls clearly has never taken the trouble to *write* any Latin verse himself. He would soon discover, if he did, that you don’t write dactyls and spondees; you write words which have a particular flow. If you are anything of a poet the thought is more important to you than the quantities, although you must have those right, too. Poets don’t slot words in so crude and mechanical a fashion.

We can be harsher with other kinds of studies, those that truly lend themselves to computer analysis. Gilbert Highet in a recent review in *Computers and the Humanities*<sup>8</sup> justly complains when a list of proper names in Latin verse is defective and incomplete.

Although certain types of computer studies have proved to be feasible, do such studies deserve the highest priority ? No one can deny the usefulness of concordances, but is this the time for scholars to be doing such lexicographical work ? Those of us who teach in America know that many of our classes read their texts through the Victorian spectacles of late 19th century annotated editions. Would it not be better for scholars to consider the less faddish, but more substantial work of commentaries on such neglected authors as Ovid and Tacitus ?

I realize that there can be a number of counter-arguments. After all, someone may say, hasn't Professor Raben refined conclusions concerning the intellectual affiliations between Shelley and Milton ? And hasn't Professor Raben said that "... we can demonstrate of the computer : it will deliver unscathed any literary work we surrender to it." ?<sup>9</sup>

Let me quote in reply the English classicist, L. P. Wilkinson :<sup>10</sup> "... For a century now a great part of the energy of scholars, and of the space in learned journals, has been devoted to tracing the traditional element in classical poems. This activity takes various forms. First there is the search for verbal reminiscences. A man with a remarkable verbal memory, such as must have been possessed by Zingerle, who collected the imitations in Ovid, will naturally want to exercise his gift, though there are now electrical machines almost capable of doing the same work. I am not sure that the results are of much value, and they may even do harm. Men of similar gifts in antiquity soon applied themselves to Vergil : "Perellius Faustus furta contraxit," says Suetonius (*Vit. Verg. 44*). *Furta* – the word indicates the danger .... If we had available all the literature the poet had read, we should be able to determine the extent of his originality. But this is a matter of biographical rather than critical interest. Ancient poets were not



themselves much interested in originality of this kind, while few modern readers of *Hamlet*, for instance, busy themselves over the extent to which Shakespeare has improved on previous treatments of the story .... One cannot help feeling that our energies ought now to be concentrated, first of all on the study of the poet's own environment ... and then on the appreciation of the poems themselves as works of art making an immediate impact on ourselves. Accumulation of irrelevant knowledge may even dull that impact. In the eighteenth century men read the classics with less knowledge than ourselves; but one has the uncomfortable feeling that they *got more out of them.*"

This is not intended to be a Luddite plea on my part; the machine is in the garden and we have to live with it. But I think we ought, with Simonides, not blame anyone, but rather remember, "ton ... elithion apeiron genethla." 11

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## FOOTNOTES

\* This paper was delivered, in slightly different form, at a symposium, "Latin Literature and the Computer," held at Pennsylvania State University on May 3, 1969.

1. Lucretius *De rerum natura* 2.14-16.
2. *Literary Data Processing Conference Proceedings* September 9, 10, 11 – 1964, New York 1964.
3. K. F. Scharfenberg, P. H. Smith, Jr., R. O. Villani, "A Concordance Generator," *IBM Systems Journal* 3.1 (1964) 104-111.
4. Philip H. Smith, Jr., "The State of the ICRH Concordance Generator," *ICRH Newsletter* 4.5 (1969) 1-4.
5. I have recently learned that the Indiana University Research Computing Center is preparing a similar concordance generator for the CDC 3400/3600.
6. *A Concordance to Livy*, Cambridge, Mass. 1968.
7. M. N. Wetmore, *Index Verborum Catullianus*, New Haven, 1912.
8. Gilbert Highet, rev. of Donald C. Swanson *The Name in Roman Verse*, *Computers and the Humanities* 3 (1968) 119-122.

9. Joseph Raben, "Computers and Literary Studies," *Data Processor* 10.1 (1967) 12.
10. L. P. Wilkinson, "Greek Influence on the Poetry of Ovid," in *L'influence grecque sur la poésie latine de Catulle à Ovide*, Vandoeuvres 1956, 240-243.
11. Simonides fr. 542, 37-38 PMG.