

FROM THE ELECTRONIC FRONTIER TO THE ANTHROPOCENE: A CONVERSATION WITH FRED TURNER

FRED TURNER

fturner@stanford.edu

Stanford University

PETAR JANDRIĆ

pjandric@tvz.hr

Zagreb University of Applied Sciences

ABSTRACT. This conversation tracks and critiques the human journey from the electronic frontier to the Anthropocene through the lens of the history of digital media. The first part of the conversation reveals complex trajectories between countercultures of the 1960s and their predecessors in the 1950s and 1940s. It links information technologies with historical struggles against totalitarianism, and inquires their contemporary potentials for creating a more tolerant society. The second part of the conversation analyses the main differences between the New Communalists and the New Left of the “Psychedelic Sixties.” Using the example of the Burning Man festival, it outlines trajectories of these movements into present and future of our consumerist society. The conversation explores the complex relationships between counterculture, cyberculture, and capitalism, and asks whether the age of information needs its own religion. Looking at mechanisms in which traditional inequalities have been reproduced in the communes of the 1960s, it touches upon contemporary Silicon Valley’s “soft discrimination.” The third part of the conversation explores contemporary transformations of various occupations. Looking at journalism, it shows that consequences of its transformation from watchdog of democracy into a tool of global neoliberalism are yet unclear, and seeks one possible solution in “computational journalism.” It also explores how the arts have often legitimated ideologies peddled by information technologies. Looking at human learning, it inquires the role of teachers in the contemporary society, and links it to the role of public intellectuals as writers of scholarly texts and builders of human networks. The last part of the conversation explores the main issues with cyber-knowledge. It examines traditional divisions between disciplines, and links them to cybernetics. It introduces the “biological metaphor” for describing the Internet and compares it to the traditional “computational metaphor.” It discusses the main pros and cons of Donna Haraway’s cyborg metaphor, and inquires whether the Internet needs to be

treated differently from the rest of our infrastructure, such as electric grids and sewage systems. Finally, it briefly outlines the main contributions of counterculture and cyberculture to our understanding of human learning, and draws lessons from the age of 'the endless frontier' for the Anthropocene.

Keywords: history; digital media; cybernetics; counterculture; cyberculture; cyborg; capitalism; New Communalists; New Left; Burning Man; endless frontier; Anthropocene

Fred Turner is a journalist, critic, academic, leading historian of the relationships between technology and culture, and a prolific public speaker. Before joining academia, he worked as freelance journalist for *The Progressive*, *Pacific News Service*, *The Boston Globe Sunday Magazine* and *The Boston Phoenix*. Between 1987 and 2003, he held various teaching positions at Northeastern University, Boston University, Harvard University and the Massachusetts Institute of Technology. In 2003 Fred joined Stanford University, where he is a Professor in the Department of Communication.

Fred has authored numerous newspaper articles and academic essays. He has published three influential books: *The Democratic Surround: Multimedia and American Liberalism from World War II to the Psychedelic Sixties* (2013), *From Counterculture to Cyberculture: Stewart Brand, the Whole Earth Network, and the Rise of Digital Utopianism* (2006), and *Echoes of Combat: The Vietnam War in American Memory* (1996 & 2001). Fred's second book, *From Counterculture to Cyberculture* (2006), received the PSP Award for Excellence for the best book in Communication and Cultural Studies (2007), the Lewis Mumford Award for Outstanding Scholarship in the Ecology of Technics from the Media Ecology Association (2007), the James W. Carey Media Research Award from the Carl Couch Center for Social and Internet Research (2007), and the CITASA Book Award Special Mention from the Communication and Information Technology Section of the American Sociological Association (2008). Fred's writing has been translated into French, Spanish, German, Polish and Chinese.

In this article, Fred discusses his ideas with Petar Jandrić. Petar is an educator, researcher and activist. He published three books, several dozens of scholarly articles and chapters, and numerous popular articles. Petar's books have been published in Croatian, English and Serbian. He regularly participates in national and international educational projects and policy initiatives. Petar's background is in physics, education and information science, and his research interests are situated at the post-disciplinary intersections between technologies, pedagogies and the society. Petar worked at Croatian Academic and Research Network, University of Edinburgh, Glasgow School of Art, and University of East London. At present he works as professor and director of

BSc (Informatics) programme at the Zagreb University of Applied Sciences, and visiting associate professor at the University of Zagreb.

Petar Jandrić: Fred, thank you a lot for this conversation! In a recent discussion about your last book, Howard Rheingold noticed that you seem to be writing a reverse trilogy (Turner & Rheingold, 2014). *From Counterculture to Cyberculture* (2006) explores relationships between technology and culture from late sixties to the present, *The Democratic Surround* (2013) covers the same theme in the period between World War II and the sixties, and now we are waiting for your new book to read what happened earlier. What inspired you to study relationships between technology and culture through the lens of history?

Fred Turner: Well, I've always been interested in history. And when I first encountered the Internet in the early 1990s, it was completely surrounded by futuristic hype. In that context it seemed especially important to have a look at digital media historically.

What actually happened was this: While I was still a journalist, I had written a book about how Americans remembered the Vietnam War. In 1996, I went back to graduate school to get a PhD in Communication. I moved from Boston, Massachusetts to San Diego, California for school, and when I got there, I saw my first copy of *Wired* magazine. I couldn't believe it. There was Stewart Brand, a former Merry Prankster and hero to many in the 1960s counterculture, promoting computers as tools for countercultural change. The magazine itself was decked out in psychedelic pinks and yellows and blues and greens – it almost looked like a time machine back to the 1960s. And I could not figure it out. During the Vietnam War, computers had been the emblems of everything wrong with the Cold War military state. Lots of Americans thought computers were inhuman. There was even a famous anti-draft chant in which protestors compared themselves to computer cards and shouted, "I am a human being, do not fold, spindle, or mutilate!" (Curran, 1970; Disney, 1970). That is, don't dehumanize me. Don't turn me into a war maker. Don't take my body away.

When I saw that first copy of *Wired*, I got to wondering: how had a tool of the Cold War military state, something that had stood for everything wrong with the atomic-era, Vietnam-invading American state, become an emblem of countercultural change just 30 years later? And how was it that people who had been leaders in what I thought was an anti-war counterculture should be promoting computers now?

To answer these questions, I started tracing the networks of writers and thinkers associated with *Wired* magazine back in time. I quickly began to see that many of them had in fact come together at one of the signal publications

of the 1960s, the *Whole Earth Catalog*, which Stewart Brand had founded to serve the back-to-the-land commune movement of the time. *From Counterculture to Cyberculture* thus became the story of Stewart Brand and his network and the ways they came to couch the arrival of digital media in terms set by the counterculture.

PJ: So, this explains your interest in the “Psychedelic Sixties.” Once you thoroughly explored the birth of the computer, why did you decide to go further back in time?

FT: When that book was done, I found my way out of it and into another puzzle. According to the generation of historians who came of age professionally in the 1980s and who were my first teachers, the 1960s were a Technicolor revolution against the black-and-white, psychologically and politically contained era that was the Cold War. But when I started reading Stewart Brand and the pages of the *Whole Earth Catalog*, I saw that the hippies of 1968 were reading all kinds of thinkers from the 1940s – Erich Fromm, Wilhelm Reich, Buckminster Fuller, even a leading military-industrial researcher like Norbert Wiener.

According to the myth of the 1960s, in which an entire generation turned away from military technology and mainstream culture, Norbert Wiener should not have been at the forefront of countercultural consciousness. Yet there he was, in the pages of the *Whole Earth Catalog*. Buckminster Fuller likewise had been active in Cold War propaganda enterprises during the 1950s. The geodesic dome which became the most popular housing on the communes was something Fuller marketed first to the American military, to house radar bases in the 1950s. How did figures like Fuller and Wiener become so important to the counterculture? And what did their popularity say about the relationship between the generations of 1968 and 1948?

These questions let me backward in time to a story about the 1940s and 1950s that I never expected to find. What I discovered – and this is the subject of *The Democratic Surround* (2013) – is that in the 1940s, many American intellectuals, journalists, and even government officials shared a deeply egalitarian vision of what the United States could be. The 1940s and 1950s that I found my way to in the archives were indeed consumed with the fight against totalitarianism, just as I had been taught. But a number of the era’s leading figures actually used the occasion of World War II and even the Cold War to attack racism and homophobia here at home. Far from the locked down, black-and-white world I had always been told about, the 1940s in particular came to look like an *inspiration* for the 1960s.

This was especially true in the realm of media. Figures such as cultural anthropologist Margaret Mead, psychologist Gordon Allport, and artists such as John Cage and Edward Steichen all promoted multimedia environments – the same environments that would ultimately give rise to the psychedelia of

Haight-Ashbury – as tools for making more democratic, more flexible, more creative people. Their ideas suffused the *Whole Earth Catalog*. And through it, they continue to shape our dreams for the Internet today.

PJ: So, information technologies are dialectically intertwined with (the fight against) totalitarianism. In the conversation with Clay Shirky, you touched upon blooming fascism in the U.S. during 1939 and said that, at a time, “it was a real option” (Turner & Shirky, 2013). Coupled with information technologies, the economically abundant and spiritually open sixties have managed to push claims of fascism out of the mainstream. Nowadays, however, the whole Western world is returning to more conservative discourse. We are in a new crisis of economy and values – but technology is stronger than ever. What do you think of the rise of fascism and racism in Europe and the U.S.? What is the role of information technologies in the contemporary struggle against fascism?

FT: Well, in the 1940s, psychologists and media makers believed that just by interacting with multimedia, we would practice encountering and learning to tolerate all forms of difference – political as well as visual, social as well as aesthetic. That was certainly a bit naïve. Yet, when we look at authoritarian movements around the world, one of the impulses they seem to share is a resistance to encountering difference of any kind. There is a deeply conservative hunkering down, a desire to build communities of citizens like oneself. The efflorescence of media today could have the effect of making social differences so visible and ubiquitous that authoritarians who resist them will come to seem ridiculous. You can actually see this process now in the United States around the issue of gay marriage. Many things have contributed to the mainstreaming of homosexuality in America, not least the AIDS crisis and gay citizens’ activism. But as the wonderful work of the sociologist Joshua Gamson (1999) has shown, television played a part in surfacing and normalizing gay culture too. I think we can and should hope that the increase in media’s availability might have a similar effect on today’s totalitarian movements.

From techno-universalism to cyber-libertarianism

PJ: During the 1960s, counterculture influenced the birth of cyberculture through two main routes. On the one hand, the New Communalists believed that new tools would bring people to new levels of consciousness, which would in turn foster development of a new and hopefully better society. On the other hand, the New Left engaged in standard political activities such as gatherings and lobbying, and sought to change the world from within the system. While both approaches epically failed in reaching their visions of

future American society, they left important legacies that can be traced up to the present. What can we learn from these two approaches?

FT: Yes, that was one of the things that surprised me most in researching *From Counterculture to Cyberculture* (2006). I really had thought there was just one counterculture, united against the Cold War state and at the same time in love with sex, drugs and rock & roll. But as you've nicely pointed out there were in fact two.

The legacy of the divide between the New Left and the New Communalists haunts us today, at least here in the U.S. One place it haunts us is the way we are thinking about the Internet. If you take a New Communalist view of the Internet, then you may be inclined to think that simply linking our minds by means of communication technology will in turn enable us to leave traditional party-based institutional politics behind. Living in a state of constant communicational intimacy, we will be able to build the kind of communities that we cannot yet experience in the material world. These ideas swirled around the Internet when it first went public in the 1990s and I think they are still with us today.

If you take a New Left view of the Internet then the question you need to ask is not, How does it connect individual to individual?, but, How does it connect individuals to institutions? How does the website that I use or blog I create open me to monitoring? How do corporations that are invisible to me on my laptop nevertheless monetize my social interactions?

And if I want to change those things, a New Communalist approach would say, "Well, I'll just change my local surroundings and the rest of the world will change." A New Left approach would say something different. It would say something like, "To change the regulation of your behavior online, you need to engage with the democratic institutions of politics and change the state systems that regulate those companies and those states."

PJ: Your article "Burning Man at Google: A Cultural Infrastructure for New Media Production" (2009) interprets legacies of these two approaches right in the heart of present-day consumerist culture. Obviously, the noble ideals of the sixties have not only been appropriated by the logic of global neoliberal capitalism: instead, they actively contributed to creation of its digital infrastructure. What is the relationship between counterculture, cyberculture, and capitalism?

FT: Wow. That is a very big question and I am pretty sure I cannot answer it in the space we have here. I *can* say that I think New Communalism and the vision of digital life that descends from it have encouraged us to turn toward consumption instead of party politics, and toward the self and the network instead of institutions. Though most Americans no longer remember the fact, the years between 1966 and 1973 saw the largest wave of commune building in American history. As many as a million of Americans began to live

together, often in the countryside. When they headed back to the land, most hoped to turn away from politics. They hoped to govern themselves by establishing a shared mindset. How would they do that? By consuming – drugs, fashion, amplified music, even the leftover automobiles of American industry. An entire generation of young communards believed that transforming the mass-produced technologies of mainstream society into tools for the reformation of one’s own mind and life would change the world. In their dreams, consumption and self-reformation would replace politics. First America and then the world would become New Edens.

It did not work out that way. Most communes collapsed within a year. It turns out that consciousness is really no substitute for the rule of law. Yet the underlying logic of consuming small-scale technologies and transforming oneself persists. Just think about the marketing of the iPhone, or any number of other devices. And think about the frenzies that have greeted the release of these things. If you believe that the best way to change the world is to buy and share the right things so as to create a new headspace, then you are ripe for exploitation by capitalism. To the extent that you believe that party-based politics and institutions are by nature bankrupt, bureaucratic, hierarchical, you are that much more vulnerable to those institutions. As we have seen very recently with Edward Snowden, states and corporations have hardly stopped concentrating power or monitoring our behavior. Or trying to take advantage of it. If we believe that consuming small-scale technologies and expressing ourselves using the signs, symbols and devices provided for us online largely by the corporate world will save us from both the highly commercial, highly militarized states we inhabit, we are radically naïve.

PJ: In the abovementioned article, you masterfully describe the intersections between the Burning Man festival and Silicon Valley culture, and develop “the notion that Burning Man serves as a key cultural infrastructure for the Bay Area’s new media industries“ (2009: 73). While some visitors conceive Burning Man in almost religious terms, others see it more pragmatically as a business and networking opportunity. In a conversation between you, Stewart Brand, Kevin Kelly and Howard Rheingold (2006), Stewart Brand even noted that some Silicon Valley entrepreneurs consider attendance to the Burning Man to be an important advantage in recruitment! As a big fan of musical and artistic festivals, I cannot help but wonder: How (and more importantly, why) did Burning Man become such an important ritual? How much of its original spirit is preserved today?

FT: I actually think Burning Man is a very good example of how the counterculture and consumer culture work together in our time. But as I argued in my article, Burning Man is much more than a giant party in the desert. It actually provides a concrete, cultural infrastructure for the new media industries here in Silicon Valley. Let me lay this out in a little bit of

detail. Contemporary engineering in places like Google is highly individualized and quite creative. People need to move very flexibly within the firm to see what other people are doing, to get to know them, to make new things together. Burning Man is a place where you can literally practice those techniques, and act out those ideals. Most people go in teams and camps, and many people make technocentric art. And many of the people who work together or get to know each other for Burning Man work together other times, here in Silicon Valley.

I am not sure I know what the original spirit of Burning Man was. But I do know that last year 69,000 people went out to the playa. The event has been growing every year even though it is almost 30 years old. Every August when it occurs you can see the traffic drop here in Silicon Valley. And when you come back to the Valley, after you have gone to Burning Man, you are going to run into some people who you saw out there. You will share a special bond with them. At one level that bond is a shared experience of a kind of consciousness; at another it is the kind of bond that can give to people the kind of trust they need to do business together. As you pursue a community of consciousness at Burning Man, you can also build the networks on which success in Silicon Valley depends. I think that dynamic goes at least some way to explaining the festival's persistence.

PJ: Many aspects of the Burning Man bear strong resemblance to religious rituals. However, this is hardly an isolated case: counterculture of the sixties was deeply entwined with various New Age philosophies. Despite the fact that information science is based on “hard” maths, physics, and engineering, many of their developers seem to be in a quest for the spiritual – LSD usage documented in your book *Counterculture to Cyberculture* (2006) and John Markoff's book *What the Dormouse Said* (2005) seems to be a typical case in the point. What brought many members of counterculture to reject traditional systems of belief and develop new ones? Was it just the spirit of general resistance, or there is a deeper logic to their quests? Does the age of information need its own, distinct religion?

FT: It's funny. I think a lot of people during 1960s, particularly in the New Communalist movement, did not think they were embracing new beliefs. They thought they were finding their way back to an older and better world. Think about what people used to wear. Even as they were living in futuristic geodesic domes on their communes, men could be seen sporting pseudo-Native American clothing, and women often dressed as if they were homesteaders on the 19th century Western frontier. If you doubt me, just go look at the cover of any Crosby, Stills, Nash and Young album. The long hair, the cowboy boots, the cowboy jackets, and sometimes, depending on the band, the six-guns – they all look like characters from the Old West.

I actually think that a lot of the New Communalists were acting out a strange fusion of very deep American beliefs in the power of the individual, in the existence of an open landscape, a frontier where the self could be remade, but they were doing it in a highly technological context. They were getting high at a time when the rockets of the National Aeronautics and Space Administration (NASA) were getting *really* high, going to the Moon. They were getting spaced out, when the astronauts were getting *really* spaced out. Even the belief in the politics of consciousness owes its origins to cybernetics and to the military research cultures of the 1940s. Even in the 1940s, this was both a technical and the mystical insight. And both sides of that insight have come down to us through time. In the cyber-libertarianism of California today, you can absolutely hear echoes of the techno-universalism of the 1940s.

Do we need a new religion? Well, if we do, it is not a religion that celebrates universal informationalism so much as it might be one that helps us to embrace those who are different from ourselves, with all their particularities. It is not a religion that helps us build networks, but it is a religion that helps us build institutions in which we can do things with those who are unlike ourselves and build communities that last longer than a blog post.

PJ: Amongst many things that the New Communalists have not managed to change – or indeed have not wanted to change – were the traditional inequalities caused by gender, race and class. In their predominantly white, well-off, male-oriented communes, daily practice was exactly opposite to declared ideals of egalitarianism and freedom of choice. Or, if we put it the other way around, these ideals worked perfectly – but only for some people in their communities. Could you please analyze sources of such discrepancy between the New Communalists’ ideals and daily life, between their theory and practice?

FT: When I started studying the communes of the 1960s, I was completely surprised. I had thought they would be places that would escape the norms of mainstream, suburban society. I thought they would be the haunts of free love and egalitarian social relations. In the communes I looked at, nothing could be farther from the truth. The New Communalists headed back to the land to escape politics. When they set up their communes, they hoped to relate to one another by simply sharing a “consciousness” – rather than a formal governance structure or a rule-bound bureaucracy. The trouble was: without formal laws, communes fell back on social norms and asked them to do the work of organizing the distribution of resources. Suddenly men were running meetings and women were baking bread and tending kids. People of color were rarely to be seen inside most communes’ gates, but very often they could be found living in impoverished communities surrounding the rural lands where the New Communalists set up home. There is a deep irony

here. By turning away from the politics of parties and governments and toward the politics of consciousness, the New Communalists ended up replicating the norms of the very world they were trying to escape.

PJ: History is the teacher of life... this is why your work is so important. In the recent interview with Olivier Alexandre, you said: “Another legacy of the sixties’ community movement in the present is about discrimination. One of the common phenomena in the Silicon Valley now is a soft discrimination” (Turner & Alexandre, 2014). Which lessons from the New Communalists can we take to our contemporary “new era of discrimination, of the white inclusion community” (ibid.)?

FT: In the 1960s, the turn to communities of like-minded people on the communes led to all sorts of inadvertent but real discrimination. In our own time, the turn toward networks here in Silicon Valley has had a similar effect. When young executives are seeking collaborators for start-ups, for example, they look to their social networks – which usually consist of people who are racially, ethnically, and economically similar. I can’t imagine that any of them would think of themselves as racist. On the contrary, they would undoubtedly think of themselves as promoting meritocracy. And yet, as on the communes, those selected for membership tend not to include members of other races or often, even members of the opposite sex.

Network intellectuals – masters of the social world

PJ: Between 1986 and 1996 you worked as freelance journalist. I must congratulate you for accurate anticipation of the future and timely “escape” into the academe: during the past decade, we have witnessed a significant decline of traditional journalism and its transformation from watchdog of democracy into a merciless tool of global neoliberal capitalism. Could you please analyze the main causes and consequences of this transformation?

FT: I do not think we know what the consequences of this transformation are yet. I think all we can do right now is watch the currents as they sweep the beach, so to speak. But before we despair completely, I think we need to acknowledge that the consequences have been very different in different countries. When I travel to Germany or to France, I find print newspapers in the airports and the hotels. I see people reading them in cafés. These are perfectly sophisticated countries technologically. So far the print press still exists. I think we need to figure out why the print press is persisting in those countries even as we acknowledge that it has been very substantially corroded here in the United States. Much of the answer will have to do with technology of course, but some of it will also have to do with owners being unwilling to tolerate substantially more modest profits.

On the tech side, I think the forces in play are just a few but they are very powerful. New media do several things: they dramatically speed the processes of newsgathering and news dissemination; they dramatically diversify the number and kinds of people who can spot things that might fit the category of news and disseminate them; and they make it infinitely easier for us to capture fragments of information from anywhere around the globe our imagination takes us. Under those conditions, it is hard to make money. It is especially hard to make money doing two kinds of work: expensive investigative reporting, of the kind we very badly need to keep states and corporations and other institutions accountable; and commentary work, long-form synthetic analyses of long-running news stories and trends that you can only write if you cover something for a long time. Both of those kinds of journalism are very expensive.

To the extent the digital media undercut the traditional business model of mainstream journalism, they make it harder to pay for the kind of journalism we need most. We can have 500 stories on the new baby in Buckingham palace – those are very inexpensive to produce and they get lots of eyeballs. But will we have the kind of coverage that calls military expansion into question? Will we have the kind of reporting that brings us Edward Snowden? I think that's still up for grabs. At least in the United States.

PJ: What can we do to counterbalance these forces – perhaps computational journalism (Cohen, Hamilton & Turner, 2011) is the way forward?

FT: My Stanford colleague James Hamilton has taken the lead in trying to solve this problem using the technologies that are in fact driving it. As he has pointed out, computers can lower the cost of information creation and at the same time the cost of finding information. Hamilton is a leading force in a movement called “computational journalism” in which computer scientists and journalists are working together to develop new tools for exploiting the rapidly growing databases of publicly available information – and some not so publicly available databases – in order to hold our leaders accountable. If newspapers and other organizations cannot put as many reporters on the ground in the Pentagon and at the White House, the very least they can do is to deploy computational techniques to engage the data that exists and to create the kinds of watchdog stories we need.

PJ: Unlike journalism, arts seem to get a better deal with the computer. Your latest article, “The Corporation and the Counterculture: Revisiting the Pepsi Pavilion and the Politics of Cold War Multimedia” (2014), explores “how the ideals and technologies of the Cold War military-industrial research world served as resources for countercultural artists. It also shows how those artists helped give form and legitimacy to the new managerial mode of American political power” (2014: 66). Could you please outline trajectories of these

conclusions into the present? What is the relationship between information technologies and contemporary arts?

FT: Artists and engineers, including computer engineers, have been collaborating forever. In the 1960s, for example, you could see the group Experiments in Art and Technology bringing together the engineers of Bell Labs and artists like Robert Rauschenberg and John Cage. And they were not the only ones. NASA had an artist in residence, as did any number of other corporations. In that time as in our own, artists seemed to be repositories of the otherwise invisible creative energy that drives innovation. Yet particularly in the 1960s and perhaps now too the environments that artists actually built using these technologies often echoed the theories of control developed by the people who designed the machines.

The Pepsi Pavilion, for example, was literally a kind of three-dimensional computer-monitored environment in which your whole experience would be shaped by your interactions with sensors, tape machines and computers. Behind the scenes at the Pavilion there was an artist/engineer, someone who ran the system and managed your experience of it. The Pavilion was meant to be a kind of model of the future as were many other pavilions at the 1970 World's Fair. And I think it was remarkably prescient. I think we live in a world now where the arts of engineering create multiscreen environments in which our attention is carefully managed, carefully monitored, and carefully monetized. Along the way, artists have helped legitimate the rise of a technology-centered mode of citizen management.

Consider the arts at Burning Man for example. There you see a celebration of the idea of creativity that ostensibly links the artist and the engineer. And there you see a space where people can practice "being themselves" in an environment that is entirely fenced off and quite expensive to enter. I think these days we have gotten in the habit of trying to be hyper-individualistic in collective spaces; artists help technologists build the spaces and lend them the legitimacy that the arts have always had.

PJ: Just like journalists, teachers have always had a special role in the society. From Antonio Gramsci's "organic intellectuals" (1992), to Henry Giroux's "public intellectuals" (1988 & 2012), this role has always implied deep social and political engagement. What does it mean to be a teacher in the contemporary university?

FT: This is a very important question. To be a teacher in a contemporary university is not to be any one thing. The nature of the work you do varies enormously depending on your field. You may be in the laboratory sciences, you may be a humanist in the archives, you may be some combination of the two. From my perspective, the job of the university teacher remains the same across time. Your job is to help students learn to identify the most important questions of their age and the questions that most animate them. And your

job is to help them develop techniques to pursue answers to those questions effectively. In the process, you can help them develop skills that may well serve them in the employment world. I suppose my vision of university education is a bit old-fashioned. I think that when it comes to undergraduates at least, we should simultaneously help our students become more open-minded and more fully themselves. Graduate education of course is a wholly different matter. There we need to introduce students to the most important questions in their fields, give them the history of their fields, and help them take their fields forward in time and space.

PJ: More broadly, Fred, what does it mean to be a public intellectual in the age of the network?

FT: Your question about being a public intellectual in a network age fascinates me. I have actually just completed a paper on it, with my Ph.D. student Christine Larson, where we talk about the kind of network entrepreneurship that Stewart Brand and Norbert Wiener and Tim O'Reilly have done (Turner & Larson, 2015). I think we still live with the myths that intellectuals are only those people who write books and say things; that they are deeply involved with culture and literature, rather than say, business and technology; that they are perforce critical. I think this is a tremendously blinkered view. My own sense is that a new kind of intellectual has arisen alongside the integration of computer networks into our lives. That intellectual lives as much by building networks as he or she does by writing books.

In the case of Stewart Brand I think you can see this quite clearly. I often think of Stewart Brand as a kind of latter-day P.T. Barnum, a circus master. He is rarely an expert in the intellectual areas of the network he gathers. But when he brings networks together they start to do things and develop new languages for their joint projects. Brand himself becomes the person who can use that language and export it. He comes to stand for the circus, just as Barnum once did. Network intellectuals I think are simultaneously masters of ideas and masters of social worlds. In fact, it is the mastery of the social world that leads to the ideas. Not vice versa.

From cyber-knowledge to cyber-learning

PJ: Speaking of networked intellectuals, I would also like to touch upon knowledge. In *From Counterculture to Cyberculture*, you show that sometime after World War II, "specialists in one discipline began to do things that had previously been considered the proper domain of specialists in other areas. They could justify such leaps across disciplinary boundaries by drawing on the rhetoric of cybernetics" (2006: 25). However, almost seventy years after, the world of academia is still shaped along the lines of traditional disciplines, while inter-disciplinary, trans-disciplinary and anti-disciplinary

research still floats on institutional fringes. What makes traditional divisions between disciplines so persistent? Should we modify the rhetoric of cybernetics, or our society is still not ready for its epistemological consequences?

FT: Traditional disciplines persist for very good reasons. Some of them are structural: it takes a long time to train a professor and to concentrate the kinds of knowledge and expertise that a professorship can represent. Once someone has done that work, they have a strong incentive to maintain the structures that brought them to their position. That can have quite a lot of benefit for us. It can preserve bodies of knowledge and ways of looking at the world that are unpopular at a given time and keep them for us later. This is the classic tale of monks in the Middle Ages. They preserved ways of knowing and being within the walls of their monasteries that had disappeared from the battle-riven world outside. That is an essential function of the Academy.

What drove the interdisciplinarity of cybernetics was partly its rhetoric, but it was also the desperate need to confront two powerful enemies: first, military enemies of World War II and second, the totalitarianism of the Soviet Union. American researchers during this period were terribly afraid that if they did not try everything all at once they might lose World War II or fall behind in the Cold War. Either one would have had catastrophic consequences. So I think that motivation is just as important as the discipline of cybernetics itself. I do not agree that we are not interdisciplinary anymore. Certainly here at Stanford we have disciplines but we also have very powerful inter-disciplines. In fact, of our three largest undergraduate majors, two are interdisciplinary programs: human biology; and science, technology, and society. Only the traditional discipline of computer science is bigger.

PJ: Cybernetics is based around “computational metaphor:” electrically powered machines based on physics and logic. However, in *From Counterculture to Cyberculture*, you also outline “the biological metaphor” (2006: 226). Could you please describe the internet through the lens of the biological metaphor? What are its main advantages and disadvantages?

FT: By the biological metaphor, I mean thinking about the Internet as an organic living system. The advantage of that model is that it lets you think more creatively and holistically about the Internet’s extraordinarily rapid growth, and about its integration with our biological systems – our eyes, our ears, our bodies, in space. The downside – and I think this is a really big downside – is that the biological metaphor de-politicizes our encounter with the Internet. We can come to think of the Internet as a force of nature, rather than as a site of political struggle between corporations, states, individuals, cultures and the like. Things in nature somehow seem much harder to change than things in the political realm. And the Internet belongs firmly in the political realm.

PJ: In 1985, Donna Haraway published the famous essay *A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late Twentieth Century* (1985[1991]), which brought the cyborg metaphor from science fiction to mainstream scientific discourse. As of recently, however, there is an growing body of research showing that the cyborg metaphor is incomplete and points towards various directions such as post-humanism and cognisphere (i.e. Hayles, 2006). What are the main pros and cons of the cyborg metaphor?

FT: Well, like many metaphors, its benefits and drawbacks depend on who is using it and why. As Hayles and others have shown, man-machine hybrids have a long history within the sciences and particularly, within war-related research and development. When Haraway wrote her famous manifesto, she was trying to reclaim cyborgs from the world of their birth. Her manifesto offered a vision of the cyborg as an emblem of the multiplicitous person, the human who could use and be amplified by an attached machine, on behalf of a vision of the woman as herself multiply enabled. Haraway's work is really an attempt to reclaim the machine for feminist politics. I think the question of whether the cyborg can be completely stripped of the militaristic, masculine tenor of the communities in which it first appeared remains open.

PJ: For the majority of contemporary users, the political nature of the Internet is becoming increasingly invisible. As the Internet becomes another piece of our everyday infrastructure together with electric grids and sewage systems, its history and architecture are mentioned in marginal parts of school textbooks and specialized publications. Should we treat the Internet differently from the ways we treat the rest of our infrastructure? Why?

FT: Actually, I think we should treat it much *more* like our other infrastructure. Our societies have become modern thanks to the telephone system, the highway system and the like. The state and the public have worked to enhance and protect those systems for many years, here in the US and in many other countries as well. We need textbooks to get our children thinking about the Internet not simply as a new and enhanced form of television, but as something as integral to their lives – and to the health of the public sphere – as highways and phone systems.

PJ: Learning, as opposed to formal education, has been one of the basic pillars of counterculture and cyberculture since their very beginnings. For instance, looking at the seven thematic categories of the *Whole Earth Catalog* – Understanding Whole Systems, Shelter and Land Use, Industry and Craft, Communications, Community, Nomadics, Learning (2006: 80) – we can see that learning was embedded throughout the publication. What are the main contributions of counterculture and cyberculture to our understanding of human learning? Could you perhaps outline their main contemporary consequences?

FT: This is actually probably a better question for Howard Rheingold, who has done a lot of thinking in this area and who is probably a bit more optimistic than I am. I think people learn all the time, and they learn more when their environments are more intellectually, culturally, and materially wealthy. What the counterculture said to us, or at least what the New Communist wing of it said, was that we were in charge of our own learning. That is a very valuable notion, especially for those who already inhabit environments rich enough to drive real learning for motivated learners. But we have to be careful here. Not everyone lives in a world like that, and the myth that we can all pull ourselves up by our own bootstraps is a myth that really only serves those with exceptionally strong bootstraps.

PJ: Actually, I did talk with Howard Rheingold about these questions – and our conversation is also published in this issue of *Knowledge Cultures* (Rheingold & Jandrić, 2015). Let us finish this conversation with one last question. Nowadays, our technological development bumps into its natural limits: slowly but surely, Vannevar Bush’s metaphor of science and technology as “the endless frontier” (U.S. Office of Scientific Research and Development, 1945) transforms into more holistic understandings of human relationships with the environment such as the Anthropocene. According to McKenzie Wark, “this is the meaning of the Anthropocene: that the futures of the human and material worlds are now totally entwined” (2015). Which lessons from the age of “the endless frontier” should we take with us into the Anthropocene?

FT: It’s strange – both today and in Vannevar Bush’s time, human beings have had to confront the fact that we can and may destroy the world. I imagine that the children who cowered under their desks during Cold War air raid drills felt something like the creeping chill I feel now, when I see a power plant belching coal smoke or even an airplane taking off. Then we thought the world might end in a single atomic flash; today, we can feel the rise of global warming. Even as I tremble at the thought of the floods and fires to come – and they will come, as they have already started to – I think the history of the Cold War actually offers us some hope. So far at least, we have not blown the world up. Why not? I’m sure the answer is more complex than either of us can imagine, but at least one part of it belongs to technology. Thanks to communication and transportation technologies, we can no longer see the Russians, say, or the North Koreans, or the Iranians, as members of some alien species. And if we see them as somehow like ourselves, they become that much harder to destroy. This strikes me as the promise of the new modes of thinking surrounding the notion of the Anthropocene. Even as our technologies threaten to overheat the planet, we are beginning to see that we are not members of a fundamentally different order of being than the plants and animals around us. This is the sort of under-

standing that fosters empathy, and empathy, in my view at least, is the force most likely to prevent conflict. Just as the media technologies of the 1950s helped reveal how interconnected our human societies were, even across national borders, so now, our scientific technologies are revealing how entwined we are with everything else in the organic world. With any luck, we may have already begun to feel an empathy for that world that will keep us from destroying it.

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