

Kat Braybrooke; Tim Jordan

Genealogy, Culture and Technomyth. Decolonizing Western Information Technologies, from Open Source to the Maker Movement

2017

<https://doi.org/10.25969/mediarep/1028>

Veröffentlichungsversion / published version
Zeitschriftenartikel / journal article

Empfohlene Zitierung / Suggested Citation:

Braybrooke, Kat; Jordan, Tim: Genealogy, Culture and Technomyth. Decolonizing Western Information Technologies, from Open Source to the Maker Movement. In: *Digital Culture & Society*, Jg. 3 (2017), Nr. 1, S. 25–45. DOI: <https://doi.org/10.25969/mediarep/1028>.

Erstmalig hier erschienen / Initial publication here:

<https://doi.org/10.14361/dcs-2017-0103>

Nutzungsbedingungen:

Dieser Text wird unter einer Creative Commons - Namensnennung - Nicht kommerziell - Keine Bearbeitungen 4.0 Lizenz zur Verfügung gestellt. Nähere Auskünfte zu dieser Lizenz finden Sie hier:

<https://creativecommons.org/licenses/by-nc-nd/4.0>

Terms of use:

This document is made available under a creative commons - Attribution - Non Commercial - No Derivatives 4.0 License. For more information see:

<https://creativecommons.org/licenses/by-nc-nd/4.0>

Genealogy, Culture and Technomyth

Decolonizing Western Information Technologies, from Open Source to the Maker Movement

Kat Braybrooke and Tim Jordan

Abstract

Western-derived maker movements and their associated fab labs and hackerspaces are being lauded by some as a global industrial revolution, responsible for groundbreaking digital “entanglements” that transform identities, practices and cultures at an unprecedented rate (Anderson 2014; Hills 2016). Assertions proliferate regarding the societal and entrepreneurial benefits of these “new” innovations, with positive impacts ascribed to everything, from poverty to connectivity. However, contradictory evidence has started to emerge, suggesting that a heterogeneous set of global cultural practices have been homogenized. This paper employs a materialist genealogical framework to deconstruct three dominant narratives about information technologies, which we call “technomyths” in the tradition of McGregor et al. After outlining the maker movement, its assumptions are examined through three lesser-cited examples: One Laptop per Child in Peru, jugaad in India and shanzhai copyleft in China. We then explore two preceding technomyths: Open Source and Web 2.0. In conclusion, we identify three key aspects as constitutive to all three technomyths: technological determinism of information technologies, neoliberal capitalism and its “ideal future” subjectivities and the absence and/or invisibility of the non-Western.

Introduction

Western-derived maker movements and their associated DIY (Do It Yourself) workshops, fab labs, shared machine shops and hackerspaces are being lauded by some as a global industrial revolution, responsible for the emergence of groundbreaking digital “entanglements” that transform identities, practices and cultures at a rate not seen since the Enlightenment (Anderson 2014; Hills 2016). Assertions proliferate regarding the widespread societal benefits of these “new” innovations, with positive impacts ascribed to everything from poverty (i.e. Code for America) to connectivity (i.e. Facebook’s Free Basics).

However, contrary evidence has started to emerge, suggesting that a heterogeneous set of globalized cultural practices are being systematically homogenized (Maxigas 2014; Nascimento 2014; Fleischmann et al. 2016). These criticisms have engendered many scholarly debates, some deriding making practices as “fringe phenomena” based on possible rather than actual usage of digital tools (Smith 2014; Troxler/Maxigas 2014; Maldini 2016). Others note that maker subcultures are often marred by cronyism, corporatization and reductionism (Braybrooke 2011; Csikszentmihályi 2012; Ray Murray/Hand 2014; Toupin 2014; Maldini 2016). While such critiques often contest what it is makers actually *do* in fablabs, hackerspaces, shared machine shops and other site-based maker communities, in this paper we ask what narratives are being disseminated *about* these practices, which frame the maker movement (and other popular technological tales like it) as a revolution. In this sense, our starting point is an exploration of claims regarding the conception of the maker movement by those like Anderson and Hills in order to explore the effects that such a conceptualization may have.

To undertake this analysis, we first outline the predominant narrative about the maker movement which is commonly used in Western popular culture. We then compare this account to three lesser-cited examples of making movements: One Laptop per Child hacks in Peru, jugaad practices in India and shanzhai copyleft production in China. This comparison suggests the concept of a “technomyth,” in which technologies are “narrated” in ways that create a larger story about society whose key component is a determinism of our experiences of the *world* through our experiences of *technology* (McGregor 1987). To further establish this view, we then explore two other popular narratives about information technology innovations that have preceded the maker movement: Open Source and Web 2.0. Underpinning this analysis is a use of a genealogical method that is developed through feminist materialism (Foucault 1977a; Haraway 1991; Butler 1997). By examining these three “myths of information technology” through materialist genealogy, we are able to critique the assumptions embedded within them, particularly their technological determinism, their assumption of the values of neoliberal capitalism and the various ways they may render Global South and non-Western perspectives invisible.

Analysing narratives of technological change as myths

Because it is useful to begin with a common frame in discussing the term “maker movement,” we refer to Erica Halverson and Kimberly Sheridan’s 2014 definition as “the growing number of people who are engaged in the creative production of artifacts in their daily lives, and who find physical and digital forms to share their processes and products with others” (496). Although such definitions, and their accompanying stories and narratives, as Halverson and Sheridan’s, do include

specific examples, they also propose wider societal and cultural themes that frame, filter and interpret both examples and evidence. It seems appropriate then to refer to these wider themes as narratives, creating “myths” because their role as interpreter is their key characteristic. By “myths,” we refer to stories which use empirically verifiable moments to also disseminate wide-reaching claims about revolutionary change and transformation. We do not mean that these myths are straightforwardly false but rather that they have a complicated relationship with empirical facts, because confirming the truth or falsity of relevant facts is not the key function of a myth – whereas “telling the story” is.

The tales we are interested in here are technologically focused, and so we implement the term “technomyth” in the tradition of McGregor’s (1987) readings of popular cultural influences in The United States to describe them. Paul Dourish and Genevieve Bell build on the idea of the technomyth to argue it is a foundational story, a method by which a mythical future is constructed and then predicted simply by inventing it (2011). In the case of ubiquitous computing in the early 1990s, for example, the notion of progress became a self-fulfilling prophecy, with technotale rhetoric itself becoming a myth, a method for making sense of the future that seemed to appear “magically [yet] also manageably” (Dourish/Bell 2011: 2). Key elements involved “heroes, seemingly impossible tasks, perils, pitfalls, and dangers, and of course, in the end, glory” (2011: 2), and as the story itself became foundational to scholars in computer science and related fields, resulting technomyths regarding ubiquitous computing as a transformational force which would “change social relations, social order and daily life” (2011: 3) would in turn shape future innovations in their own image.

In our exploration of technomyths, we have additionally chosen to appropriate the critical method of genealogy for our analysis because of its specific concern for absences and silences and its further critique of the ways that the origins of a story often authorize the *meaning* of that story. Three principles are key to a genealogical approach (Jordan 2016). First, history is not written with the present at its defining frame; it is not teleological and avoids “victor’s history” (Edgerton 2011). Second, genealogy pays attention to things that appear to have no history – love or hate for example. Finally, absences are identified to be analysed. These three principles come together in a critique of origins which suggests that where there is a narrative about the origins of a technomyth, the origin may itself do considerable work articulating the nature of that technomyth. An origin does not record but instead helps produce the myth (Foucault 1977a; Nietzsche 2013). Genealogy, therefore, is a form of troubling the narratives we are told about regarding the nature of larger technological interventions.

Nietzsche famously argued that genealogy should be “grey,” concerning itself with “what is documented, what can actually be confirmed and has actually existed” (Nietzsche 2013: 7), which we interpret using feminist materialism because the latter has articulated a position which focuses on issues of power in the construction of narratives. Feminist materialism, in this sense, provides a

further basis for objectivity in its care and concern for the materiality, for the interactions – and, in Barad’s sense, intra-actions – through which a technomyth like the Western conception of the maker movement is itself maintained (Barad 2007). Moreover, this kind of hands-on materialism comes with a focus on the politics, the values and the forms of power that course through a technomyth (Haraway 1991; Harding 1991).

Our frame is, therefore, a genealogically and feminist-inspired critique of the kinds of techno-narratives within which myths are embedded. We understand our frame as a situated and materialist analysis of the ways in which complex social, cultural and technological constructs are created and maintained as forms of power. While such a critique is applicable to many social and cultural forms, in this paper we direct it first towards some of the key technomyths of our time. Starting with the maker movement, we then demonstrate how similar forms of power and hegemony found in the maker movement can also be found in other key technomyths like Open Source and Web 2.0, together reconstructing social, cultural and technological landscapes of the 21st century according to particular forms of power. We do not want to suggest these myths are themselves false. Instead we want to, in the tradition of Dourish and Bell, draw attention to “the ideas that animate and drive” (2011: 2) the popular subjectivity of technomythical notions and their conceptions of social and human progress.

The maker movement as technomyth

In 2012, former WIRED editor-in-chief Chris Anderson’s book *Makers: The New Industrial Revolution* became a best-seller in America, praising the country’s proliferation of Maker Faires and DIY tools as signs of a new industrial revolution, where fabrication of consumer items would liberate a new generation of makers, meaning “the path from ‘inventor’ to ‘entrepreneur’ [becomes] so foreshortened it hardly exists at all any more” (Anderson 2012). Dale Dougherty, who has been named a “Champion of Change” by the White House and is generally credited for popularizing the maker movement through his company Maker Media (an affiliate of the Silicon Valley conglomerate O’Reilly Media), further reinforces an emerging assumption that, through the democratization of digital tools, “making” has become a universal element of human identity, “describ[ing] each one of us, no matter how we live our lives or what our goals might be” (2012: 11). Shingy, AOL’s “Digital Prophet,” adds his own advertiser-friendly elucidation of maker culture as an opportunity for “curated nichiness,” a brave new world where consumers get “experiences delivered [...] in neat packages that make us feel as though we are discovering them” (Perlis 2014). Here, the initial elements of a technomyth show themselves both in the story being told and in the fervour it is told with.

In this tale, we are presented with a world where everyone has the freedom to make their own products through “prosumerism,” a hands-on form of capitalism that exploits consumer creativity (Paltrinieri/Esposti 2013). This imaginary is echoed in many places across the West, from scholarly articles and presentations throughout America, Canada, Europe, and Australia to popular technology magazines like *Wired* and *Make*, the branding of which is aggressively protected by the O’Reilly Corporation (Hertz 2012: 4–6; Ray Murray/Hand 2014). A 2014 *TIME Magazine* exposé argued that the maker movement is essential to today’s America, with its greatest success being the way it “bring[s] techies and non-techies alike into the world of being creators” (Bajarin 2014). The possibilities of celebrating “your right to tweak, hack, and bend any technology to your own will” (in 2016 the slogan of *Make* magazine) has inspired several enthusiastic accounts of a “renaissance of the DIY movement with a high-tech facet” (Mota 2011: 283) happening around the world.

The maker movement narrative, here, becomes a means of understanding widespread sociotechnical changes (like those of ubiquitous computing) since the rise of hands-on tools like 3D printers, laser cutters, biosensors, Arduinos and Raspberry Pis and their embedding within so-called new community spaces like fab labs and hackspaces (Smith 2014). The myth’s core is revealed in the suggestion that this flowering of digital technologies has placed in the hands of users the ability to become, for the first time, their own creative economic producers. In this story of a “new industrial revolution” (Anderson 2012), we are offered a neatly packaged and widely disseminated view of myriad disruptive technological innovations, which, it is claimed, will lead to economic and political changes.

However, not everyone is convinced. In 2012, the then-director of the MIT Centre for Future Civic Media described his frustration: “What is [being] called ‘making’ in North America and Europe is, frankly, a luxurious pastime of wealthy people [...] all over what is called the Global South there have been makers everywhere, only they are not called makers” (Csikszentmihályi 2012: 9). We are also seeing increased accounts of discrimination and exclusion of makers and hackers in Western communities who do not fit normative moulds, including women and cultural minorities (Braybrooke 2011; Toupin 2014). What if, in this spirit, we chose to shift our attention “from the new to the old, the big to the small, the spectacular to the mundane, the masculine to the feminine, the rich to the poor”? (Edgerton 2011: xiv). How might “making” be analysed by integrating accounts of “technology-as-use” with those of “technology-as-innovation”? And what might an interrogation of the West’s maker movement tell us more generally about technomyths? To pursue this line of thought, we will first look at the practice of *jugaad* used by indigenous populations in India, then we will examine *shanzhai* production in China, and finally we will look at how the One Laptop per Child initiative was reordered in Peru.

Jugaad: Indigenous maker materialities in translation

Jugaad (or *juggaar*) is a colloquial Hindi and Punjabi word meaning an innovative fix or a simple workaround. It is used to describe creative and hands-on solutions to making that bend the rules of daily life, enabling practices defined by casual ubiquity (Ray Murray/Hand 2015). In a different tradition from making-as-leisure activity explored by a Western prosumer, jugaad-style making is employed by individuals throughout India as “community combinations of making-do, hacking, and frugal engineering” featuring recycled materials and other re-appropriated elements of consumer culture (Ray Murray/Hand 2012).

Communications scholar Amit S. Rai has pointed out an interesting way today’s jugaad is starting to move beyond its initial characterization as “individualized, impoverished and frugal tinker[ing]” into a more “distributed nature [...] across associated contexts and shifting timespaces” (Rai 2015: 991). Rai argues this is due to the term’s co-option by Indian cell phone companies in order to sell products that are marketed as subversive and rebellious (products which are then themselves often subverted by the very communities they are marketed at). From the 1990s onward, Indian telecommunications firms such as Bharti Airtel have featured instances of jugaad in their campaigns, branding products as “digital cool” (Rai 2015: 992). A more complicated interaction between effect and affect then emerges when the exact kind of “pirate modernity” (Rai 2015: 991) that is introduced by these companies is then reshaped by consumers, allowing objects to “exceed the intentions” of their original design, existing “outside of any one human’s grasp” (Ash 2015: 88). Rai provides the example of Haier washing machines in rural China, where they are used by villagers to wash vegetables, in turn inspiring Haier to affix parts more applicable to vegetable washing to newer models. This kind of interaction, Rai argues, reveals how the reframing of jugaad practices can be seen, though postcolonial analysis, as a translation of “unequal relations of power in contexts characterized by extreme poverty” though (re)making, where consumer needs are co-opted into the hegemonizing narrative of products, which are then themselves co-opted by local peoples (Rai 2015: 987).

While corporations may attempt to design thresholds and fail-safes into digital objects in order to control their effects, actual use can exceed and defy original intentions. Rai believes that the strategic multiplicities of these kinds of subversions reveal a potential for longer-term, distributed subaltern resistances that continue to subvert seemingly straightforward controls (Rai 2015: 992). Sekharia further defines jugaad in this way, explaining that the complexity of the word’s use today suggests that it now represents

concept, process and product all rolled into one at the same time [...] reconfiguring materialities to overcome obstacles and find solutions [...] working the system to one’s advantage [...] a synonym in certain contexts for gambling and corruption. Jugaad is not just an

inextricable part of local vocabularies in India, it is an *integral part of the way life is lived and the world negotiated* (2013: 137).

These kinds of hands-on maker materialities also thrive in other informal economies of the Global South, from Brazil to Kenya (Hertz 2012; Ray Murray/Hand 2012; Viña 2012). In Colombia, making-as-technological-disobedience is called *rebusque* (rummaging), which describes the many side activities necessary to make a living, from selling phone cards to repairing neighbours' computers in exchange for food, in an economy where 67% of jobs are informal (Viña 2012). Viña quotes the Columbian radio station Caracol in explaining that “[i]n Medellín, 20,000 people work in informal activities considered as Rebusque [...] at the city centre, in the slums and even in commercial malls. They apply creativity to keep themselves active, included and productive” (2012).

These are examples of an increasingly significant body of evidence which reveals that “making” (starting with and moving beyond the maker movement technomyth) has been going on both well before and also at the same time as the movement's rise in the West. If making can be defined not only as tinkering innovation brought on by leisure time but also as creative, hands-on activities borne out of necessity, re-appropriating material aspects of life and digital technologies to find solutions to local problems, then jugaad activities can be seen as making *par excellence*. Yet jugaad features nowhere in mainstreamed maker movement narratives. The communal, non-Western and non-information technology aspects of jugaad and other creative Global South practices suggest already that the maker movement technomyth has been feeding us not a vision of global revolution but instead one predetermined by capitalist, North American and information technology-based values.

Shanzhai: Copyleft making from a Chinese perspective

Another area dominated by a specific kind of making narrative is that of the mobile phone industry. In a Western context, intellectual property laws apply to every aspect of a cell phone that potentially lies under copyright protection, including all “symbols, names, images, and designs used in commerce” (WIPO 2002). However, in fast-growing technology hubs across China like Shenzhen, a different lineage of digital remix through making has unfolded, one that defies the patent-based logics of Western intellectual properties while championing uniquely Asian historical and cultural values.

This remixing is a practice called *shanzhai* (山寨), which emerged as a phenomenon in relation to mobile technologies around 2008 (Zhu/Shi 2010) and describes the production of cheap, copyright-infringing goods distributed across Asian markets, especially electronics. Shanzhai products are recreated from original brand-name variants in black-market factories; pirated copyleft methods

are employed that subvert local and international manufacturing licences. The result is a proliferation of cheap cell phones that are easy to purchase. “Like bandits of yore,” Viña explains, “shanzhai live by their own code, steal from the rich, and provide to the poor” (2012). In 2016, Townsend et al. (2016: 185) described the core rules that unite today’s shanzhais: “Do nothing from scratch; build on the best of what others have already done. Innovate process ceaselessly at small scales for speed and cost savings [...] share as much as you can to make it easy for others to see your value.”

Not only is the present economic and legal context of shanzhai a challenge to the current maker movement technomyth but so is its temporality, as shanzhai itself predates making. The term was originally used as a metaphor to describe Chinese mountain bandits who opposed corrupt authorities as early as the 12th century (Hennessey 2011; Baidu 2013). It was then appropriated as Cantonese slang to describe low-end family factories that made equally low-end, poor-quality goods (Baidu 2013). This evolved into the more philosophical *shanzhaiism* (山寨主義), which connotes a kind of innovation that is seen as specifically “Chinese” in spirit, a return to the richness of traditional Chinese culture through *fugu*, or returning to the past (Hennessey 2011).

The disruptive, grassroots and copyleft values of shanzhai practices are also reflected in the conception of the region’s hackerspaces. The first such space in China, XinChejian, opened in 2009 (Hertz 2012). Its founder, David Li, has said, “If it’s going to be copied anyway, it may just as well be open and shared” (Viña 2012). Denisa Kera (2012) has explored the ways that hackerspaces are emerging with similarly unique characteristics in other Asian nations as well. “Within [Asian] hackerspaces we are witnessing a ‘technological folklore’ developed by post-industrial (Singapore, Japan) as well as more traditional or industrial communities (Indonesia) around technological solutions and scientific interests, in which vernacular and cosmopolitan blend together [...] reviv[ing] certain indigenous (but also pre-modern) practices of knowledge creation” (Kera 2012: 1). Through community spaces like these and the accumulation of cheap mobiles, China’s shanzhai recreation practices are now moving from Asia’s fringes to its mainstream (Hennessey 2011), with a recent estimate by the U.S. International Trade Commission putting the market share for shanzhai phones between 20 and 38% of mobile phone sales in China (2011).

Like jugaad, shanzhai describes a similar proliferation of making and remix-based technocultures to those addressed in the maker movement, but it also represents a unique cultural context in relation to sharing and property that comes from a much longer history than that of Western making practices. As Silvia Lindtner finds in her 2015 ethnography of Chinese makers, the unique practices of the making and hackspace scene in China – making-do, reuse and mass (re)production – demonstrate that the cultural assumptions of the maker movement’s core characteristics coming from the usual information technology hubs like Silicon Valley need to be re-examined. Chinese makers, she finds, are eager to move away

from mere re-appropriations of Western concepts regarding sharing and openness, instead finding passion in articulating “a unique culture of hacking with Chinese characteristics” defined by locally oriented traditions of industrial production and remix (Lindtner 2015). Again, we see the existing narrative about the origins of the maker movement questioned for its exclusion and absence of similar-yet-different practices in other cultures, and by examining this exclusion, we start to see what kinds of messages are embedded within making-as-technomyth.

One Laptop per Child: Western determinism and local subversion

The strange and ultimately hacked journey of MIT’s One Laptop per Child’s (OLPC) programme, which aimed to produce a laptop cheap enough to distribute at low cost worldwide, provides another example of the possibilities of indigenous, locally situated technological subversion. In 2007, mass production of the \$100 laptop started in the Changshu manufacturing centre near Shanghai. Pioneered by OLPC Foundation chairman and MIT Media Lab founder Nicholas Negroponte and hundreds of investors including “AMD, Brightstar, Chi Mei, Citigroup, eBay, Google, Marvell, News Corporation, Nortel Networks, Quanta Computer, Nortel and SES-Astra” (Buchele/Owusu-Aning 2007: 113), it was backed by the UN Development Programme and lauded as a groundbreaking idea that would improve the lives of millions of children in developing countries by providing unprecedented access to knowledge while “building global solidarity” (Twist 2005; Chan 2014).

However, perhaps because of Negroponte’s “chronic resistance to learning from the lessons of local implementations” (Chan 2014), OLPC undertook only a cursory analysis of local traditions, cultures and communities before dropping laptops into classrooms in countries like Rwanda and Uruguay. As a result, reception of the laptops became increasingly critical; their Western-centric interfaces and content were seen as damaging to local needs (Buchele/Owusu-Aning 2007; Warschauer/Ame 2010; Say Chan 2012). In 2011, a global group of professors wrote an open letter against OLPC, outlining problems with the devices being imposed on developing nations using colonialist tactics “inappropriate for locals, simply to benefit a Western need [...] for moral reinforcement” (Warschauer/Ame 2010).

One problem was that Western donors funded laptops without consulting local needs and instead of supporting other aid programmes already focused on improving social, infrastructural and educational conditions. Buchele and Owusu-Aning argue this is what may have led India to decline participation, quoting India’s education secretary who said in 2007 that “[w]e need classrooms and teachers more urgently than fancy tools” (2007: 114). But for many, OLPC’s problem was the belief that “benefits will be achieved by simply giving children technologies and getting out of their way, reflecting naïve and technologically deterministic views” (Warschauer/Ame 2010), combined with cultural insensi-

tivities in its assumption that a one-interface-fits-all approach to design would carry the “power [...] [to transform] realities as varied as Afghanistan or Uruguay” (Villanueva 2011). By the late 2000s, only a few hundred thousand laptops had been shipped to developing nations, despite the OLPC’s claim of 150 million by the end of 2007, and in places like Uruguay, only 21.5% of teachers reported actually using them (Warschauer/Ame 2010).

However, in 2011 Say Chan found that something interesting had started to happen to OLPC’s XO laptop in Peru. In the rural region of Puno, locals recognized the deep techno-fundamentalism of its “air drop” deployment model, noting that “when they arrived, there was no option [other than to accept them]” (2014). However, it is from here that the first XO user manual, centred on teachers and distributed online in several languages, was published (Salas 2009), and also from here that localization workshops to translate software into indigenous languages were organized by activists, linguists and elders. This and other laptop modifications arose at least in part from strong local hack lab networks in Peru, who responded to OLPC techno-fundamentalism by cultivating “their own multi-disciplinary global collaborations” aimed at proposing critical, local alternatives to Western expansion (Say Chan 2014). Re-appropriating a technology against its dominant narrative or myth in this way reveals that the technologies involved are not embedded as essential to the myth, nor is the myth itself essential to uses of the technologies.

We argue that these examples of jugaad, shanzhai and OLPC question the Western maker movement narrative. What we mean by this is that the proponents of the maker movement neglect similar cultures of technological use in a way that subsequently positions Western making practices as revolutionary innovations. Our issue here is not that the dominant maker movement technotale claims to be different from other cultural practices because it is based on specific technologies and practices. Instead, we are concerned that by making the global claims it does, it masks a particularly local set of wide-reaching politics within its myth – politics buried within a seeming *focus* on technologies and practices. We can now begin to identify these politics by drawing out some common elements of critique from the examples we have given to question the maker movement technomyth.

First, there is a deep-rooted association with Western actors, who are assumed by the maker movement technomyth to be the core sources and legitimators of making practices. OLPC demonstrates this most clearly, as it literally represents the imposition of its version of a Western technoessentialism on the rest of the world, blithely assuming there are no cultural or technical problems in doing so. A genealogical overview of jugaad and shanzhai practices in India and in China demonstrates further that making itself carries a much longer and more diverse indigenous history than that of the current maker movement narrative. This essentialism seems driven by *absence*. Western understandings of making are not compared to those of other cultures but are simply “assumed”; the subaltern

exists, here, in the inability of the makers of jugaad, shanzhai and other traditions to speak within the dominant maker movement myth (Spivak 1988).

Second, there is a close association with late-stage capitalism here, or what is generally called neoliberalism, in the presumption that making practices only make sense within the dominant form of early 21st-century capitalism. There is, in particular, a concern for forming subjectivities that see individuals working outside of state control, with the emphasis being on a particular free market subjectivity that is consonant with broader neoliberal economic norms (Jarrett 2008; Crouch 2011).

Finally, there is a technological determinism embedded in these tales which assumes that information technologies will *actually produce* the kinds of cultural and social effects claimed by the movement's proponents. There is, then, within the different potential modes of technological determinism a focus on particular kinds of information technologies (Jordan 2008: 66–70).

Even at this high level of abstraction, we argue that “Western,” “neoliberal” and “deterministic” are the three key elements embedded within making as a technomyth. We recognize these are large and complex concepts which we cannot do justice here, but they reveal the politics embedded within the technomyth as critiqued by other making practices. To further this analysis, we will now augment our assertions by comparing them to two more significant technomyths from the last few decades, Open Source and Web 2.0. We do this to extend the discussion beyond an analysis of the maker movement to consider Western technomyths more generally and also to add nuance to what we mean by a technological politics that is Western, neoliberal and deterministic.

Open Source as technomyth: Free Software into good business

Open Source's origins have already been canonized, making them ripe for the genealogist to take a look. The story unfolds, briefly, in the following way. There existed, in Free Software and the Free Software Foundation, a process for creating software which was becoming recognized by many as producing higher-quality and more easily updated software than other existing methods. At its heart, free software demanded two things and implied one. First, full access to the source code was necessary so that any appropriately skilled software programmer could alter and improve the software. Second, any changes had to be committed back to others, so that anyone with relevant skills could use and improve the programme. These two demands implied a community of coders. Free Software gained recognition in the 1990s for its ability to produce high-quality pieces of software, with several programmes (such as BIND) integral to the growing Internet (Weber 2004: 1–8; Coleman 2013: 64–88).

A spectacular moment then occurred with the transition of the once-dominant web browser Netscape from closed proprietary code to using free

software principles to share that code – and this galvanized a group of interested promoters of free software techniques who were concerned that the label “free” was restraining the use of the technique. A particular group of such interested coders and publicists met and agreed that the term “Open Source” might offer a more neutral and attractive term than Free Software, and then began promoting it within the community and outside, gaining considerable purchase, even at the cost of creating a rift with strong free software advocates (Kelty 2008; Coleman 2013: 77–79). This shift produced a major appropriation of software techniques within a new frame, which has had widespread success with the adoption of such software in many companies – for example Google and IBM rely heavily on Linux (Weber 2004).

Open Source Initiative co-founder, early free software propagandist, coder and co-architect of the shift to Open Source Eric Raymond outlined two reasons, at the moment of conceiving Open Source, as to why it was needed. In what Raymond calls “the original call to the community to start using the term ‘open source’ that I issued on 8 February 1998” (Raymond 1998), he argued:

Specifically, we have a problem with the *term* “free software,” itself, not the concept. I’ve become convinced that the term has to go. The problem with it is twofold. First, it’s confusing; the term “free” is very ambiguous [...] Does “free” mean “no money charged?” or does it mean “free to be modified by anyone,” or something else? Second, the term makes a lot of corporate types nervous. [...] There’s now a chance we can make serious gains in the mainstream business world without compromising our ideals and commitment to technical excellence – so it’s time to reposition. We need a new and better label. (Raymond 1998)

What is the “concept” of free software that is being renamed here? Free software was first formed as an idea in response to software becoming a commodity for sale. “Sale” meant that software had become subject to closed licences, enabling payment for a commodity that would otherwise be easily shareable through copies, and this required closed source code available only to its corporate owner. What Richard Stallman¹ and others had experienced as a community of sharing coders was broken apart, as legally enforced secrecy arrived when programmes were

1 It is worth noting that the meeting, and soon after the conference, which first gave the term “Open Source” purchase did not include Stallman, which is both strange, because of his obvious and overwhelming commitment to the principles under discussion, and obvious, because he was perceived as a barrier because of his refusal to compromise. A further aspect we do not have time to go into here is the way Stallman and his politics have become often disparaged as that of a “crank” or “zealot.” There is a personalization of Stallman as a kind of “nut” which serves to make Open Source appear stable and reasonable compared to Free Software. This is not only useful to the technomyth of Open Source but also dismissive of Stallman’s ideas and highly ironic given the rather obvious “crankiness” of someone like Raymond.

developed for sale (Williams 2002; Coleman 2013: 67–71). From this was born the desire for a return to coding as the result of a community who shared their work openly. What was required was the freedom to inspect and change the source code combined with the requirement to give back any changes. This requirement was eventually enforced through particular licences (e.g. GPL) aiming to legally bind the requirements that made free software. It is this concatenation of communal and technical values that Open Source found wanting, and which is missing from Open Source as a technomyth (Moody 2001; Weber 2004; Jordan 2008). We can also particularly see the focus of technological determinations on information technologies. Here we see source code as crucial to the nature of the technologies that are being disruptive and therefore the source of the new Open Source business and technology strategy. The communal side of free software is stripped away in Open Source to establish a narrative with, at its core, a business-friendly means of developing better software.

One further elision from this technomyth that is key to Open Source is the fact that Open Source emerged when the first Internet financial bubble was taking off (Kely 2008: 98–110). The context for the transformation from Free Software to Open Source is not just one that focuses on a reductionist technique that removes the community and politics while taking an American (if not Silicon Valley)–centred vision as normal but also one in which a major economic boom around the Internet had started. In the two years from the beginning of 1997 until the end of 1998, the birthtime of Open Source, the technology stock market NASDAQ rose by 71% (Google 2016). The appeal to companies to use Open Source software, and the story told with it to convince those companies, was made at a financially compelling time, when the first Internet gold rush was happening. Lurking within the Open Source story is a commitment not just to spreading software principles but also to the urgency of spreading them, in a time of what seemed like easy wealth creation and the triumph of a new informational capitalism birthed in Silicon Valley.

We have seen how Open Source reads from – and obfuscates – the community and politics of Free Software, reducing a complex cultural position to a technically expedient one: from freedom to software production. We have seen how left as a trace within this story is its connection to capitalism and profit. Last, we should also note another absence, one of those silences that genealogy asks us to look for, because this is an American narrative. There are occasional mentions of the nationalities of some individuals from outside the United States (something hard to avoid when Linux that is a key part of the story is primarily overseen by a Finn who migrated to the United States around 1997 [Moody 2001]), but this is predominantly a Silicon Valley–centred story. There is no mention in this technomyth of software industries from elsewhere in the world, and there is no adjustment to consider the equally prevalent sharing practices of others in this narrative. Open Source remains a resolutely Western story.

Analysing the technomyth of Open Source offers us a similar opportunity for analysis as that of the maker movement, revealing a technical focus close to determinism, a concentration on neoliberal capitalism and, by the 1990s, a Western centrism. We see some nuancing of the connection between Western and capitalist to a particular Silicon Valley vision of capitalism and a rejection of communal sharing of code. In this case, these influences are so strong as to have obliterated not only the “non-Western” but also many other related practices of the Western world itself (such as free software).

Web 2.0 as technomyth: Fads, convergence and interactivity

On the other side of the 1998–2001 dot.com bubble (and burst) lies the technomyth of Web 2.0. The skeleton of the technomyth here is the emergence of the phrase “Web 2.0” as a significant moment through a conference from the publisher O’Reilly (the same who sponsored the conference that began the business promotion of Open Source and who now publishes *Make* magazine and its highly protected branding apparatus). Founder Tim O’Reilly’s 2005 summary offers the origin of Web 2.0:

The bursting of the dot-com bubble in the fall of 2001 marked a turning point for the web. Many people concluded that the web was overhyped, when in fact bubbles and consequent shakeouts appear to be a common feature of all technological revolutions. Shakeouts typically mark the point at which an ascendant technology is ready to take its place at center stage [...] far from having “crashed,” the web was more important than ever, with exciting new applications and sites popping up with surprising regularity. What’s more, the companies that had survived the collapse seemed to have some things in common. Could it be that the dot-com collapse marked some kind of turning point for the web, such that a call to action such as “Web 2.0” might make sense? (O’Reilly 2005)

While Open Source rode the wave of the first dot.com bubble, Web 2.0 responded to the bubble’s bursting. However, O’Reilly and others were responding with 2.0 not only to the dot.com bust but also to the ongoing and exponential rise in numbers of users of the Internet, all through the boom, bust and afterwards (ITU 2006). The overriding theme of 2.0 was that the idea that it would bring a full realization of the convergence possibilities of the Internet in a new digital economy. As Caroline Bassett has argued, this put technological determinism at the heart of the Web 2.0: “Convergence discourses, leaning on a sense of ontological revelation, by definition entailed a destining of the cultural and the social by the technological, a sense that convergence in one domain, the domain of the technical, would have ‘inevitable’ consequences in others” (Bassett 2008).

The key narrative of Web 2.0 is convergence, meaning the bringing together of different media into one frame, and interactivity, in making these media active

by allowing users to interact with and continue adding to them. This is what the Internet has always enabled, such that the kinds of innovations Web 2.0 pointed to might most accurately be described as being part of the packaging and accessibility of the Internet's already existent forms of convergence. If social media like Facebook are the epitome of Web 2.0, then we should also recognize that all the interactive practices that converged in Facebook were available prior to it and other social media, such as chat rooms, messages, picture posting and sharing of media. Web 2.0 elides this to champion something "new" about convergence and interactivity, in order to attract attention and business back to the Internet. Again we see the theme of determination by the emergence of information technology. It is the particular repackaging of Internet-based capabilities, and the possibilities those technologies create, that seem core to Web 2.0 (Berry 2011: 56–61).

Having asserted something old as something new, and as a realization of the unrealized promise of Internet technologies, the focus on converged interactivity suggests also a particular kind of subjectivity in the Web 2.0 technomyth – that of the "ideal neoliberal subject." Similar to that of the maker movement, it is conceived of through a sense of subjects being free. This occurs both in the sense of having the capacity to choose and in the sense of being without external controlling forces [...] the governable neoliberal subject is one who is a "self-steering Self." [...] By not rigidly defining the relationship of the user to the technology and by allowing the "play" of creativity, interactivity refers to an already agential subject: a subject with the *a priori* power to act. [...] The Web 2.0 user thus is represented as both agential and endowed with freedom from externally derived controls (Jarrett 2008).

This kind of neoliberal capitalism needs not only certain macroeconomic features, such as withdrawal of the state in favour of market-based private enterprises, but also a kind of subjectivity that is consonant with neoliberal economic practices, and this subjectivity is embedded in Web 2.0 (Ringrose/Walkerline 2008; Van Dijck 2009; Crouch 2011).

Lastly for the Web 2.0 technomyth, and in a further echo of both maker movement and Open Source technomyths, the West is assumed here as the centre, and the rest of the world is an absence. Such an absence has already been criticized in many contexts, and we are not trying to assert anything new about the absence of non-Western perspectives here, except to note it is essential in understanding all three technomyths to know that an equally relevant proliferation of Global South and subaltern practices have been rendered invisible and non-influential by these technomyths.

We might now wonder what other big technological stories of our time could be subject to this kind of analysis. Big Data? The Internet of Things? Unfortunately, there is not space to consider them here. However, our arguments about Open Source and Web 2.0 do aim to build on those already made about the maker movement, while suggesting that even if different patterns and emphases occur, three key aspects are constitutive in all three technomyths: first, technological

determinism of information technologies in general and the Internet in particular; second, neoliberal capitalism and its subjectivities as the ideal future; and, third, the absence and invisibility of the non-Western. Our comparison to jugaad, shanzhai and other non-Western grassroots techno-practices throws these three factors into especially sharp relief.

Conclusion

The 21st century has been marked by a seemingly never-ending series of technomyths focused on the Internet, from early hype about the Internet itself to the 2010s when Big Data promised the “next big thing”; we now wait for the maker movement myth to progress while knowing that the “entanglements” of the Internet of Things may become the next focus (Edgerton 2011; Cukier/Mayer-Schonberger 2013; Hills 2016). In this paper, we have presented an analysis of the ways that three broad sociotechnical innovations have been framed by mainstream, Western-derived narratives. We have examined them genealogically, looking for absences, elisions and other sociocultural elements not foregrounded or acknowledged. We explored with the ideas of feminist materialists like Barad and Haraway in mind, seeking both to examine forms of power and to stay with the “messy” and interconnected troubles that constitute modern technologies across the world (Barad 2007; Haraway 2016).

By looking closely at the maker movement as a technomyth through comparisons to other practices, and then comparing this analysis to the Open Source and Web 2.0 myths that came before it, we have been able to argue that not only do enthusiastic, zeitgeist-like proclamations about Internet and information-based technologies exist (something often noted) but these hypes take particular forms, framing societal possibilities through culturally unique perspectives to innovation itself. Here it is important to underline that we are not arguing that nothing is new. Instead, in each of the technomyths we have explored, we have noted that there are specific technological origins, practices, economics and social interactions that are recognized – and many that are not. Our point here is that new technosocial practices are continually being channelled by influential technomyths that frame, direct and disseminate practices in their own mythical images.

We have also argued that jugaad, shanzhai and OLPC appropriation demonstrate what is neglected by the current dominant notion of the maker movement. The lack of communal, re-appropriated, necessity-based and non-Western uses of technology that we found were obstructed by maker movement progenitors has suggested three core constituents embedded within its claims: technological determinism, neoliberal capitalism and Western centrism. Our analysis of two further technomyths, Open Source and Web 2.0, has confirmed these constituents as key.

A continued difficulty here is that our description has had to rely on the very broad categories of Western, neoliberal and technologically determinist. Each of these is complex in its own right, with substantial literature devoted to it, too substantial for proper analysis here. What we have been able to do is to identify openings or questions for future analysis of other technomyths. First, we have identified the “West” as being formed not by a concrete conception of others but by a relation to absence. The non-Western is simply erased and ignored. This is something that jaggad and other materialist practices fundamentally challenge, and it also suggests that attention should be paid in future to the techno-subaltern. Second, we have seen a particular economic subjectivity presumed, one that prioritizes the use of information technologies to act outside of state boundaries in the general pursuit of profit. This was most clear in Web 2.0 but is also present in other myths and is again clearly challenged by more community-centred efforts such as OLPC re-appropriation. Finally, we have seen how certain technologies are privileged as the drivers of technological determination. In all three Western technomyths, we find a fascination with – and focus on – information technologies, with special attention on Internet technologies as determining social and cultural structures.

While we cannot hope to pin down exactly the complex meanings of what has been introduced here, we can argue that in examining technomyths, we would do well to ask three key questions: What is presumed to be absent in global terms? What kind of subjectivity is being proposed, particularly in relation to state and economy? What technologies are being privileged as the drivers of change? While we recognize extending such discussions is important, the arguments of this paper can only start to open up this further research. In short, while we acknowledge our three pillars of technomyths – Western, neoliberal, technologically determinist – connote large and complex concepts presented at a high level of abstraction, we believe this has been necessary in order to establish the fundamental positions of power that are embedded within myths like the maker movement.

What we also hope to add to existing debates through our analysis of “technomyth” and its effects is a means of understanding the pervasive ways that new creative and information technologies are being channelled, and especially how they might be directed differently, particularly towards a greater focus on communal and subaltern uses of technologies outside of dominant Western narratives. This genealogical perspective presents (and defies) a world in which information technologies inevitably create social and cultural practices on the basis of Western values and the promotion of a neoliberal capitalism.

List of references

- Anderson, C. (2012): "The Makers: Hobbyists are Going to Beat the Industrial Giants." In: WIRED Magazine, October 23 (<http://www.wired.co.uk/article/the-makers>).
- Anderson, C. (2014): *Makers: The New Industrial Revolution*. New York: Crown Business.
- Ash, J. (2015): "Technology and Affect: Towards a Theory of Inorganically Organised Objects." In *Emotion, Space and Society*, 14, 84-90.
- Baidu Encyclopedia (2013): "Shanzhaiism (山寨主義)," (<http://baike.baidu.com/subview/268947/5666635.htm?wtp=tt>).
- Bajarin, T. (2014): "Why the Maker Movement is Important to America's Future." In: *TIME Magazine*, May 19 (<http://time.com/104210/maker-faire-maker-movement>).
- Barad, K. (2007): *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning*. London: Duke University Press.
- Bassett, C. (2008): "FCJ-088 New Maps for Old?: The Cultural Stakes of '2.0'." In: *Fibreculture* 13 (<http://thirteen.fibreculturejournal.org/fcj-088-new-maps-for-old-the-cultural-stakes-of-2-0>).
- Berry, D. (2011): *The Philosophy of Software: Code and Mediation in the Digital Age*. Basingstoke: Palgrave Macmillan.
- Braybrooke, K. (2011): "She-Hackers: Millennials and Gender in European F/LOSS Subcultures." In: Lecture at the 4th Chaos Communication Camp (<https://events.ccc.de/camp/2011/wiki/Lectures>).
- Buchele, S. F./Owusu-Aning, R. (2007): "The One Laptop Per Child (OLPC) Project and its Applicability to Ghana". In: *Proceedings of the 2007 International Conference on Adaptive Science and Technology*, pp. 113-118.
- Butler, J. (1997): *Excitable Speech: A Politics of the Performative*. London: Routledge.
- Chan, A. S. (2014): "Beyond Technological Fundamentalism: Peruvian Hack Labs and Inter-technological Education." In: *Journal of Peer Production* 5. (<http://peerproduction.net/issues/issue-5-shared-machine-shops/peer-reviewed-articles/beyond-technological-fundamentalism-peruvian-hack-labs-and-inter-technological-education>).
- Coleman, G. (2013): *Coding Freedom: The Ethics and Aesthetics of Hacking*. Princeton: Princeton University Press.
- Crouch, C. (2011): *The Strange Non-Death of Neoliberalism*. Cambridge: Polity.
- Csikszentmihályi, C. (2012), "Sixteen Reflective Bits." In: *Critical Making: Manifestos* (<http://conceptlab.com/criticalmaking>).
- Cukier, K./Mayer-Schonberger, V. (2013): *Big Data: A Revolution that will Transform how we Live, Work and Think*. London: John Murray.
- Dougherty, D. (2012): "The Maker Movement." In: *Innovations* 7/3, pp. 11-14.

- Dourish, P./Bell, G. (2011): *Divining a Digital Future: Mess and Mythology in Ubiquitous Computing*. Cambridge: MIT Press.
- Edgerton, D. (2011): *Shock of the Old: Technology and Global History since 1900*. London: Profile Books.
- Fleischmann, K./Hielscher, S./Merritt, T. (2016): "Making Things in Fab Labs: A Case Study on Sustainability and Co-creation." In: *Digital Creativity* 27/2, pp. 1–19.
- Foucault, M. (1977a): "Nietzsche, Genealogy, History." In: D. Bouchard (ed.), *Language, Counter-memory, Practice: Selected Essays and Interview by Michel Foucault*. Ithaca: Cornell University Press, pp. 139–164.
- Google (2016): "Historical Analysis of Nasdaq Composite." (<https://www.google.com/finance/historical?cid=13756934&startdate=Jan%201%2C%201997&enddate=Jan%201%2C%201999&num=30&ei=h6agV-mqHtPRUvDlkNAH&start=480>).
- Harding, S. (1991): *Whose Science? Whose Lives? Thinking from Women's Lives*. Cornell: Cornell University Press.
- Haraway, D. (2016): *Staying with the Trouble: Making Kin in the Chthulucene*. Raleigh, NC: Duke University Press.
- Haraway, D. (1991): *Simians, Cyborgs, and Women: The Reinvention of Nature*. London: Free Association Books.
- Hennessey, W. (2011): "Deconstructing Shanzhai, China's Copycat Counterculture: Catch Me if You Can." In: *Campbell Law Review* 34, pp. 609–660.
- Hertz, G. (2012): *Critical Making. Hollywood*: Telharmonium Press.
- Hills, D. (2016): "The Enlightenment is Dead, Long Live the Entanglement." In: *MIT Journal of Design and Science* 1(1) (<http://jods.mitpress.mit.edu/pub/enlightenment-to-entanglement>).
- ITU (2006): *International Telecommunications Union Global ICTs Report 1997–2005* (<http://www.itu.int/ITU-D/ict/statistics/ict/>).
- Jarrett, K. (2008): "Interactivity is Evil! A Critical Investigation of Web 2.0." In: *First Monday* 13(3) (<http://firstmonday.org/ojs/index.php/fm/article/view/2140/1947>).
- Jordan, T. (2008): *Hacking*. Cambridge: Polity.
- Jordan, T. (2016): "A Genealogy of Hacking." In: *Convergence: The International Journal of Research into New Media Technologies* (<http://journals.sagepub.com/doi/abs/10.1177/1354856516640710>).
- Kelty, C. (2008): *Two Bits: The Cultural Significance of Free Software and the Internet*. Raleigh: Duke University Press.
- Kera, D. (2012): "Hackerspaces and DIYbio in Asia: Connecting Science and Community with Open Data, Kits and Protocols." In: *Journal of Peer Production* 2, pp. 1–8.
- Lindtner, S. (2015): "Hacking with Chinese Characteristics: The Promises of the Maker Movement Against China's Manufacturing Culture." In: *Science, Technology, & Human Values* 40(5), pp. 854–879.

- Maldini, I. (2016): "Attachment, Durability and the Environmental Impact of Digital DIY." In: *The Design Journal* 19(1), pp. 141–157.
- Macey, D. (1994): *The Many Lives of Michel Foucault*. London: Pantheon.
- Maxigas (2014): "Hackerlabs and Hackspaces: Tracing Two Genealogies." In: *Journal of Peer Production* 5 (<http://peerproduction.net/issues/issue-2/peer-reviewed-papers/hacklabs-and-hackerspaces>).
- McGregor, G. (1987): "The Technomyth in Transition: Reading American Popular Culture." In: *Journal of American Studies* 21(3), pp. 387–409.
- Moody, G. (2001): *Rebel Code: Linux and the Open Source Revolution*. London: Penguin.
- Mota, C. (2011): "The Rise of Personal Fabrication." In: *Proceedings of the 8th ACM Conference on Creativity and Cognition*, pp. 279–287.
- Nascimento, S. (2014): "Critical Notions of Technology and the Promises of Empowerment in Shared Machine Shops." In: *Journal of Peer Production* 5 (<http://peerproduction.net/issues/issue-5-shared-machine-shops/editorial-section/critical-notions-of-technology-and-the-promises-of-empowerment-in-shared-machine-shops>).
- Nietzsche, F. (2013): *On the Genealogy of Morals*. London: Penguin.
- O'Reilly, T. (2005): "What Is Web 2.0: Design Patterns and Business Models for the Next Generation of Software." In: O'Reilly Publications (<http://www.oreilly.com/pub/a/web2/archive/what-is-web-2.0.html>).
- Paltrinieri, R./Esposti, P. D. (2013): "Processes of Inclusion and Exclusion in the Sphere of Prosumerism." In: *Future Internet* 5(1), pp. 21–33.
- Perlis, M. (2014): "7 of the Next Big Things from David Shingy, AOL's Digital Prophet." In: *Forbes*, June 14 (<http://www.forbes.com/sites/margaretperlis/2014/06/16/aols-david-shingy-deconstructed-digital-prophet-or-marketing-profiteer>).
- Rai, A. (2015): "The Affect of Jugaad: Frugal Innovation and Postcolonial Practice in India's Mobile Phone Ecology." In: *Environment and Planning D: Society and Space* 33(6), pp. 985–1002.
- Raymond, E. (1998): "Goodbye, 'Free Software'; Hello, 'Open Source,'" Eric Raymond Website (<http://www.catb.org/~esr/open-source.html>).
- Ray Murray, P./Hand, C. (20145): "Making Culture: Locating the Digital Humanities in India." In: *Visible Language* 49(3), pp. 140–155.
- Ringrose, J./Walkerdine, V. (2008): "Regulating The Abject: The TV Make-over as Site of Neoliberal Reinvention Toward Bourgeois Femininity." In: *Feminist Media Studies* 8, pp. 227–246.
- Salas, S. (2009): *La Laptop XO en el Aula*. Puno: Sagitario Impresores.
- Sekhsaria, P. (2013): "The Making of an Indigenous STM: Technological Jugaad as a Culture of Innovation in India." In: K. Konrad et al. (eds.), *Shaping Emerging Technologies: Governance, Innovation, Discourse*. Berlin: IOS Press.
- Smith, A. (2014): "Technology Networks for Socially Useful Production." In: *Journal of Peer Production* 5 (<http://peerproduction.net/issues/issue-5-shared>

- machine-shops/peer-reviewed-articles/technology-networks-for-socially-useful-production).
- Spivak, G. (1988): "Can the Subaltern Speak?" In: L. Grossberg/C. Nelson (eds.), *Marxism and the Interpretation of Culture*. Chicago: University of Illinois Press, pp. 271–315.
- Toupin, S. (2014): "Feminist Hackerspaces: The Synthesis of Feminist and Hacker Cultures." In: *Journal of Peer Production* 5 (<http://peerproduction.net/issues/issue-5-shared-machine-shops/peer-reviewed-articles/feminist-hackerspaces-the-synthesis-of-feminist-and-hacker-cultures>).
- Townsend, A. et al. (2016): *The Future of Open Fabrication Website* (<http://www.openfabrication.org>).
- Troxler, P./Maxigas (2014): "Editorial Note: We Now have the Means of Production, but Where is my Revolution?" *Journal of Peer Production* 5 (<http://peerproduction.net/issues/issue-5-shared-machine-shops/editorial-section/editorial-note-we-now-have-the-means-of-production-but-where-is-my-revolution>).
- Twist, J. (2005): "UN Debut for \$100 Laptop for Poor." In: BBC News, November 17 (<http://news.bbc.co.uk/2/hi/technology/4445060.stm>).
- United States International Trade Commission (2011): "China: Effects of Intellectual Property Infringement and Indigenous Innovation Policies on the US Economy: Investigation." In: US International Trade Commission (<https://www.usitc.gov/publications/332/pub4226.pdf>).
- Van Dijck, J. (2009): "Users Like You? Theorizing Agency in User-generated Content." In: *Media, Culture and Society* 31(1), pp. 41–58.
- Villanueva, E. (2011): "The Importance of Being Local." In: *The European Magazine*, April 28 (<http://www.theeuropean-magazine.com/256-villanueva-masilla-eduardo/255-ict-in-development-cooperation>).
- Viña, V. (2012): "DIY in Context: From Bricolage to Jugaad." In: *Fadfest: Open design, Shared Creativity* (<https://www.scribd.com/doc/98988556/DIY-in-Context-From-Bricolage-to-Jugaad>).
- Warschauer, M./Ames, M. (2010): "Can One Laptop per Child Save the World's Poor?" In: *Journal of International Affairs* 64(1), pp. 33–51.
- Weber, S. (2004): *The Success of Open Source*. Harvard: Harvard University Press.
- Williams, S. (2002): *Free as in Freedom: Richard Stallman's Crusade for Free Software*. Sebastopol: O'Reilly.
- WIPO (2002): "What is Intellectual Property?" In: World Intellectual Property Organization (<http://www.wipo.org/about-ip/en/>).
- Zhu, S./Shi, Y. (2010): "*Shanzhai* Manufacturing – an Alternative Innovation Phenomenon in China: Its Value Chain and Implications for Chinese Science and Technology Policies." In: *Journal of Science and Technology Policy in China* 1(1), pp. 29–49.

