Review Article: The Personalisation of Computing—from Behemoth to Desktop

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iWoz-Computer Geek to Cult Icon-Getting to the Core of Apple's Inventor

Steve Wozniak and Gina Smith

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From Counterculture to Cyberculture—Stewart Brand, the Whole Earth Network, and the Rise of Digital Utopianism

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These two books tell complementary and fascinating stories of the emergence of the golden age of personal computing and its impact on how we live and work. The first is the personal story of how Steve Wozniak came to design what has been called the first personal computer in the world—the Apple II. The second is a detailed analysis of how the counterculture movement of the 1960s fed back into high-technology culture in the United States (US), bringing about flattened, more distributed organisations and work style.

The simple, direct, conversational style of *iWoz* gives the reader the impression that much of the text is in fact Wozniak's—that is, it sounds like an engineer talking. Wozniak is focussed on detail, and the down-to-earth concerns that are at the heart of designing things that work. His book gives a rare glimpse into the early days of Apple Computer and the shy engineer who built one of the world's most successful personal computers. Turner's thoroughly-researched book, by contrast, looks to the big picture, makes connections between many disparate ideas, and is written in much more abstract language.

Turner makes clear that many of those coming of age in the 1960s felt repelled by the society that their parents' generation had left them. The technological advances of the Cold War had developed atomic bombs so powerful that they were capable of wiping most life from the face of the planet. As such the development of 'acceptable' strategies for waging a nuclear war, involving colossal civilian casualties, seemed like pure insanity to many, rather than the product of any kind of rational mind.¹ The United States was also at war in Vietnam in which thousands of young people were loosing their lives. Technology had brought the world to the brink of annihilation, and a new generation saw little but death and unhappiness in their near future. Understandably they wanted to find a better way to live—a counterculture which would break free of the oppressive institutions and rigid, hyper-specialised thinking which had brought the US, and much of the world, to such gloomy circumstances. To this end, between 1965 and 1972 thousands of communes were created in the US, with as many as 750,000 people living this way at their high point—the greatest period of commune living in US history.

All Aboard the Mother Ship

Although the communards rejected and distrusted the technical institutions of the time—the universities, government research labs and military establishments, what became known as the military–industrial–university complex—they still required small-scale technologies to create their new communal way of life. Such technologies included farming equipment, alternative housing methods such as geodesic domes, and the mind-altering drugs that would allow them to explore alternative modes of consciousness. Many of the communards were college educated and were impressed by Norbert Wiener's *Cybernetics* and systems theory, which treated biological and human systems as analysable, mechanical entities. Turner claims that many communards saw themselves as Buckminster Fuller's 'Comprehensive Designer'—someone who would not be another hyper-specialist, but would take information from many specialties and integrate it to solve problems and create new tools for human happiness. Thus, although the institutions of the military–industrial–university complex were rejected, their intellectual output was not.

Stewart Brand was one of those who felt a new way of life was required, but his career can probably be best described as a countercultural entrepreneur. In 1968 Brand first published his *Whole Earth Catalog*, subtitled *Access to tools*, which quickly became one of the central documents of the youth counterculture and commune movement. The *Catalog* was divided into loose sections by topic, and contained reviews on a wild variety of goods including buckskins, programmable calculators, glass beads, books such as Wiener's *Cybernetics*, and reports on scientific developments including plastics and computer generated music—every tool, physical and intellectual, that a communard might need. Each *Catalog* entry had information about how much the product cost and where to get it from. On the cover, Brand put one of the first images of the whole Earth taken from space—here was our entire world, mother ship Earth, floating through space carrying its human cargo. The image alone had enormous appeal to members of the counterculture—it made the Earth seem small, fragile, and the common denominator for all life as we know it.

In his book, Turner claims that the *Whole Earth Catalog* was in fact a networked forum, and precursor of the kind of networked, Internet communities we know today. People reading the *Catalog* could write in and give their feedback on its products and this would be published in the next edition and distributed to its community of readers. In its first issue in 1968 the *Catalog* was 61 pages long, but by

1971 it was 448 pages, had sold more than a million copies and won a National Book Award. Brand had been profiled in *Time* magazine and was widely seen as a countercultural visionary. However, by June 1971 the *Whole Earth Catalog* publishing project was coming to an end. During the 'Demise Party' organised by Brand, money left over from the project was given out to various new countercultural projects. One of those receiving such money later went on to found the Homebrew Computer Club four years later, where Wozniak was inspired to design the Apple I and Apple II computers.

From Behemoth to Personal Computer

In the 1950s and 1960s computers were expensive, power-hungry devices that took up entire rooms. They were generally used for weapons research and other military applications such as early-warning monitoring of Soviet missile attacks and in controlling the launch of a possible US counter-attack. Understandably, the counterculture, and much of the public at the time, saw computers as sinister technology—tirelessly analytical, yet mindless.²

It is perhaps ironic then, that it was Steve Wozniak's father's involvement in the military–industrial–university complex that kick-started his son's interest in electronics, and ultimately brought about the creation of the world's first *personal* computer. Jerry Wozniak worked as an engineer in the missile programme at the Lockheed Corporation. Although Jerry's work was secret and he would never discuss it with his son, he gave Steve a great fascination with electronics at a very early age.

The Vietnam War, however, caused considerable friction between father and son, when it became clear to Steve that the government was deliberately deceiving the public about how the war was proceeding. In the same way as members of the counterculture, Steve began to see peace as a much more important goal for humanity than war.

After designing various computers on paper through-out his school and college years, building a few working proto-types, working for Hewlett-Packard for four years, and even doing project work for Atari on games consoles as large as fridges, Steve had a big idea. It was at the Homebrew Computer Club in March 1975. The goal of the club was to bring computing into the reach of the average person. Steve was so inspired that he began thinking about the design of a small, cheap computer after the very first meeting he attended—the computer would later become known as the Apple I. Hobbyist computers did exist at this time, but most worked by having rows of lights that blinked on and off for the output and rows of switches for the input. The Apple I was the first affordable computer to have a keyboard as we know them today and was able to plug into a television set to display output. After demonstrating the machine at Homebrew, people began to buy them. It was later the same year that Wozniak and his old college friend, Steve Jobs, realised the potential to set up a company making the machines. They managed to scrape together the money they needed, and in an interesting connection with the communards of the time, came up with the company name while driving through the apple fields of a nearby commune—the name they settled on, of course, was Apple Computer.³

Almost as soon as the Apple I was complete, Wozniak began working on the Apple II—a computer that was surprisingly advanced for its time. It was 1976, but the Apple II could display colour graphics, had sound, ran faster than the Apple I, had a floppy disk drive, and eight expansion slots for additional external devices. It also came fully assembled in its own plastic moulded box. The addition of VisiCalc

software, an early spreadsheet programme, made the Apple II irresistible to an even wider market—now business people were buying them, not just hobbyists. Sales exploded. By 1980 Apple was the first company to sell a million computers, and was well on its way to becoming a Fortune 500 company. It would be 1981 before IBM produced their rival personal computer. Apple had a huge head start, making Wozniak, Jobs and the company's share holders a great deal of money. Amazingly, the Apple II line of computers remained in production until 1993. Wozniak went on to fund numerous philanthropic events aimed at educating people about technology and increasing understanding between the US and Russian during the Cold War.

The Communards Go Virtual

Turner reports that many communes were failing by the mid-1970s. Communards, finding life on the land more difficult than they suspected, began to move back into society at large, but they brought with them their countercultural perspectives. In 1983 one of the most well-known communes, the Farm, collapsed and former members found a virtual or electronic equivalent of communal living on the newly emerging computer networks of the time. In 1985 Brand co-founded the highly influential Internet community called the Whole Earth 'Lectronic Link or the WELL.⁴ Two of its early directors, Cliff Figallo and John Coate, were former members of the Farm commune.

Creating new, networked communities, Brand went on to co-found the Global Business Network⁵ in 1987, and *Wired* magazine⁶ in 1993. The Global Business Network is a consulting firm that helps businesses plan for the future by presenting multiple alternatives drawn from the analyses of a network of experts. *Wired* magazine is a popular technology magazine concerned with how technology affects culture, politics and economics. The WELL, the Global Business Network and *Wired* magazine continue to this day.

Reality and Techno-fantasy

In a 1995 special issue of *Time* magazine entitled *Welcome to Cyberspace*, Brand wrote an article arguing that the personal computer revolution and the Internet had grown directly out of the counterculture, claiming 'we owe it all to the hippies'. As Turner points out there is certainly a grain of truth in this. The San Francisco Bay area technology communities were clearly influenced by countercultural ideals such as decentralisation and personalisation, but Brand is overstating his case. The computer networks and forums favoured and developed by the 'hippies' would not have been possible without the development of the underlying computing hardware and the Internet itself, carried out years before by the very organisations the hippies recoiled from-the military-industrial-university complex. Wozniak, who many claimed changed the world by single-handedly designing the world's first personal computer, was not a hippie. In his book, Wozniak makes clear that, although he was offered it many times in the 1960s, he never tried LSD, the hippies' mind-expanding drug of choice, and the one considered an essential countercultural tool by Brand. Wozniak did not even drink alcohol until he was in his 30s.

Although Turner's book is clearly well researched, it contains much technological hyperbole that pricks my sense of scepticism—this seems due to the subject matter rather than Turner's writing style. Perhaps is it the significant influence on Brand and the other counterculturalists of utopian theorists such as Buckminster Fuller that has fostered the use of jargon and lofty language. For example, Fuller's term for civilisation is man's 'pattern-complex function', and not being content with words which actually exist in English to describe his ideas, Fuller makes up a few of his own, such as 'killingry' and 'livingry'.

Brand and fellow members of the networked, Internet age and Global Business Network, are continually re-inventing the world apparently. But what these proselytisers forget is that re-inventing themselves is not the same thing as re-inventing the world. For example, Turner describes Esther Dyson's invitation in 1994, along with other notaries including Newt Gingrich, to help write the 'Magna Carta for the Knowledge Age'. This document opens with a flourish: 'The central event of the 20th century is the overthrow of matter ... The powers of mind are everywhere ascendant over the brute force of things'. These kinds of claims are always connected with the notion of the New Economy-where computers and the Internet have made commerce and trade so efficient that physical processes hardly seemed to matter anymore. Such ideas are very appealing to Republican politicians who want to reduce government spending, and deregulate industry. Earlier in 1988 Ronald Reagan made a speech in which he said 'In the new economy, human invention increasingly makes physical resources obsolete'. Unfortunately, in light of the facts, these ideas seem flatly false. Although our globalised world means that goods are often produced far from their markets, the physical goods must still be made and transported. In fact, goods today are transported further than ever. As David Edgerton put it recently in his article The Stuff of Techno-fantasy,7 'We could easily have had today's globalised world without the Internet, but without cheap air travel—carrying people and some cargo—and cheap shipping—carrying most of the world's tradable goods and some people-it would hardly be possible'. The physical world and 'old' technologies such as air travel and shipping remain the cornerstones of our modern existence; the Internet is simply the gloss. We need look no further than the US's addiction to oil and its involvement in the Iraq war for evidence that physical resources have not been made obsolete, and are not likely to become so anytime soon. Neither has the efficiency of the Internet brought about the realisation of that other long-standing myth of the computer age, the paperless office. Today, modern offices consume more of the physical resource of paper than ever before.⁸

It also seems rather ironic to me that a group so closely connected with the hippie counterculture should go on to re-align themselves with Republican politics, form the Global Business Network and become a corporate consulting firm. This is the apparent contradiction that Turner points out at the start of his book, and through his many-threaded argument, does a good job of explaining. His answer is that Brand and his associates re-invented business along countercultural lines. But a more cynical reading of the events might be that Brand simply sold out and became wealthy in the process. At the end of the day, reality usually turns out to be more complex and unpredictable than our heartfelt ideals.⁹ However, whichever way you read Turner's account it is an interesting story.

The Utopia That Never Was

Is digital utopianism really on the rise as Turner's book's subtitle suggests and as Brand and many other counterculturalists seem to believe? Like all utopias your answer to this question probably depends on who you are. If you are making a great deal of money from high technology then you are likely to answer 'yes'.¹⁰ But many people are not. To his credit Turner does touch on this in a section of his book entitled *The Dark Side of Utopia*. Although one of the myths of the New Economy is that Internet-fuelled globalisation is increasing everyone's standard of living, there is increasing evidence that the gap between the rich and the poor is getting larger both nationally within the US and internationally.¹¹ Since the early 1960s, the period in which personal computing has emerged, the gap between the wealthiest households in the US and everyone else has increased by more than 50%.¹² Those left behind in this technology race are unlikely to agree that a digital utopia is just around the corner. The central problem though, is that one person's utopia is usually someone else's dystopia. As Robert Hughes puts it:

The culture of the twentieth century is littered with Utopian schemes. That none of them succeeded, we take for granted; in fact, we have got so used to accepting the failure of Utopia that we find it hard to understand our cultural grandparents, many of whom believed with the utmost passion, that its historical destiny was to succeed.¹³

The final irony then may be that the only aspect of their cultural grandparents' ideals that the counterculturalists forgot to re-invent was the belief in utopia itself.

In Conclusion

The journey from expensive computers that occupied entire rooms to cheap, userfriendly desktop computers is a technological and political one. Only wealthy organisations could afford computing power in the 1950s and 1960s—access to such machines was restricted and their functions often seemed mysterious or sinister. Steve Wozniak single-handedly designed what has been called the most influential personal computer in the world. Stewart Brand set up a series of networked forums that fostered a flat, non-hierarchical working style that has become increasingly popular in large companies and organisations throughout the world. Today, the computers on our desks have many times the computing power of the behemoths of the past and are doubly powerful because almost anyone can access them and the information networks they make possible. Whether or not you believe we now live in a digital utopia will not detract from the scope and fascination of the story of how we got here, and these two books give significant insight into this journey, both from a personal and historical perspective.

Notes and References

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- 2. For example, the IBM 701, first available in 1953 was called a 'Defense Calculator' and cost between US\$12,000 and US\$18,000 a month to rent. See: M. Hally, *Electronic Brains—Stories from the Dawn of the Computer Age*, Granta Publications, London, 2005.
- 3. I have often heard the story that Apple Computer's logo of an apple with a bite out of it was an allusion to the fact that Alan Turing, inventor of the modern digital computer, died after eating an apple poisoned with cyanide. Wozniak's account in his book shows this to be false.
- 4. See: http://www.well.com.

- 5. See: http://www.gbn.com.
- 6. See: http://www.wired.com.
- 7. D. Edgerton, 'The stuff of techno-fantasy', New Scientist, 193, 2007, pp. 46-7.
- 8. A. J. Sellen and R. H. R. Harper, *The Myth of the Paperless Office*, MIT Press, Cambridge, MA, 2002.
- 9. C. S. Webster, 'Resistance is futile—the future and post-humanity', *Prometheus*, 24, 2006, pp. 341–8.
- 10. If you work in the Googleplex you are likely to believe you are part of a digital utopia. The fantastic wealth made by the founders of Google is often held up as an example to aspire to, but ironically it is an example of the Internet not flattening hierarchies, but creating a new very steep wealth hierarchy, one which very few can expect to match. See: D. A. Vise and M. Malseed, *The Google Story*, Pan Books, London, 2005.
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