

JefRaskin@aol.com

Many people have sent me copies of Bruce Horn's (attached after this message for your easy reference) comments on the sources of the design of the Mac, asking my thoughts on them. I thank you all for sending me Bruce's essay and hope you enjoy some further information.

I read Bruce Horn's recollections of the Macintosh project with some interest. Horn arrived at Apple in 1981 after the Macintosh project had been running about two years. I started working on it in early 1979, presented it to Mark Markkula about March of that year; it became an official project in September. From the chronology, it is clear why Horn doesn't have (as he is careful to say) first-hand knowledge of where many of the original ideas came from, this note can fill in a few details.

My primary role in this matter was to create the Macintosh project. I named it for my favorite kind of eatin' apple, the succulent McIntosh (I changed the spelling of the name to avoid potential conflict with McIntosh, the audio equipment manufacturer). There have been, as Horn points out, many inaccurate recountings of the early Mac history. The best I've seen (they guy did some heavy-duty research) is Owen Linzmeyer's "The Mac Bathroom Reader". My own history of the Mac (entitled "The Mac and Me") is currently being serialized in the Computer Historical Association of California's journal.

Other articles of mine that might interest readers of this: Two articles that address interface issues: \* "Down With GUIs! Wired, December 1993, pg. 122. \* "Intuitive Equals Familiar". Communications of the ACM. 37:9 September 1994 pg. 17. Two articles that address historical matters: \* "Holes in the Histories" Interactions 1.3, July 1994 pg. 11 \* "Hubris of a heavyweight. A review of Steve Jobs & the NeXT Big Thing by Randall E. Stross." IEEE Spectrum, July 1994 pp. 8-9.

Horn is correct that click-and-drag methods were invented at Apple and not at PARC (or elsewhere, as far as I know). I created this method for moving objects and making selections after finding the Xerox click-move-click method prone to error. Bill Atkinson extended the paradigm to pull-down menus. This all happened relatively early in the history of the Mac. The way my insight got extended by Bill was typical of how things developed then. Surprising as it may seem in retrospect, there was some resistance to my new way of using a graphic input device and I had to repeatedly explain how drag worked and why it was often easier to use than the modal click-move-click technique developed first (as far as I know) on the Sketchpad system and then used at Xerox PARC. Some of the arguments I used involved looking at number of user actions and the time they took, an approach that was then or would soon become the very useful GOMS model of Card, Moran, and Newell. Bill was a strong supporter of my ideas and at one session where I was explaining how drag worked Bill, by way of amplifying how useful it was, said something like, "And you can use it to open menus, just put the cursor on the top and drag

down to the item you want."

I hired Bill for Apple, inviting him up from UCSD, where he had been a student of mine. His close friend Bud Tribble, another UCSD student I knew, joined us. Later still Bud was to lead software development at Next.

Trying to untangle the history is sometimes hard, as in my reference to the work of Card et. al. To see what I mean, here's a bit of background: I had been, in the early 70's, a professor and computer center director at the University of California at San Diego and a Visiting Scholar at the Stanford Artificial Intelligence Laboratory (SAIL) at the now-demolished D.C. Power Laboratory (named for a Mr. D. Power). When PARC was in its first few years I was often a visiting academic there, taking part in discussions and viewing with delight some of the developments going on there; I trust that people there also took pleasure in finding in me someone who was already on much the same user-interface wavelength. I didn't have to be sold on the idea that UI and graphics were of primary importance to the future of computing. When I joined Apple in 1978 I stopped visiting PARC to avoid any possible conflicts of interest. Given these circumstances I could have learned from Stu Card, Tom Moran or others at PARC the basic ideas of GOMS style analysis, or I might not have run into that work during my visits to PARC. I don't remember, and unless I find something in my files about it someday or someone else recalls a significant event, I will never know if my primitive GOMS-style analysis that helped lead to Apple's adopting my click-and-drag methods was based on their work or not.

I was the 31st employee at Apple (joining in January, 1978), but I had first met Jobs and Wozniak in their garage in 1976, and told them of the wonderful work being done at PARC. Working on the Apple I at the time, they weren't interested in human factors. While I was the first PARC-savvy person at Apple, Larry Tesler was the first PARC employee to join the company. At first he was strongly opposed to the Mac's easier-to-use mouse methods, and I eventually wrote a memo that showed, point by point, that the one-button mouse could do everything that PARC's three-button mouse could do and with the same number or fewer user actions. It was faster and more efficient, and much easier to learn and remember how to use. I had observed that people (including myself) at PARC often made wrong-button errors in using the mouse, which was part of my impetus for doing better.

Horn makes it seem that the selection-based editor came with Tesler from PARC. It may have been a case of convergent evolution, since we already had that paradigm at the Mac project. In this case it dates at least back to an editor I designed much earlier, while at Bannister & Crun. In '73 I discussed my editor concepts with many people at PARC, so I do not know whether Tesler's design was influenced by my work, I know it was not the other way around.

My thesis in Computer Science, published in 1967, argued that computers should be all-graphic, that we should eliminate character generators and create characters graphically and in various

fonts, that what you see on the screen should be what you get, and that the human interface was more important than mere considerations of algorithmic efficiency and compactness. This was heretical in 1967, half a decade before PARC started. Many of the basic principles of the Mac were firmly entrenched in my psyche. By the way, the name of my thesis was the "Quick-Draw Graphics System", which became the name of (and part of the inspiration for) Atkinson's graphics package for the Mac.

Thus Horn is more correct than he knew when he wrote that the world has generally overestimated the influence of PARC on the Mac, as even some of the concepts that he attributes to PARC's influence predated PARC.

When Bruce Horn discusses the hardware, and attributes the overall concept for the design to Jerry Mannock (who indeed did a world-class job on the final design of the box). Horn is unaware that the requirements for a small footprint, unique aesthetic, built-in sound, etc. were all part of the project specs from the very beginning, long before Mannock joined the team. I still have drawings (mostly by my long-time friend and fellow early Apple employee Brian Howard) starting in late 1979 that show these features. The built-in speaker and serial ports were merely carrying on the Apple II tradition. My design also had a bus extension port to allow additional memory and other devices to be added, but Steve Jobs removed that feature. It returned with the SE.

Before creating the Mac project, I was Manager of Publications at Apple, and so for the Mac I was careful to insist that the excellence of the product extend, to use Horn's words, to "the unpacking instructions, the profusely-illustrated and beautifully-written manuals, ... tastefully packaged." Packaging was another major concern of mine; I had worked for a company in South San Francisco called "The Box Factory" where I had done box and display design. I did not work on the manuals or the box design myself, but I had put in place the systems and people who would do a first-rate job, and inculcated these values in Apple's management.

Horn and many other people who joined Apple long after the Mac and Lisa projects were well under way never knew the genesis of many of the ideas they were later to become prominent and widely copied. For example, he attributes the internationalization of the products to the Lisa group, but it actually began when I hired Joanna Hoffmann into the Mac group partially because of her international background and my interest in providing international fonts. I could go on for another few pages of similar small errors in chronology or attribution in Horn's remarks, but they are not of major importance (except perhaps to the people who did the work).

Time plays tricks on memory. By chance, I got to use a Xerox Star for the first time recently. It was in a room with a Lisa and an early Mac. I found the Star and the Lisa to be incredibly slow and somewhat clumsy to use; the Mac was far faster and more fluid (a tribute to Horn and his associate's efforts!). The speed differences were real, but it could be that my familiarity with the

Mac accounts for the feeling of clumsiness with the Star and Lisa. I suspect if Horn were to go and use a Star today, he would not be quite so enthusiastic about how "advanced" it was, at least from a user's point of view. Of course, he might well be correct when speaking from a programmer's point of view. However, I've always been more concerned with users. Programmers do their work but once, while users are saddled with it ever thereafter.

I find looking at the past not nearly as interesting as looking into the future. As Horn says, and as I have written in a number of articles, things haven't changed as much as the hype would have it. I think that years from now, when the details have been washed away by the acid rains of time, four major commercial events will stand out in the history of personal computers: the advent of the microprocessor which drove prices of computers down to the point where individuals could buy them and led to the first flowering of the present computer revolution, the ascendancy of the software industry and the shift from "users will program them" to "users will run software packages", the Mac interface and its followers which brought the benefits of computers to a far broader audience and fundamentally changed the way we use computers of all sizes and software of all kinds, and (to tread on dangerous ground since the event is relatively recent) the blossoming of the Internet. To sum up the history:

o Cheap Hardware o Application Software o Human Interface o Internet

Forget operating systems as a significant part of the story, they are just a detail. Users would be better off if they never had to deal with one, and someday operating systems will disappear from view, just as the details of the processor (thankfully) have.

The future lies with getting rid of the cumbersome and complex systems we have now and moving to simpler, more direct methods of harnessing the power of the processor. See my article in Wired (cited above) for a bit more on the reasons for this.