

## WHAT MAKES HISTORY?

Michael S. Mahoney  
Program in History of Science  
Princeton University  
Consulting Historian, HOPL-II Conference

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As you look over the reviewers' and Program Committee's comments on your paper, you may be perplexed by admonitions in one form or the other to "make it more historical". After all, you've been talking about the past, you've got the events and people in chronological order, you've related what happened. What more could be needed to make history? The answer is hard to pin down in a series of methodological precepts, since history is ultimately an art acquired by professional practice. But it may help you to understand our specific criticisms if I describe what we're looking for in general terms.

Dick Hamming captured the essence of it in the title of his paper at the International Conference on the History of Computing held in Los Alamos in 1976: "We Would Know What They Thought When They Did It" (N. Metropolis, J. Howlett, G.-C. Rota (eds.), *A History of Computing in the Twentieth Century: A Collection of Essays* [N.Y.: Academic Press, 1980], 3-9). He pleaded for a history of computing that pursued the contextual development of ideas, rather than merely listing names, dates, and places of "firsts". Moreover, he exhorted historians to go beyond the documents to "informed speculation" about the results of undocumented practice. What people actually did and what they thought they were doing may well not be accurately reflected in what they wrote and what they said they were thinking. His own experience had taught him that.

Getting behind the documentation to discover what people were thinking is no easy task, even when the people are still available to ask or when they themselves are doing the history. A story, perhaps apocryphal, about Jean Piaget shows why. The psychologist was standing outside one evening with a group of 11-

year-olds and called their attention to the newly risen moon, pointing out that it was appreciably higher in the sky than it had been at the same time the night before and wondering why that was. The children were also puzzled, though in their case genuinely so. In his practiced way, Piaget led them to discover the motions of the relative motions of the earth, moon, and sun and thus to arrive at an explanation. A month or two later, the same group was together under similar circumstances, and Piaget again posed his question. "That's easy to explain," said one boy, who proceeded to sketch out the motions that accounted for the phenomenon. "That's remarkable", said Piaget, "How did you know that?" "Oh," the boy replied, "we've always known that!"

Not only children, but people in general, and scientists in particular, quickly forget what it was like not to know what they now know. That is, once you've solved a problem, especially when the solution involved a new approach, it's difficult to think about the problem in the old way. What was once unknown has become obvious. What once tested the ingenuity of the skilled practitioner is now "an exercise left to the student". The phenomenon affects not only the immediate past, but the distant past as well. When scientists do history, they often use their modern tools to determine what past work was "really about"; e.g. the Babylonian mathematicians were "really" writing algorithms. But that's precisely what was not really happening. What was really happening was what was possible, indeed imaginable, in the intellectual environment of the time; what was really happening was what the linguistic and conceptual framework then would allow. The framework of Babylonian mathematics had no place for a metamathematical notion such as algorithm.

These considerations suggest the paradox inherent in the role of pioneers and participants in the history of computing, whether as active members of panels and workshops, as subjects of interviews, or as historians of their own work. On the one hand,

they are our main source for knowing "what they thought when they did it", not only they themselves, but their colleagues and contemporaries. On the other, it is they who reshaped our understanding by their discoveries, solutions, and inventions and who, as a result, may find it harder than most to recall just what they were thinking. Precisely because they helped to create the present, they are prone to identify it with their past work or to translate that work into current terminology.

Doing so defeats the utility, or even the purpose, of their testimony. To the historian, the old way is crucial: it holds the roots of the new way. It does not illuminate history to say "We were really doing X," where X stands for the current state of the art. Talking that way masks the very changes in conceptual structure that explain the development of X and that history aims at elucidating. It may well be that the roots of a modern technique or theory lie in work done thirty or forty years ago. That can only become clear by tracing the growth of the tree, determining its branching pattern, and identifying the points at which grafting has occurred. That requires in turn that the root be characterized in its own terms. When a pioneer talks about his or her work in the past, it is important for others to listen critically and be ready to say, "Now wait a second, we didn't put the question that way at the time, nor did we know that concept." It is important for the pioneer to develop the same sensitivity to changes in language over time. They point to changes in conceptualization. Historically, a rose by another name may have a quite different smell.

Having the solution can mask the original problem in several ways. One may forget there was a problem at all, or undervalue the urgency it had, projecting its current insignificance back to a time when it was not trifling at all, but rather a serious concern. One may reconstruct a different problem, overlooking the restructuring of subject brought about by the solution. One may ignore or undervalue alternative solutions that once looked attractive and could very well have taken development in a different direction. Historically, a "right" answer requires just as much explanation at a "wrong" answer, and both answers are equally interesting – and equally

important.

Several years ago I asked someone at Bell Labs responsible for maintaining software what sort of documentation she would like most to have but did not. "I'd like to know why people didn't do things," she said. "In many cases when a problem arises, we look at the program and think we see another, better way of doing things. We spend six months pursuing that alternative only to discover that it won't work, and we then realize why the original team didn't choose it. We'd like to know that before we start." Something quite close to that holds for historians too. They want to know what the choices and possibilities were at a given time, why a particular one was adopted, and why the others were not. Good history, from the historian's point of view, always keeps the options in view at any given time.

Getting the facts right is important, both the technical facts and the chronological facts. But the reasons for those facts are even more important, and the reasons often go well beyond the facts. When people come together on a project or for a meeting – when, indeed, they are creating a new enterprise –, they bring with them their past experience and their current concerns, both as individuals and as members of institutions. In both cases, they have interests and commitments that transcend the problem at hand, yet determine its shape and the range of acceptable solutions. It is essential to know, in both the real and the idiomatic sense of the phrase, where they are coming from. In some cases, discretion, proprietary information, or just plain ignorance may preclude a definitive answer. Nonetheless, even when we can't know the answers, it is important to see the questions. They too form part of our understanding. If you cannot answer them now, you can alert future historians to them.

What makes history? It's a matter of going back to the sources, of reading them in their own language, and of thinking one's way back into the problems and solutions as they looked then. It involves the imaginative exercise of suspending one's knowledge of how things turned out so as to recreate the possibilities still open at the time. In *The Go-Between*, Leslie Hartley remarked that "The past is a foreign country; they do things differently there." The

historian must learn to be an observant tourist, alert to the differences that lie behind what seems familiar.