

The psychology of the user.

The following has been written after I had studied the special issue (guest editor: Thomas P. Moran) on "The Psychology of Human-Computer Interaction" of the ACM Computing Surveys 13,1 (March 1981). Out of a sense of duty, I studied this issue with a greater attention than usual, the issue being devoted to a topic I had always ignored happily.

I found "The Psychological Study of Programming" by B.A. Sheil (Xerox Palo Alto Research Center) a revealing and illuminating article. In his introduction he states about programming methodology "[...] the claims that are made are all basically psychological; that is, that programming done in such and such a manner will be easier, faster, less prone to error, or whatever. [...] However great their appeal, though, the methodological recommendations of computer science should be recognized as empirically testable, psychological hypotheses. Unlike mathematics, literary criticism, or folklore, a discipline of computer science has an obligation to validate these claims."

Does it? Fulfilling this obligation seems to me for computing science as hard (or even impossible) as for the rest of mathematics. It is more honest - and, hence, probably wiser - not to make such claims and show one's methodological findings - as in the rest of mathe-

metics! - on the basis of "Take it or leave it." (In this connection I am tempted to add that we had better recognize the scientific community's freedom to teach on that basis. I shudder at the thought of the totalitarian environment in which we may only teach what has been "validated" by the psychologists.)

That Sheil himself has not challenged the stated obligation is the more amazing since the rest of his article argues that - even to the standards of psychology - the empirical testing done so far is not above criticism and that the psychological hypotheses submitted so far are much too simplistic to be of any relevance for a subtle activity such as programming. In contrast to the quotation from Sheil my conclusion is that "the recommendations of computer science should be recognizable as empirically testable, psychological hypotheses if psychology is to fulfil its scientific promise". Sheil's article is reasonably well-written.

So is "Human-Computer Interaction in the Control of Dynamic Systems" by W.B. Rouse. On linguistic grounds I have argued elsewhere - in EWD618 - that "the user" is not a person of flesh and blood, but a literary figure like a caricature; he - or should I say: it? - is an artefact of computing. This is fully confirmed by Rouse's article, largely devoted to user models. For a given

model one can try to maximize the model's satisfaction, motivation, or performance. Functional specification acts as a logical firewall between the concern for correctness - i.e. the question whether a system meets the specification - and the concern for pleasantness - i.e. the question whether a system meeting the specification fits well in the intended environment - . It is a pleasure to see how well W.B. Rouse keeps these two concerns separated: he fully confines himself to concerns for pleasantness. By way of illustration I quote the question he raises in his conclusions: "What fraction of the task responsibility should be allocated to the human (at a particular instant in time) in order to keep him sufficiently involved and motivated [sic!] to perform acceptably over weeks, years, or a whole career?". His concern is entirely at the other side of the logical firewall, and I cannot even regard it as a "subfield of computer science". (Rouse's article is so readable because he is quite honest about his pragmatism: "While such explanations may be inadequate in terms of scientific rigor, they can be quite useful as design tools." He is from the University of Illinois, Urbana.)

The paper "Human Factors Studies of Database Query Languages" by Phyllis Reisner (IBM Research Laboratory, San Jose) is perhaps best characterized

by the following quotation. "Gould and Ascher [also from IBM, EWD] asked subjects, who were given a problem statement [...], first to write a problem formulation in their own words, then to write a plan to solve it, and then to code it [what?, EWD] in IQF. [...] They found, for example, that whether or not the problem was well expressed seemed to affect problem formulation time, but not [the time taken by?, EWD] the other two stages." What an amazing finding. Earlier, Reisner devotes almost a column to "procedurality" though "The notion is not clearly defined" and remains that way. The "experiments" described don't seem very relevant to me, the paper is poorly written and I got nothing out of it.

The paper "Behavioral Aspects of Text Editors" by David W. Embley and George Nagy (both of the University of Nebraska, Lincoln) is long, and contains a lot of information, such as "The standard key size is 0.5 inch (1.27 centimeters) in diameter and the standard horizontal spacing is 0.75 inch (1.81 [sic!] cm)." and "Prolonged use of the light pen was also reported to be fatiguing since the arm cannot rest." I don't exclude that the paper is interesting for people interested in such things.

The paper "The Psychology of How Novices Learn Computer Programming" by Richard E. Mayer (the

University of California, Santa Barbara) closes the issue. For everyone who wants his prejudices against psychologists - or against BASIC, for that matter - reconfirmed, the paper is obligatory reading. His approach to understanding computer programming - and also to teaching it, if he had his way - is fully operational; BASIC's statement "LET X=5" is explained as a succession of 6 (!) so-called "transactions", each with three attributes. The paper is 20 pages and almost impossible to plough through.

The introduction "An Applied Psychology of the User" by T.P. Moran (Xerox Palo Alto Research Center) should be reread when all is over. Its opening sentence "This special issue of Computing Surveys on "The Psychology of the Computer User" [notice the difference, EWD] represents [= presents? EWD] the debut of user psychology, as a coherent sub-field of computer science, to the computing community." is then no longer convincing. Its last section "Status of the Field" is quite sober: "Too much of the reported work on user psychology suffers from sloppy methodology, such as lack of experimental control and overgeneralized interpretation."

I couldn't agree more.

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