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Abstract

This article discusses the visions and practices of DIY (do-it-yourself) maker culture in China. It analyses how the ideals held by DIY makers, such as openness, peer production, and individual empowerment, are formulated in relation to China's project of building a creative society and economy. To demonstrate, this article draws from long-term ethnographic research, including the setting up of China's first hackerspace, the proliferation of making, and partnerships between makers and manufacturers. China's makers are driven to reinvent what creativity, innovation, industrial production and citizenship mean today, simultaneously exploiting and challenging political rhetoric. By setting up hackerspaces, designing open technologies and starting up businesses, they craft alternative subject positions, for themselves and others. The contribution of this article is threefold. First, it fills a gap in current research by providing an account of a culture of technology production. Second, it proposes the analytical lens of 'making subjectivities' to open up the concept of the netizen, illustrating the importance for Chinese Internet research to consider not only technology *use*, but also the culture and materials of its *production*. Third, it demonstrates that maker culture is better understood as a parasitic culture rather than a counterculture, altering the system from within, contributing to our understanding of the relationship between technology use, production, society, activism and the state.

Keywords

DIY, maker culture, hackerspaces, technology production, open source, netizen, industrial production

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The contemporary landscape of information technology is one that has been profoundly influenced by the emergence of the 'hacker culture' in the 1960s and 1970s. From the computer you might be using at this very moment to online services you use frequently to communicate, the technology landscape is full of products that depend on alternative models of technology production that were driven by this early hacker culture. These alternatives are variously known as open source, open innovation, peer production, free software, and the like. The vision that drove these open forms of technology production depicted the emerging digital world in revolutionary terms and as antithetical to the technologies and social structures powering the Cold War state and its defence industry.¹ Members of this hacker culture were committed to designing technologies which are open and modifiable by their users. Their approach towards technological 'makings' evolved out of an 'orientation toward the computer as a tool of empowerment and discovery'.²

Today, we find ourselves in the middle of a new hacker culture (or 'maker culture') that both harkens back to this model of technology production as individual empowerment and departs from it in significant ways. This contemporary maker culture is concerned not only with open Internet technology and digital things, but also with physical things such as hardware designs, sensors, and networking devices that bridge the digital and physical worlds. While the earlier movement was concerned with the workings of software code and the workings of the Internet, this contemporary maker movement is concerned with hardware designs and the workings of the Internet of Things.³ Chris Anderson, the former editor-in-chief of *Wired* magazine, suggests that this contemporary maker movement is driving forward the 'third industrial revolution'⁴ – a generation of technology producers that expands from the earlier Internet and Web 2.0 techniques to make innovative hardware products and remake industrial production.

In this article, I explore the unique manifestations of this maker movement in China. The two main questions I set out to explore are: how do maker ideals of individual empowerment and open knowledge production unfold in relation to China's politico-economic project of building a creative society?; and what can a study of a culture of technology producers tell us about the relationship between identity, collectivity and digital technology in China?

I approach these questions by centring in on debates over creativity in China such as its supposed lack and/or the opportunities that lie in the nurturing of creativity. For instance, politicians argue that Chinese citizens lack creativity and that as a consequence China lags behind other countries in terms of innovation output. In contrast, scholars in the field of Chinese Internet research find that individual and creative expression flourish online.⁵ The work of such scholars has contributed important insights to our understanding of the Chinese Internet as multifaceted and as a site through which social norms are simultaneously reworked and existing control is further extended. However, much of this prior work has focused on political issues, including, for instance, censorship and political control,⁶ online activism, the public sphere and tactics to circumvent censorship,⁷ as well as disadvantaged populations, such as migrant workers, who have limited access to Internet technology or technological work-arounds.⁸ With the notable exceptions of Andrew Ross's detailed account of white-collar workers in the high-tech industries in China and Taiwan and Lorraine Justice's work on contemporary Chinese product design, the experiences and practices of those who work in the high-tech and creative industries in China today have received less attention.⁹

Especially rare in the growing field of Chinese Internet research is work that involves long-term, on-the-ground ethnographic engagement with people involved in the creation and design of technologies. With my research on DIY (do-it-yourself) making, I hope to contribute by providing exactly such an in-depth account of a culture of technology producers. It is important to note, here, that my goal is not to predict whether 'DIY making is really going to make a big difference' for China's project of creativity, as one of the reviewers of this article challenged me to articulate. Rather, I provide a situated account of a unique moment of industrial and social development in China, as new alliances between DIY makers and established industries are forged. The goal is not to speculate whether or not this is going to make a difference (a question to be answered in historical retrospect), but to illustrate what motivates China's makers to reinvent what counts as creativity today and to alter contemporary tech industries from within.

Making subjectivities

An important analytical category deployed in the broader field of Chinese Internet research to describe the relationship between individual expressions, collective identity and digital technology in China is the notion of the netizen. It is predominantly understood as a new form of citizen engagement enabled by the increase in digital technologies and the rise in the number of people who have access to the Internet in China.¹⁰ The perspective of the netizen has allowed us, for instance, to account for new forms of individual and collective expression, in particular in regard to political debates. It has led to important insights about playful approaches towards censorship and creative work-arounds,¹¹ and has uncovered the many shapes of contentious activities and activism associated with the *use* of the Internet.¹² This idea that Internet technologies in China, despite censorship, contribute to the empowerment of citizens (when they act as netizens) has been taken up widely beyond the field of Chinese Internet research, for instance in communication studies and popular tech discourse. Most of this work has approached the notion of the netizen through the lens of technology use. While technology use and access has been a central topic, we know relatively little about the culture and politics of technology *production* in China. In this article, I demonstrate that the study of technology production provides new insights into how people *build* their own spaces and tools for individual and collective expression, economic activity, and citizen engagement in China today.

I argue for opening up the concept of the netizen to include practices of both use and production of technology. As China's technological landscape changes, so too does participation in technological production. Think, for instance, of social networking applications such as microblogs (微博) and WeChat (微信) which have enabled new forms of individual and collective participation as well as new measures of control. These platforms are shaped significantly both by user and system developers, designers and content managers. A focus on technology production, then, provides new insights into how netizens are co-designing and co-producing the technologies they use.

For the purposes of this project of reopening the concept of the netizen, I bring together Chinese Internet research with work on individual subjectivity in anthropology, which recognizes the multiplicity of selfhood.¹³ So far, the netizen has largely been understood as personhood enacted through technology use. This is based on the idea that the use of the Internet enables people to express themselves in new ways. While I consider it crucial to

identify such emergent forms of expression and citizen engagement, the netizen as an analytical tool has in many ways turned into what the anthropologist Marilyn Strathern terms a stable ontological category.¹⁴ Strathern illustrates how a new mode of governance emerged in Europe between the 16th and 18th centuries, which made sense of diverse people and populations by classifying citizens into discrete entities based on statistical analysis, that is, 'persons became like data entities thought of as individuals, and society defined as the connections between them'.¹⁵ Strathern argues that ever since, we have understood identity as an ontological given that remains stable across time and space. Strathern's insights allow us to see how netizen identity runs the risk of functioning as an ontological given, classifying people into online users (netizens) versus the rest (the state, the non-user, the citizen, and so on). For instance, the term netizen as it is used today generalizes across diverse values and practices in order to articulate the potential impact of Internet technology on social and political change. How can we account for diverse technology practice in China beyond mere use and the enactment of citizen–state relations?

Strathern proposes the analytical lens of the *dividual* to account for the multiplicity of selfhood through which a person acts, positions himself or herself, and makes meaning of the actions of others. This concept has been taken up widely in both anthropology and digital media studies. For instance, building on Strathern, the anthropologist Tom Boellstorff illustrates how the notion of the 'flexible worker' in contemporary tech business and political rhetoric is exactly such a closed identity, predicated on a single selfhood, that Strathern describes.¹⁶ Boellstorff urges not to re-inscribe dominant subject positions such as the flexible citizen, but to focus on how people make meaning out of tenuous, glancing, fragmentary, and half-understood engagements.

Building on this prior work, I propose the analytical sensitivity of 'making subjectivities' to open up the notion of the netizen. Making subjectivities draws attention to the ways in which people craft their own positions in society and how this is a process continuously in the making, situated and historically specific. It means paying attention to the work performed when we position ourselves in relation to others. It also acknowledges that our position is never singular and predicated on a single goal or purpose (e.g. to make money or to resist state control), but multiple, fractal, and heterogeneous. With making subjectivities, I wish to shift our focus from single identities such as the activist, nationalist, Internet user, and so on, to the multitude of subject positions within and across such well-understood categories. In particular, I build on prior research that highlights the diversity of technology use¹⁷ and apply it to the study of technology production. As such, I do not propose a move away from what we have gained through our explorations of netizen practice, but to open up the concept of the netizen itself to include the many positions people craft for themselves, and others, when they use and produce technology.

In what follows, I illustrate that when China's makers designed technologies, set up new businesses and organized tech conferences, they also intervened in the status quo from within. By designing open technologies and developing new businesses, they repositioned themselves in relation to others. Their efforts were not directed at escaping the system but at making use of it, making fun of it, altering it, and provoking it. In that sense, the subject positions they crafted were 'parasitic', a term I draw from Geremie Barmé who critiques common analytical binaries such as 'the dominant social order' versus

'subculture' or 'counterculture'.¹⁸ Providing a detailed historical account of China's 1980s and 1990s' avant-garde and pop art scene, Barmé suggests recognizing the mutual dependencies and alliances between artists and the state. Illustrating how the state leveraged dissident artists for claims over national cultural production and how artists in turn exploited state support, Barmé argues:

nonofficial culture can also be spoken of as a parallel or even parasitic culture. As such, it is neither nonofficial nor necessarily anti official. Much of it was and still is produced with state funding and certain (often low-level) official or state involvement. It may not be directly sanctioned or beholden to the overculture, and it cannot simply be classified as oppositional.¹⁹

China's DIY maker culture is neither entirely countercultural nor pro-system. DIY makers align with start-up culture and hackerspaces in the United States, do not hesitate to take advantage of foreign venture capital,²⁰ and exploit political promotions of China's remake into a creative economy. They bring together and align often contradictory ideas such as copycat and open source, manufacturing and DIY, individual empowerment and collective change; and in doing so they craft a particular kind of subject position for themselves and others in China.

DIY making and creativity in China

China's maker culture emerged from a growing network of hackerspaces, that is, physical spaces that expand ideas and practices of the web generation into hardware and manufacturing. Hackerspaces are community spaces created by people committed to new approaches towards technology use and design, based on the open sharing of software code and hardware designs. A typical space is equipped with computing tools that allow for experimenting with the physical/digital boundary – computer-controlled laser cutters, 3D printers, and microcontroller kits. Hackerspaces also often host educational workshops, where these tools are used to teach others about manipulating the physical environment through software, or vice versa.

China's first hackerspace opened in Shanghai in the fall of 2010 under the name Xincejian²¹ (新车间). I was able to witness this moment while I was conducting research with a collective of entrepreneurs, designers, bloggers, and artists active in and around the co-working space Xindanwei²² (新单位). About three months into my ethnographic research with Xindanwei, a small sub-community formed, led by David Li, Min-Lin Hsieh and Ricky Ng-Adam, who were interested in DIY and open hardware. They equipped a room with a 3D printer, sensor toolkits, soldering irons – and China's first hackerspace was born. Only six months later, Xincejian had grown to such an extent that it moved into its own building. Today, there are hackerspaces across several cities in China such as Shanghai, Beijing, Shenzhen, Ningbo, Huangzhou, and Guangzhou.

Hackerspaces are not unique to China. With an estimated 700 to 1,100 active spaces in existence worldwide, hackerspaces are a significant global phenomenon.²³ The proliferation of hackerspaces around the world has helped promulgate a DIY maker culture that revolves around both technological and social practices of peer production, creative tinkering, a commitment to open source principles, and a curiosity about the inner workings of

technology.²⁴ The significance of hackerspaces goes well beyond the leisure-time activities of a bunch of geeks (however interesting they might be). Large corporations currently make money from open source, while inventing new business, organizational models, notions of property, ownership and innovation along the way.²⁵ According to Stephen Weber, ‘by experimenting with fundamental notions of what constituted property, this [open source] community has reframed and recast some of the most basic problems of governance’.²⁶ Powell, similarly, argues that open source communities and market structures are dialectical, demonstrating how ‘major software companies are now core contributors to open source projects, recuperating the processes that hackers originally linked with radical politics’.²⁷ It is this confluence of a countercultural ethos with corporate culture, and how it plays out in China, that this article sets out to explore.

Just one year after the founding of Xinchejian, the Chinese government made a call for proposals to build 100 ‘innovation houses’ (创新屋) to be supported by government funding. Although the official document²⁸ described this initiative as part of a larger effort to build a citywide platform for supporting popular science and innovation, national and international media interpreted this move as an endorsement of China’s fledgling hackerspace community. What is going on here? How do DIY makers and communist politicians come together in their belief that hackerspaces are the way of the future for creativity and innovation in China?

In popular discourse, when it comes to elaborating on the meaning of creativity, the quintessential example commonly used is Silicon Valley tech entrepreneurialism and start-up culture. Silicon Valley has not only produced technologies we all use today – think of web browsers and word processing programmes which readers may be using to read this article – but also a particular way of thinking about what counts as innovation, good design and creativity.²⁹ China, on the other hand, is often invoked as Silicon Valley’s unimaginative counterpart. Silicon Valley comes up with the ideas and China manufactures them. Apple products, for instance, are labelled ‘designed in California’ and ‘assembled in China’ (see Figure 1).

It is exactly this image – that ‘assembled in’ or ‘made in’ inherently refers to China, while ‘designed in’ or ‘created in’ inherently refers to California – which Chinese politicians are driven to remake, when they promote the cultivation of creativity. For example, in 2004, Liu Shifa from the Chinese Ministry of Culture, stressed that:

The new century should be a century of creativity. From flourishing creative industries to a rising creative economy, until the emergence of a creative society, this will bring about a new cultural perspective to our world. Contemporary China should be a creative China. From ‘manufactured in China’ to ‘produced in China’, from ‘made in China’ to ‘created in China’, this will bring about a new face and spirit to contemporary China.³⁰

According to Liu Shifa, China should make the shift from its reliance on manufacturing (made in China) by redirecting economic and social development towards the creation of ideas, services and knowledge (created in China). Politicians and policymakers present this remaking into a creative economy as the ultimate path to train a ‘quality’ workforce that would enable China to move ahead in a global market oriented towards knowledge production. This notion of quality (素质)³¹ is a common rendering of social status and class, often linked to ideas of what counts as civilized and modern, especially in



Figure 1. Apple iPhone: Designed by Apple in California, assembled in China.

comparison to the West. Politicians, here, enlist citizens as co-creators in the cultivation of a creative China, tethering neoliberal politics and free market ideology to Confucianist values. They call upon Chinese citizens to develop techno-entrepreneurial thinking and become adaptable and flexible quality workers. The anthropologist Susan Greenhalgh (2011) describes this as:

an embrace of human-centered techniques of governance that have become the hallmark of the Hu Jintao–Wen Jiabao administration ... which like the neoliberal methods of good governance used elsewhere, work in part by promoting entrepreneurial, self-directed private selves.³²

With the emphasis on creativity, politicians such as Liu Shifa invoke an older discourse based on the principle that China's development rests on the development of a high-quality workforce.³³ In the book *How Creativity Is Changing China*, Li Wuwei, one of China's leading policymakers, reiterates this larger discourse, promoting creativity as a new economic development strategy accomplished by the cultivation of a new society.³⁴ For China to become creative, Li asserts, a remake of both its economy and its people is required. This call for creative development is exemplary of several official documents, by and large produced since China's entry into the WTO in 2001, drawing upon the idea that the world economy has reoriented from the production of materials to the production of immaterial goods, ideas, knowledge and services. The underlying tenor of these documents is that it is still the 'low quality' of China's citizenry and the failure of its people to modernize that hold the nation back from cultural leadership in the international arena.

Such allusions to international competition, mostly from the United States and the Asian economies, have been central to the modernization discourse since the 1920s and 1930s, in which China's progress was measured against technological and civil standards elsewhere, in particular the West.³⁵ China's culture was rendered as lagging behind according to international standards, because of China's state of *wenming* (文明, civility).³⁶ Earlier work³⁷ suggests that *wenming* has been invoked at different historical moments and for different reasons to compare China's state of civility and cultural development with the West, making China's modernization a project of catching up with the West. In the same vein, contemporary discourse presents China as inherently lacking and lagging behind.³⁸

In contemporary creativity discourse, *wenming* is used to account for China's lack of creativity and the failure of its people to modernize. However, the very meaning of modernization has shifted. To be modern now refers to a disciplined citizenry in China which simultaneously embodies nationality and globality, including qualities such as entrepreneurial thinking, technological ingenuity and stature in international relations. Taken together, the cultivation of creativity is envisioned to lead to the necessary technological innovation and scientific advancements in China which will turn the nation into both an economic and cultural leader on the global stage. *Wenming* is at the heart of this process, casting the future of China's development in the hands of its people.

In their call for societal change in order to cultivate creativity, Chinese politicians are not alone. They share this vision with politicians, policymakers and business leaders in other regions across Europe, North America and Asia, who have embraced theories of the post-industrial society,³⁹ knowledge economy,⁴⁰ and creative class.⁴¹ These theories, developed since the 1970s, call forth a new class of workers such as the self-made entrepreneur, the flexible worker, the creator and innovator of technology. Prior research⁴² has traced how political discourse and managerial literature across North America, Asia and Europe have taken up this idea in the cultivation of tech-savvy, self-reliant and inventive citizens. These articulations call upon individuals to become creators of culture, technologies and profitable subjectivity.

The remainder of this article shows how China's makers simultaneously critique and relate to these calls for social change. They find common ground with government officials, when they propose that innovation and creativity are crucial for China's development. However, China's makers differ in how they envision that this change would unfold. While politicians argue that creative industry development will make China a cultural leader of the 21st century, China's makers believe that individual empowerment and a bottom-up approach will lead to social and economic transformation. I will show that we cannot fully understand DIY maker culture or IT development in China more broadly, if we neglect such parasitic alignments between seemingly opposing actors such as makers and politicians.

Fieldwork with makers

The work presented here is based on in-depth ethnographic research I have conducted with China's DIY makers since 2010. Similar to makers elsewhere, makers in China see technology production as creative expression and a form of individual empowerment,

achieved in particular by engaging with the inner workings of technology. They identify themselves as members of a global ‘maker movement’⁴³ with roots in the early Internet and technology counterculture, and they are committed to open source principles. My ethnographic research includes participant observations at Chinese hackerspaces, maker-related events, and a China-based hardware incubator programme. While mostly representing the middle and upper-middle classes, China’s DIY maker scene is diverse, including Chinese who have never left China, transnational Chinese who frequently travel to present their work or collaborate with others abroad, and expats who live and work in China. Their world, which I came to know through my ethnographic fieldwork, is a fascinating one, and one whose contours confound any simple generalization about China being a place where there is little or no creativity. Through my ethnographic research, I have become engaged as a close collaborator and co-producer in their cultural analysis, maker and business projects.

As part of my research, I also accompanied makers to events they helped organize or attended, such as TEDx conferences, BarCamps, Dorkbots, Hackathons, Startup Weekends, creative industry conferences, Arduino workshops and Maker Faires. I participated in the organization of some of these, as well as in the production of digital materials that unfolded at the hackerspaces on a daily basis.⁴⁴ In addition to participant observations and interviews with people affiliated with the DIY maker scene, I conducted archival research on policy documents on creative industry development, technological and urban development in China. Interviews were held with other relevant stakeholders such as urban planners, policymakers, founders of Chinese start-ups and international design firms.

Making as individual empowerment

From the perspective of the makers with whom I worked, DIY making meant, among other things, utilizing computational tools for creative expression and individual empowerment. Many shared a commitment to the open and free sharing of software codes, hardware designs, ideas and resources, with the goal of reflecting on and reworking dominant social and economic frames. As in open source communities elsewhere, there is no single ideology or narrative that dominates the maker scene in China. Considerably numerous and at times conflicting ideas and values animate makers. Some people, for instance, are committed to starting up firms or grass-roots communities, others are eager to rethink contemporary meanings of technology production through re-use and open sharing while working for larger corporations, and yet others are driven to invent new organizational models or alternative approaches to the legal system. Based on their research on free and open source software, the anthropologists Gabriella Coleman and Alexander Golub describe this multitude of goals and motivations in open source communities as ‘a mosaic of ethical positions’.⁴⁵

China’s maker scene became internationally visible when its members hosted the first Maker Carnival (创客嘉年华), a local version of the trademarked Maker Faire in Beijing in spring 2012. Maker Faire is a large-scale festival founded and organized by Make Magazine and features hundreds of exhibitors who celebrate the arts, crafts, engineering, technology and science projects with a DIY mindset. Maker Faire is typically an event

held in the United States (although more recently there have been smaller Maker Faire events in Canada, Europe, South America and Asia, and China's first large-scale Maker Faire is scheduled to be held in Shenzhen, 6–7 April 2014). It serves as a cultural meeting point and catalyst for a maker community that presents itself as acting globally and broadly providing the opportunity for people to exploit their creative capacities. The mission statement on the Maker Faire website reads: 'Maker Faire offers the opportunity for us to see ourselves as more than consumers; we are productive; we are creative. Everyone is a maker and our world is what we make it.'⁴⁶ Although the Maker Carnival in Beijing was not hosted under the licensed name Maker Faire, the event nevertheless was crucial for China's makers in demonstrating their belonging to the global maker movement.

Many of those who attended the Maker Carnival, whether local Chinese or from abroad, told me that they believed that a maker approach towards creativity would place China at the centre of global development. In the words of a maker from San Francisco, 'All of the world economy today is based on a creative economy. And if China is going to be part of this economy, people have to be able to take risks and be encouraged to be creative.' In this call for social change, makers aligned with official rhetoric, arguing for the cultivation of a new creative society. They differed, however, in the reasons for China's lagging behind. Many stressed that China lacked the necessary infrastructure such as educational programmes for children and youths, funding programmes and independent organizations that support artists, entrepreneurs or generally anyone who works outside traditional frames and large institutions. They repeatedly emphasized that China's weaker position as compared to the rest of the world was not due to the low quality of its people and lack of *wenming* as government officials argue, but was caused by the lack of important infrastructures and support networks. To quote one of the co-founders of the co-working space Xindanwei at a TEDx Shanghai event:

People say that Chinese have no creativity. That's bullshit! There are lots of very great ideas, some of them are almost too incredible to believe. We are not short of people with good ideas. What we lack are the ability to execute and to extend as well as the power of influence and resources. Where can you get those things? ... if there is a place where people can meet each other and come into contact with all those resources, what will happen then?

Establishing a hackerspace in China, then, was in part motivated by the intention to address this lack and to create a space that helps others in China think of new career paths (for instance, to become a freelance developer or designer, to start up your own business, or simply to work with physical materials). During the first months of the Shanghai hackerspace Xinchajian, the co-founders organized a series of workshops to introduce others in China to the maker culture and its commitments to creative play, DIY and open sharing. During one of the first workshops, the organizers assembled participants around a big table that they had placed at the centre of the hackerspace, introducing the tools they thought to be quintessential for any hackerspace: a 3D printer, Arduino boards, a laser cutter, some wires and electronic components, and soldering irons (see Figure 2). Coming together around a table that displayed 'lots of cool stuff', as one of the co-founders put it, made visible what working in a hackerspace meant in practice and what it symbolized. A co-founder further explained:



Figure 2. Table with tools during first maker and Arduino workshops at Xinchajian.

There is a new maker movement that's emerging right now. It builds on the DIY culture, to get people excited again to build stuff. It's anti-consumerism ... it's affordable today to do it for fun and that's of course driven by the power of open source. The iPhone is fun, but it's more fun to make it yourself. This is part of the maker movement.

Such introductory workshops were a means for the co-founders to identify what the maker culture could mean in and for China. Many makers were particularly sensitive to the issue that a hackerspace would be associated with the image of a *heike* (黑客, black hacker) engaged in illegal activity. As stories of Chinese hackers breaking into Google servers circulated widely in mass media outlets in 2010, the term *heike* became the common term to describe this practice of hacking into a system. And so many makers were anxious to come up with a term that did not have any immediate associations with *heike*. It was during the planning stages of the first international Maker Carnival in Beijing that China's makers settled on an alternative term: *chuangke* (创客, creative professional). The term *chuangke* has the advantage of connoting creativity (创意) and innovation

(创新), which are employed in positive terms within the wider creativity discourse, as elaborated earlier.

Through these early efforts, makers negotiated how best to position themselves and their work in China. Xinchajian and the other hackerspaces and maker events that spun from it produced not only a wider imaginary of DIY making in China, but also with makers elsewhere. International attention brought with it legitimacy as well as access to a transnational network of like-minded tinkerers. More importantly, though, the maker imaginary nourished a new subjectivity that existed simultaneously in relation to China's creativity discourse and in its opposition. While government officials argued that creativity would flourish through top-down creative cluster development,⁴⁷ Chinese makers argued that creativity is stimulated when people adopt a DIY mentality, guided by their own passions and working beyond rigid institutions and large corporations. DIY makers questioned one central pillar of creativity discourse in China – the contention that the quality of China's citizenry is low – by reformulating ideals about self-governance. Their businesses and daily work processes were centred around the idea that technology production can lead to individual empowerment and freedom of expression, ideas common to the free and open source software movement. Their businesses were targeted towards helping others in China to become creators not only of technologies, but also of a new position in society beyond rigid institutional frames and against a political rhetoric premised on the low quality of Chinese citizens. This orientation towards technology production as a form of individual empowerment goes back to the early days of personal computing and the Internet.⁴⁸ Drawing upon Steven Levy's writings on the 'hacker ethic',⁴⁹ Mimi Ito, for instance, describes how a group of computer enthusiasts at MIT in the early 1960s began to think about technology as open and modifiable by its users. Rather than the contemporary perceptions of the hacker as somebody engaged in unlawful activity breaching security, this earlier approach towards technological 'makings' evolved out of an 'orientation toward the computer as a tool of empowerment and discovery'.⁵⁰

In what follows, I elaborate how China's makers on the one hand identified with this idea of open technology production as individual empowerment, and on the other hand challenged what they believed to be a Western-centric interpretation of openness.

China's authentic maker culture

Many makers I worked with shared the belief that their work in China was uniquely positioned: at the heart of a pre-existing maker culture emergent from the hardware repair workshops on the streets and from factories that produce for the world. David Li, one of the co-founders of Xinchajian, often described this to me as an authentic maker culture, driven by necessity rather than countercultural ideals, which he associated with maker practice in the West. The last two years have seen a rise in hardware start-ups working with manufacturers in China in order to turn their DIY maker ideas into end products for consumers. One of the regions central to this development is the Pearl River Delta in the south of China, and Shenzhen in particular, home to factories such as Foxconn which produce for companies such as Apple and HP. Shenzhen has long been a particularly unique region in China. Declared a special economic zone upon its

inception, it was designed and built with the goal of encouraging foreign investment and economic growth. Foreign corporations, for instance, received tax reductions and other benefits when they opened a production site in the region. Today, Shenzhen also attracts a new generation of entrepreneurs – DIY makers who described Shenzhen’s electronic markets downtown as ‘a life-size Digikey’ and Shenzhen as a whole as ‘China’s most open city’. Many of the makers who started up businesses and moved to Shenzhen in order to manufacture their products were of the opinion that the region’s openness in manufacturing was central to its uniqueness.

What does open manufacturing as employed by makers mean? To answer this question, I first turn to the region’s history of *shanzhai* (山寨) production. *Shanzhai* traditionally stands for counterfeit products and low-quality copycat productions of well-known brands ranging from retail such as Gucci bags to electronic products such as the iPhone. The literal translation into English is ‘mountain fortress’ and carries connotations of self-reliance and resourcefulness. In this formulation, copying, re-use, and innovation are not mutually exclusive. For example, *shanzhai* factories in Shenzhen not only produce copies of the latest tablet or mobile phone. They also remix functional albeit discarded components with new parts in order to produce novel products, often tailored towards niche markets in China, India and Africa. Often-cited examples include mobile devices for Chinese migrant communities that allow users to send remittances easily or phones with built-in compasses that point users in the direction of Mecca.

Makers referred to a second meaning of *shanzhai* when they described an efficient open manufacturing system that has formed around these small-scale factories in Shenzhen over the last 20 years. Open manufacturing means that many factories, and in particular *shanzhai* factories, have informally organized a peer-to-peer database for sharing hardware design schematics and their bill of materials, a list of materials used in manufacturing a particular product. Sharing these resources allowed the factories to lower production costs and to stay competitive in a global market. Bunny Huang, an acclaimed member of the international maker movement and regular visitor to Shenzhen, described *shanzhai* in a blog post as China’s open source. Suggesting that the phenomenon has grown beyond the original *shanzhai* practice, he proposes the term *gongkai* (公开) to account for a ‘self-sustaining innovation ecosystem ... just as the Galapagos Islands are a unique biological ecosystem evolved in the absence of continental species, *gongkai* is a unique innovation ecosystem with little western influence, thanks to political, language, and cultural isolation’.⁵¹

Many other makers have similarly highlighted *shanzhai*’s workings through open sharing and remix-as-innovation. Many also believed that by focusing on this unique open source culture the image of Chinese manufacturing can be revamped from a site of cheap, copycat production to one that highlights the more creative connotations *shanzhai* shares with the international maker movement. Let us look at a specific example of a business model built on this idea of bringing together an international DIY maker culture with China’s open manufacturing system.

In 2008, Eric Pan founded Seeed Studio,⁵² a small-scale manufacturing and design house located in Shenzhen. Seeed Studio designs and manufactures products for an emerging niche market: DIY makers. Its products include open hardware platforms, hardware developer kits, hardware hacking tools, and custom-made printed circuit



Figure 3. Seedeuino v 3.0 Atmega.

boards. Today, Seeed Studio is internationally renowned in maker circles and amongst design professionals, with 98 per cent of its revenue stemming from product sales and contracts with clients in the United States and Europe. According to Pan, Seeed Studio might not have survived if it was not for Shenzhen's *shanzhai* production. Before Seeed was established, he discovered a copycat Arduino board during a stroll through Shenzhen's Huaqiangbei electronic markets. The Arduino board is essentially an easy-to-use microcontroller, a single-chip computer that supports the design of hardware-software-material interaction, and accompanying programming environment. Invented in 2005 in Italy at the Ivrea Design School, it has popularized the design of interactive systems and DIY making, by simplifying the process and greatly reducing costs. After Eric Pan had bought the *shanzhai* Arduino board, he turned to the Internet and discovered an international network of makers connecting hackerspaces across the world. It was then that the idea arose to partner with members of Shenzhen's manufacturing ecosystem in order to invent new open hardware products and to cater to this growing international market of makers. One of the first products that Eric designed was a board that builds on the Arduino board – in the spirit of open source – by making it significantly better, which was made possible by the partnerships he had established within the informal social network in and around Shenzhen's *shanzhai* culture (see Figure 3).

Seeed Studio is based on a business model that effectively merges maker ideals with China's manufacturing expertise. It works because new ideas for products emerge from strong partnerships with both Shenzhen's manufacturing world and DIY makers. For Pan, this notion of partnership is more than a business model; it is about shaking up and remaking our very idea of manufacturing, innovation, and copy. This is best exemplified



Figure 4. ‘Innovate with China’ product label by Seeed Studio.

by the label of Seeed Studio products. For instance, rather than the common ‘Made in China’ tag that adorns most of the products we use on a daily basis, Seeed Studio’s products are labelled ‘Innovate with China’ (see Figure 4). ‘Innovate with China’ illustrates the potential that lies in approaching China as a partner in the creation process rather than just a cheap producer. For Pan, as for many other makers, *shanzhai* and the process of copying is better seen as a productive force, rather than as something inherently negative, or in his words:

Shanzhai is ... you learn from something and you are redoing it in your own way and it could be shabby at times, but also interesting at other times ... it’s the same when you learn a new language. You have to write the sentence again and again, copying from your teacher. *Shanzhai* makers learn from their teachers such as Apple and Samsung to create a mimic first. So they have the basic skills and develop the basic infrastructure to create. After you have learned how to write a word, a sentence, you remember it. From words you can create sentences and grammar, then you can write a whole article. You can develop your own style. It’s a very natural process. It’s the same with *shanzhai* production, it’s nothing to be ashamed of or to be blamed for. It’s a very important learning process.

Similarly, many other makers considered *shanzhai* not as something negative or to be avoided. On the contrary, they often described it as a form of creativity and

resourcefulness. *Shanzhai* stood for a form of ingenuity many considered intrinsically Chinese: a do-it-yourself mentality, inventive ways of working with materials, and adaptability to local shortages and rapid changes to the physical and social environment. By forging connections between *shanzhai* and DIY maker culture, Seed Studio repositions Chinese manufacturing, challenging dominant associations of 'made in' such as cheap and low quality. It promotes a version of creativity that differs drastically from what the Chinese government has been promoting over the last years, as outlined at the beginning of this article; a move away from 'made in' and from China's reliance on manufacturing. Seed Studio's products and processes demonstrate that the long-term manufacturing know-how with its unique open source spirit could be the very seed for China's remake.

Conclusion

In this article, I have shown how China's DIY makers are remaking common understandings of innovation and creativity, and in doing so they craft a subject position beyond the common rhetoric that Chinese citizens lack creativity. I have also shown that makers believe that technological innovation and social change can be enabled by setting up physical spaces such as hackerspaces and/or starting hardware businesses as interfaces between a wider public, potential investors, like-minded makers, Chinese manufacturing and officials. What drives their open approach towards technology production is the belief that it will lead not only to new forms of innovation, but also to individual empowerment in a climate of rapid change on a global scale.

Throughout this article, the analytical lens of 'making subjectivities' was employed to illustrate that the social meaning of technology in China is shaped by technology use and production. Makers are promoting the importance of a maker approach for China's future development. However, being a maker was not seen as being distinct from other aspects of their lives. DIY making was not only a mode of technology production, but also a way of being and acting in the world through which other aspects of life were tackled. For instance, being a maker did not mean that one could not be a parent. Rather it meant being a parent differently, committed to teaching one's child to act in the world in a hands-on and engaged manner. Similarly, being a maker was not perceived as being distinct from an entrepreneur, designer, programmer, engineer, artist, geek, blogger, citizen or netizen, and so on. Identifying as a maker meant constructing a multifaceted position in society that exists in relation to many other spheres of life. Entering into partnerships between diverse stakeholders, the makers I worked with positioned themselves in a world they perceived as being in flux. They refused to be caught up in urban, economic, technological and social transformation in China. DIY making as a mode of living and working remained central.

As the site of individual empowerment within unstable and shifting worlds, DIY making enabled people to remake the very societal norms and material infrastructures that undergird their work and livelihood. Their technology productions and businesses were neither entirely countercultural nor pro-system. In order to account for these at times symbiotic, at other times parasitic practices, analytical categories such as tactics versus strategies, state (or corporation) versus netizen, or official versus counterculture are

clearly insufficient. For instance, I have shown in this article how Seeed Studio simultaneously appropriates and remakes industrial production in China and international ideas of creativity and innovation. Members of hackerspaces in their formulations of creativity both align with and critique official discourse.

The lens of making subjectivities allows us to see how people actively craft a position for themselves and others, and how this process is neither just resistance nor just acceptance of the status quo, but a continuous interplay between both. What I wish to emphasize, finally, is the importance for researchers of the Chinese Internet and technology to reflect on their form of participation in both the use and design of technologies in China. Speaking of netizens as the other, ontological category while speaking for (or about) scholars and researchers separates us or the observer from the practices we study. Taking a position removed from the network we study is complicated by our position within the same technological and social infrastructures, or as Annelies Riles put it so poignantly, 'We lack an outside today. We are all in the network.'⁵³ As politicians across regions are calling upon all of us (technology producers, educators and researchers alike) to become creators of innovation, flexible and innovative workers, it is ever more important to understand how people craft positions in relation to this discourse and how they partially resist and exploit it. DIY makers exemplify this process, as they embed themselves in (and simultaneously challenge) political and market processes directed at involving all of us as potential producers of things, economies, and knowledge.

Notes

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 14. Strathern, *The Gender of the Gift*.
 15. *Ibid.*, 38.
 16. Tom Boellstorff, *The Gay Archipelago: Sexuality and Nation in Indonesia*, Princeton, NJ: Princeton University Press, 2008.
 17. Yang, *The Power of the Internet in China*.
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 19. *Ibid.*, xiv.
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28. <http://www.stcsm.gov.cn/jsp/xxgk/zhtz/content.jsp?id=2267>, accessed 1 June 2013.
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