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Waves and Forms

Inside Technology

edited by Wiebe E. Bijker, W. Bernard Carlson, and Trevor Pinch

A complete list of the series appears at the back of the book.

Waves and Forms

Electronic Music Devices and Computer Encodings in China

Basile Zimmermann

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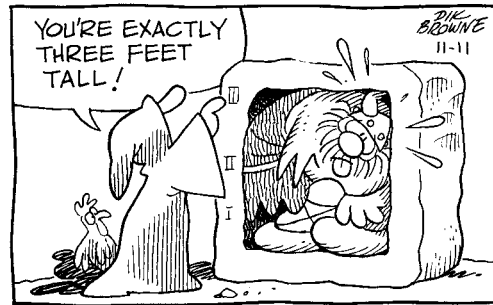
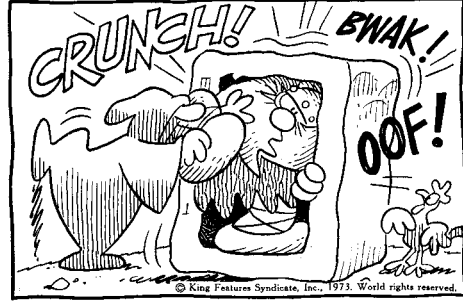
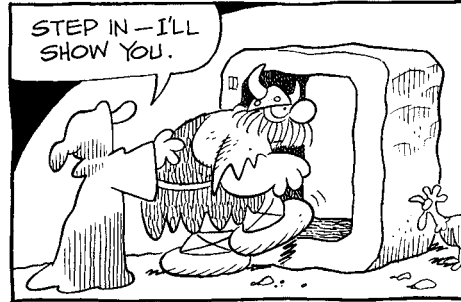
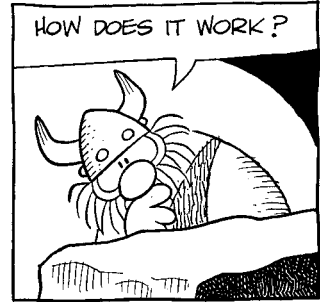
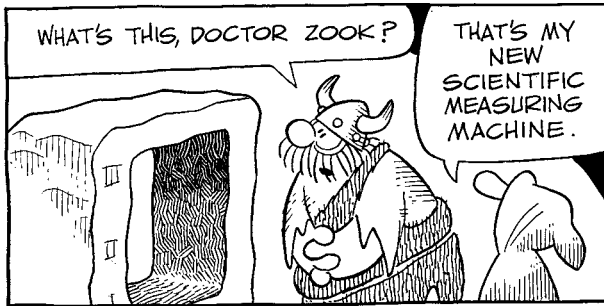
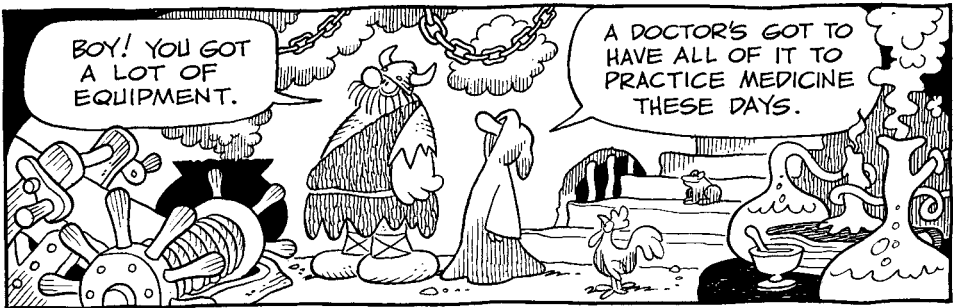
I Culture, Chinese Studies, and STS

1 Introduction

In a comic strip by Dik Browne, his famous character Hågar the Horrible, the red-bearded Viking, is at the house of Dr. Zook. Hågar is impressed by the various devices the druid-like physician uses for his practice and intrigued by a stone with a square-shaped, empty space carved in the middle. Measure values are indicated on the side: I at the bottom, II in the middle, III on top. “How does it work?” Hågar asks. Dr Zook explains that the device is used to measure the size of people and offers to show him how it works. He then pushes Hågar into the square-shaped space. Since Hågar is far too big to get into the tiny space, a couple of images follow where we see the physician compressing the body of Hågar, which finally ends up squeezed in, his back uncomfortably located on top, with his head, hands, and feet stuck together. Dr Zook proudly comments: “You’re exactly three feet tall!”¹

Technical objects constrain what users do with them. They are not neutral entities; they embody information, choices, values, assumptions, or even mistakes that designers have voluntarily or involuntarily embedded in the technology. As a result, we often observe discrepancies between users’ needs or expectations and what the creators originally had in mind.

Although this issue—sometimes labeled as technological determinism—was problematized by sociologists and historians of technology a long time ago, and even though its characteristics can be observed in everyday life (e.g., when entering a house one generally uses a door, as there is no possibility of walking through the wall), technical objects are often viewed as supercultural and not tied to any particular ways of living and thinking. For instance, in observing Chinese users confronted with Roman alphabet-embedded interfaces, such as the ASCII keyboard, as they attempt write in Mandarin, I have heard people wonder if the Chinese script—made up of thousands of characters—that has been used in China for three millennia, is convenient.



HAGAR

Figure 1.1

Hägar the Horrible. © HAGAR © 1973 by King Features Syndicate, Inc. World rights reserved.

In this book, I will discuss how technology creates, transmits, or suppresses various sorts of information. I will build upon Madeleine Akrich's influential concept of *script* in science and technology studies (STS), which she uses to describe how designers embed their vision in the content of technical objects (Akrich 1992).

Designers . . . define actors with specific tasks, competences, motives, aspirations, political prejudices, and the rest . . . A large part of the work of innovators is that of "*inscribing*" this vision of (or prediction about) the world in the technical content of the new object. I . . . call the end product of this work a "*script*" or a "*scenario*." (Akrich 1992, 208; emphasis in the original)²

I will go beyond the notion of script and discuss how designers' visions of the world travel between humans and nonhumans. While examining this question in detail, I will also attempt to provide an alternative to the notion(s) of culture and to connect Chinese studies issues with research methodologies from STS.

Specifically, this book develops two concepts I call *waves* and *forms* and illustrates how they can be used to deal with the notion of cultural difference. The core idea is to consider the shape that matter takes to host information and use it as a way to deal with materiality. To comprehend it, think of a plate filled with grains of sand, and imagine that you use a finger to write the letters *happy* in the sand. Then you erase it with your palm and write *heureux* ("happy" in French). If we compare these two situations—with the two words, in English then in French—we note that the material content of the plate—the grains of sand—hasn't changed much (we assume all the grains remain in it, with none sticking to the hand of the person writing), but the shape created by the position of each grain has changed. In the same way that the sand is made of grains, the idea is to consider that the shapes of the words *happy* and *heureux* are made of *waves*—lower-level entities of shape. I will also use the word *forms* to describe aggregates of waves one identifies for operational purposes, such as the words *happy* and *heureux*.

In order to describe the transfer of waves from one medium to another, I will rely on the word *circulation* to speak about situations in which waves' contents are created, conserved, or dissipated. For instance, if we imagine that we take a picture of the word *heureux* written in the sand inside the plate, send it by email to a computer, and print it on a sheet of paper, we say that the form *heureux* circulated from the plate to the sheet of paper. Its content of waves remained in the sand, but it was also transferred to the camera, the computer, and the paper (as well as various other human and nonhuman entities on the way, but I will get back to this question later).

In a nutshell, the strength of the binomial framework *waves* and *forms* is that it constitutes a powerful descriptive toolkit for speaking about technology and culture. On the one hand, the idea of waves is a positivist stance; it aims to describe the lowest level of shape that matter can take and allows us to measure precisely how things are shaped (e.g., the shape of each grain and the grains' respective positions in relation to each other). On the other hand, the idea of forms is a relativist stance; it describes aggregates of waves, and it allows one to identify different shapes for operational needs (the words *happy* and *heureux* are each a different form). It allows one to provide a detailed account of circulation processes while keeping such descriptions grounded in data.

Most of the case studies presented in this book relate to China and connect with the concerns of sinology (the traditional European science of China). As sinologists traditionally focus on history and philology rather than technology studies, I will rely on STS frameworks to deal with the technical aspects of the research.

The materials used to develop the arguments and illustrate them come from three groups of case studies. The first group, of considerably longer duration than the two others, consists of observations of electronic music devices I conducted in Beijing between 2001 and 2011. The second is a study of a Chinese social networking site called Happy Network 开心网 that I observed between 2008 and 2012. The third one is a collection of personal, small-scale observations, collected between 2001 and 2010, that concerns the way Chinese characters behave when they are located in alphabet-encoded devices, such as mobile phones, Web pages, or printed documents.

The first part of this book, which follows right after this short introduction, is a general presentation of the research. It comprises considerations about STS and Chinese studies; I try to show how these two disciplines share a common ground on the question of physical objects. The second part is a presentation of the case studies involving Chinese electronic musicians and their equipment. Each case discusses one technical object and its environment, together with an analysis of how the data provides insights on the issue of technology and cultural difference. My goal is to build, using a bottom-up approach, an account of observations closely connected to the data that provides enough material for sketching up the main theoretical argument of the book. In the third part, I test the ideas developed during the study of electronic music devices by applying them to a case study of the social networking site Happy Network and then to the observations of computer encodings. In the concluding fourth part of this book,

the theoretical and methodological findings are summarized, and I suggest how the arguments could be pursued in further research.

Throughout the book, Chinese studies and STS frameworks are used in conjunction to analyze observations with a focus not on science or technology but on Chinese culture. For instance, when a Chinese DJ plays a German techno song in Beijing, where a sociologist of science might want to consider the agency of the German producer through the record (together with the many other human and nonhuman agencies around it), I am paying attention to what sinologists call the German *culture* inside the vinyl disc.

When presenting the case studies, I also provide a discourse closer to a description, as opposed to an explanation, of what I understand from them. By this, I attempt to avoid using abstractions and, instead, tell stories, because I believe that stories often do a better explanatory job than logical explanations can.³ These descriptions are both thin and thick at the same time. Thin because, for each presentation, I concentrate on specific aspects of the interactions between one human and one technical object and deliberately neglect other interactions. Thick (in the sense defined by Geertz [2000]) because, at the same time, I provide information about the larger environment of each case under study, my encounter with it, and my understanding of it, before developing a fine-grained analysis of the role played by a single technical object I select in the observations.

In each case, my goal is to grasp the activity of *one* technical object with respect to *one* individual in *one* specific situation. In this regard, it is important to keep in mind that this book neither attempts to discuss the developmental process of a technology, nor to analyze an assemblage made of humans and nonhumans entities interacting (although I do believe such theoretical frameworks are useful ones, and I rely on them for producing the thick description). Like a chemist who analyzes the content of a bottle of orange juice and does not pay much attention to the graphic design of the sticker on the bottle, I will focus on one small piece of data and try to get something specific out of it.

In observing various people and situations in China, my aim is to research the following questions: What is a technical object in today's China? How does it act? How to describe the relationship between "technology" and "culture"? By contrasting the observations, I hope to come up with statements that have a certain degree of generalization power.

This book can be read in two different ways. One, suitable for readers who are mostly interested in China, is to concentrate on the observations of electronic musicians in Beijing (part 2) as well as the Chinese social

networking site and the computer encodings (part 3). The details of everyday life in China are not common knowledge in the West, and I certainly hope that this book contributes to mutual understanding between the two worlds; for this reason, I tried to keep these sections somewhat independent from the rest of the text. The second way to read this book is from beginning to end. Read in this way, the book provides readers with an inductive theoretical journey; in the following chapter, I will discuss what this means.

2 An Inductive Theoretical Journey

This book relies on a bottom-up, inductive style of presentation. This is because it is partly intended for an audience interested in sinology and Chinese studies—a community not necessarily familiar with the scientific literature that constitutes the basis of the theoretical arguments discussed herein. By bringing up a selection of classic questions and answers in science and technology studies, mixed with new propositions and topics closer to the work of China specialists, and by accumulating arguments while moving from one case study to the other, I hope to make the overall discourse accessible to a wider audience while simultaneously maintaining its value for these two scientific communities.

Recent difficult experiences by local and international communities in the Middle East, as well as in Afghanistan, Russia, China, Korea, and Japan, to name just a few, illustrate the urgent need for adequate methodological tools to deal with cultural difference in the present (as opposed to a historical perspective). If I had to summarize the objective of this book in one formula, I would say it is, on the one hand, to understand how cultural difference can be integrated into STS research, and, on the other hand, to figure out how sinologists can work on the present of everyday things in China: not ancient texts, ceramics, sculptures, or paintings, but present-day, mundane artifacts. In addition to these two goals, I also hope that my observations dealing with electronic music will contribute to the new field of sound studies (perspectives from science and technology studies on music production¹), with a special focus on the question of cultural difference.

The starting point of the book is materiality: the idea that there are no immaterial objects and that everything and everyone are always closely related to its/his/her own materiality. In this perspective, I aim to contribute to the materialist turn that came during the last decade in various scholarships as a reaction to social constructivist approaches (materialist

return might be more appropriate, as these are old questions, and readers will notice that I still actively rely on social constructivism). In short, Chinese culture exists because there are Chinese texts, Chinese people living and thinking, and Chinese artifacts throughout the world that constitute its existence.

The theoretical line followed in this book is an attempt to touch on the old dichotomy of nature versus culture through a reflection on the idea of “culture.” The perspective is embryonic and paradoxical: embryonic because the concept of culture has been scarcely discussed in the science and technology studies frameworks I rely on (I will come back to this later) and paradoxical because the concept of culture is one of the most discussed concepts ever in the social sciences. The theoretical movement in this book consists of sketching up the beginning of an idea while building up and discussing its links with a selection of the existing literature in science and technology studies and other disciplines.

As many authors in humanities and social sciences argued during the last three decades, the separation between the two concepts of nature and culture does not make much sense anymore, nor does any form of theoretical dichotomy. Most scholars agree that everything and everyone are interrelated, and the question that remains is how to understand these interrelations and how to use dichotomies or categories while knowing that these are perfectible. Contemporary phenomena, such as climate change or the development of the Internet, bring to the fore a reality that appears as a constant mix of natural and cultural entities (see Latour 1993 for a philosophical discussion on the nature/culture debate). From a methodological perspective, after dissolving the dichotomies, the question is whether to bring them back or how to proceed without them (see Collins and Evans 2002 for an STS-informed point of view).

Technical Objects

How does the use of technical objects influence the ways of life and ways of thinking of humans? What is “culture” with regard to “technology,” and vice versa? These two questions are so broad they easily take us back to the origins of science. I will come back later to the concept of culture; for now I will briefly focus on how this book discusses technology.

The book deals almost exclusively with artifacts as physical objects and not with methods, ideas, or procedures. I am interested in a scientific cross-roads where social sciences and humanities meet up on a common ground: material culture. On the one hand, by working on technical objects such

as texts, paintings, sculptures, ceramics, or almost any kind of artifact, the humanities have made material culture their principal object of study for a long time. On the other hand, social scientists—sociologists of science at the end of the 1980s in particular—developed a special interest in nonhumans (with the debate centered on the actor-network theory (ANT) discussed in the next section). It is this focus on the nonhuman physical object, the cultural artifact, that is at the core of this book.

Looking at material culture with both a humanistic and a social science perspective, one question that comes to mind is whether it is possible to consider artifacts alone, or if it is mandatory to consider a broader network of things and people that interact. For sinology and Chinese studies, which benefit from a long tradition of studies based on texts, images, sculptures, and other kinds of physical objects, a study of an artifact alone is fine. For STS—a scholarship that argues that an object without a human being does not mean much—a perspective limited to a technical object is not appropriate. The sociologist of technology Wiebe Bijker, for instance, using the history of the bicycle as an illustration, emphasized the complexity of human beings' internal reality, noting that the high-wheel bicycle of the early twentieth century was at the time considered macho by some people and unsafe by others. Bijker used these observations to demonstrate that "there is no universal time and culture-independent criterion with which to judge whether the high-wheeled bicycle was working or not" (Bijker 1995, 75).

In the same way, another question at the crossroads of sinology, Chinese studies, and STS is the difference between what relates to culture or semantic content, as opposed to what relates to agency and human action. Traditionally, sinology—especially traditional sinology in Europe—has been more concerned with the former and STS with the latter.

Because of these differences between two scientific traditions that are equally important for the forthcoming discussion in this book, it is necessary to present briefly what I mean by physical objects as an object of study.

The focus of the book relates to the old idea of technological determinism.² Not the concept that technological developments are located outside society and develop independently of social, economic, and political forces (an assumption that was disputed successfully by STS scholars), but the idea that technological change can cause or determine social change. To use rhetoric familiar to STS, I am interested in the role of technological objects as *explanans* (explanations) and not *explanandum* (what has to be explained). I am interested in analyzing under which conditions technological objects enter accounts as *explanans*—without denying that under

different conditions they have a status of *explanandum*³—and how this specific cause-to-effect relation, whenever it is observable, can be understood.

Similar to the way that “interpretative flexibility” was demonstrated by sociologists of science in battles over scientific facts (Collins 1985; Pinch 1986) and, later, by the “new sociology of technology,” which discussed how people think of artifacts and how artifacts are designed (Bijker et al. 1987), I am interested in the flexibility of *how technical objects “think” or “interpret” people and other artifacts*. It is the idea that the usage of technical objects is open to sociological analysis, but turned on its head: not on the human side, but on the side of physical objects. I pay special attention to how the technical “content” of an artifact can be observed outside the same artifact. I am not paying much attention to how it is seen through the eyes of a user or a relevant social group. I choose to focus on how I, as a scientist, see this content coming out in the actions of the users I observe.⁴

My main methodological point here is that, in a similar way to social constructivists of technology, who used unsuccessful machines to show that the “closure” of a technical design was the result—and not the cause—of a machine becoming a successful artifact and that users (and nonusers) were integral to the establishment of its meaning and success (Pinch and Bijker 1984; Bijker et al. 1987; Bijker 1995; Oudshoorn and Pinch 2003), it is possible to use China, as a non-Western environment, to question the cultural content of technical objects.

Here is an illustration of how the approach works, using a common situation: a text message displayed on a mobile phone.

My Siemens 3618

In June 2004, I received a text message from Lao Dong (the musician discussed in chapters 8 and 9), on my Siemens 3618 mobile phone. In the text message, he commented the performance of the Greek team during the European Soccer Cup: “You’re right, they’re very stable, their defense is awesome.”

As displayed in figure 2.1, details of the punctuation are especially interesting. In the Chinese script, although the use of different types of punctuation is almost as old as the script itself (about three thousand years), the signs people use nowadays often relate to the shaping of modern Chinese language at the beginning of the twentieth century, when their usage was influenced by their Western counterparts. For instance, the *juhao* 句号, “。” placed at the end of Lao Dong’s comment, is the Chinese final dot used in Mandarin today. It looks like a small circle and is graphically different from the small black dot used in English. It can be found in texts as

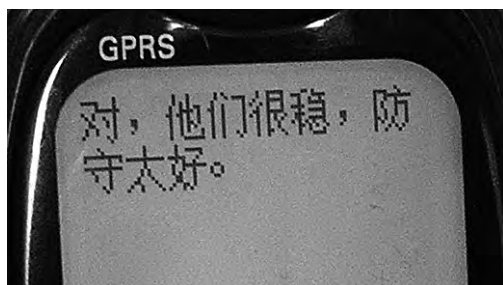


Figure 2.1

“You’re right, they’re very stable, their defense is awesome.” Segment of a text message from Lao Dong. Beijing, June 2004.

early as those from the Song dynasty (960–1279) and seems to have been chosen later, instead of the Western dot, because of its “visibility” 醒目 (中国大百科全书语言文学卷 1988, 20–21).

In figure 2.1, we see that the two commas in Lao Dong’s message are positioned midway vertically, at the level of the center of the Chinese characters on their right and left; this is often the case in Chinese texts, because characters are supposed to be at the middle of invisible regular squares (i.e., one square per character).

Now, compare this sentence to another one I received on the same phone, a couple of months before. (The lighting of the screen in figure 2.2 is slightly different because I didn’t use the internal light of the phone when taking the photograph.)

In figure 2.2, the punctuation is Western: the commas are positioned at the bottom of the line, as they would be for an English message. And the final dot is a black one, different from the *juhao* found in Lao Dong’s message (figure 2.1). Why are there two different punctuation systems on a single mobile phone?

In 2003–2004, I spent about six months taking pictures of the text messages I got from people in Beijing and questioning my friends about the various models of mobile phones they were using. I worked on a corpus of about 600 text messages received on my Siemens 3618, from which I selected about 150 that I then analyzed in detail. I also made comparisons using the mobile phones of friends and colleagues—who knew about my research and helped me to test the devices—from the Department of Sociology at Peking University.

I eventually understood one thing: the difference in punctuation marks depended not upon users but on the type of mobile phone that had been



Figure 2.2

"I wish you a Happy New Year, happiness in your life, and all things be fine." Text message from a student friend. Beijing, January 2004.

used to write the message. A text with Western punctuation had most likely been written using a Motorola, Samsung, Siemens or LG mobile phone, and one with Chinese punctuation (e.g., commas located at the center of characters, *juhao*, and other specificities) had most likely been written with a Nokia or a Sony.

The explanation for these differences of punctuation marks was simple: users of the mobile phones had no choice. Each company provided, through the internal software of the device for the input of Chinese characters, one and only one system for the punctuation. In the first group, engineers had integrated Western punctuation, available even when the user entered Chinese characters. In the second group of mobile phones, other engineers had integrated Chinese punctuation, available in a similar manner whenever the user entered Chinese characters.

Upon reception, my mobile phone displayed, in the first case, a message in Mandarin with a Chinese punctuation, and in the second, a message in Mandarin with a Western punctuation. Using its own system of format management for different languages (which allowed me, among other things, to write in both English and Chinese), my phone reproduced on its screen the nuances that had been originally programmed by the designers of the devices used by my correspondents.

One year later in 2005, this interesting punctuation phenomenon had already completely changed. When I went back to Beijing for the summer, new Motorola mobiles now included Chinese punctuation. Some other phone brands did not, but the overall picture between companies was different.

Although I don't believe that this aspect of the design of mobile phones in Beijing is essential to understanding mobile culture in China, from a theoretical point a view I find it interesting for two reasons. First, it shows that there are things related to technical objects, *and to technical objects only*, that have something to do with cultural diversity. In the text message punctuation example, it doesn't matter much why the messages were sent or what people said in the messages. The punctuation relates to the input system inscribed in the device that was used to write the original text, no matter who used it to write or what was written.

Second, the text message punctuation example illustrates the importance of something STS scholars discussed in length during the 1980s about the agency of nonhumans (see Callon 1986 for what is arguably the first paper of the series, with scallops playing the role of nonhumans), and what Madeleine Akrich theorized as the *script* of the designer, when it comes to cultural difference.

Using Akrich's conceptualization (see chapter 1), we can consider that the designers of the input system decided on the punctuation of the mobile phones. If we schematize the process of writing a text message, we distinguish three steps: (1) The user writes a sign of punctuation, say a comma, (2) the engineer decides—we note that this decision occurs *before* the decision of the user who is writing on the phone, but intervenes *after* it—to position this comma either on the line or midway, at the level of the Chinese characters, and (3) the device on which the message is received displays it as the result of the collaboration between the two preceding interveners (the user of the phone and the engineer/designer of the input system).

As pointed out by Steve Woolgar, from a designer's point of view, users don't necessarily know best, and "configuring the user involves the determination of likely future requirements and actions of users. Since the company tends to have better access to the future than users, it is the company's view which defines users' future requirements" (Woolgar 1991, 75; see also chap. 1, n. 2, on Akrich).

Although Akrich's concept of script and Woolgar's arguments about configuring the user are useful for looking at how designers inscribe their predictions about the world in technical objects, the framework *waves* and

forms (sketched in chapter 1) provides another perspective. We can say that the *forms* “Western punctuation” and “Chinese punctuation” *circulate* from the mobile phone of the sender to the receiver. Other forms circulate as well—for instance, the Chinese characters in the sentences being sent. In these two cases—the punctuation, the characters—the circulation processes occur with *conservation*: the forms’ transfer from one medium to another modifies neither the choice of characters nor the punctuation formats. However, interestingly, although the choice of Chinese characters can be freely decided by the users, the punctuation format cannot.

In other words, and as I will argue in more detail later in this book, what we observe in this type of setting is the sketch of a law of *waves’ circulation* that relates to technology and possesses a degree of predictive power: Whenever a technical object (1) is used and (2) its respective waves’ content cannot be modified by the user, then (3) the same waves’ content will invariably be present in the output of the collaboration between the user and the artifact. In Beijing, in 2003–2004, if a mobile was used to send a text message, the punctuation would become either Western or Chinese, according to the model of phone that sent it.

As Akrich (1987, 1992) emphasized, different cultural contexts allow researchers to understand more about technical objects that have become standards, where the norms by which the tools have been developed have already disappeared from the debate.⁵ In other words, if I had observed mobile phones in Switzerland, this process would probably have remained invisible. Traveling to China to look at a mobile phone helped me understand things about it.

This is basically the story of this book: observing, in China, electronic music devices, social networking sites, and computer encodings to see what can be learned. As in the case of the Siemens mobile phone, I observe technical objects that I’m already familiar with. Specifically, and contrary to traditional field work in anthropology, in which scientists observe and study unfamiliar situations, I enter fields in which I already have a level of expertise and am close to a full-blown participant in—I have a “contributory expertise,” in Collins and Evans’s terms (Collins and Evans 2002). I then rely on this existing knowledge to help me conduct analysis.

Biographical-Level Observation

In a well-known book on the sociology of art, the American sociologist Howard Saul Becker discusses what he calls *conventions* in art that, he emphasizes, are often embodied not only in human beings but also in physical

objects. Becker points out that shared knowledge (e.g., music chords, laws of perspective, poetic forms) provides a point of contact between humanists and sociologists: humanistic scholars, such as art historians or musicologists, may rely on it to explain artists' ability to make art works that evoke an emotional response in audiences, and express sociological ideas such as norm, rule, shared understandings, and so forth (Becker 2008, 29–30). In a more recent publication, Becker goes one step further by explaining how different kinds of material (a novel, a phone book, a photograph, a map), can be considered as reports or analyses of the functioning of society, similar to the works that sociologists produce (Becker 2007a).

In connection with Becker's point of view on how to understand human society, a scientific tradition close to what this book attempts to perform is the one described by the British anthropologist Alfred Gell in his last opus, *Art and Agency: An Anthropological Theory* (Gell 1998). Gell unfortunately died at the time he completed the first version of this work—he certainly would have wanted to modify parts of the text if he had had more time—but the rough text, written with striking intelligence, provides a particularly frank and detailed discussion of the differences among the disciplines of sociology, cognitive psychology, anthropology, and art history.

In short, Gell acknowledges that anthropology is a broad church only ambiguously distinct from other disciplines such as history, sociology, social geography, or social and cognitive psychology. He argues that “anthropology is, to put it bluntly, considered good at providing close-grained analyses of *apparently irrational behaviour*, performances, utterances, etc.” (emphasis in the original), a task it performs by “locating or contextualizing behaviour in the dynamics of social interaction seen as a real process, or dialectic, unfolding in time” (Gell 1998, 10). He situates anthropological theories at what he calls a “biographical” depth of focus and opposes it to (historical) sociology as being often “supra-biographical” or to cognitive psychology as “infra-biographical.”

Anthropology therefore tends to focus on the “act” in the context of the “life”—or more precisely, the “stage of life”—of the agent. . . . This time perspective (fidelity to the biographical) dictates just how close to and how far away from the subject the anthropologist stands; if the anthropologist studies (say) cognition at the micro-scale typical of much laboratory cognitive psychology, the biographical perspective is lost and the anthropologist, in effect, is just doing cognitive psychology; conversely, if the anthropologist's perspective expands to the degree that the biographical “life cycle” rhythm no longer delimits the scope of the discourse, he or she is doing history or sociology. (Gell 1998, 10)

It is this biographical depth of focus that I retain to present the case studies, wherein most observations concern individuals and their immediate environment. I do not discuss, for instance, considerations about the state of institutions of the People's Republic of China (PRC) at the moment of the observations, the development of Information and Communications Technologies (ICT) at the end of the 1990s, or elements of Chinese culture as parts of a traditional corpus of ways of thinking and ways of living of people in China. I focus on seizing, or rather attempting to seize, the close interactions between Beijing electronic musicians and some of their devices. In the case study of the social networking site, I concentrate on my own interactions with the Web pages and how I saw the pages changing. When discussing computer encodings, I rely on face-to-face contact with the various software and hardware objects I encounter. I am preoccupied with the immediate, heterogeneous network of relationships surrounding some of the people, technical objects, and artwork I select and contrast.

Another close relation with the anthropological tradition concerns the defamiliarization, and relativization, of the notion of "humans." Reading Gell's work, one can only marvel at the similarities to publications in science and technology studies, especially those of the actor-network community, published a dozen years prior to Gell's work. Intriguingly, Gell doesn't mention authors such as Michel Callon, Madeleine Akrich, Bruno Latour, John Law, or Howard S. Becker (whose work was known in the sociology of art at that time), although the approaches are strikingly close.

One reason for this absence of references to sociological works is probably that anthropology is a pioneer in dealing with nonhumans. Alfred Gell did not need to import theoretical frameworks from technology studies. *Animism*, as the attribution of life and sensibility to plants, animals, and inanimate physical objects, always challenged anthropologists to deal with the separation between humans and nonhumans. In his own scientific tradition, Gell considers a species of anthropological theory in which "*persons* or 'social agents' are, in certain contexts, substitute for *art objects*" (Gell 1998, 5; emphasis in the original). He defines his anthropological theory of art as (roughly) "the 'social relations in the vicinity of objects mediating social agency'," in which "an idol in a temple believed to be the body of the divinity, and a spirit-medium, who likewise provides the divinity with a temporary body, are treated as theoretically on a par, despite the fact that the former is an artifact and the latter is a human being" (Gell 1998, 7; see also 96).⁶

Although I discovered Gell's *Art and Agency* after finishing this study,⁷ I have to confess that sometimes I suspect its influence on my analysis is

deeper than I realize. As I will discuss later, Gell's theory on a specific type of relation, which he uses to describe interactions between humans and artifacts, together with his use of the word *circulation* and his emphasis on "agency, intention, causation, result, and transformation" (Gell 1998, 7), are close to the framework I establish in the book with the concept of waves.

This said, there are important differences between what I attempt to do in this book and Gell's perspective on art works. Mainly, I do not try to explain why people behave as they do, and, where he discusses mostly visual art, I rely mainly on observations of music activities. As I will consider in the conclusion, the gaseous form that music often takes when it travels through the air makes it a very unusual object of study when compared to other kinds of artifacts.

Going back to the comparison between Gell and the STS tradition, generally speaking, one can say that approaches in STS at the time that Gell wrote *Art and Agency* varied in being slightly anthropocentric (as in the new sociology of technology or the social construction of technology [SCOT]) or slightly nonhuman-centric (as the actor-network theory, or ANT, was often accused of being). Interestingly, Gell describes his approach as "action-centered," and he opposes it to the alternative of a semiotic approach. He considers the former "more anthropological . . . because it is preoccupied with the practical mediatory role of art objects in the social process, rather than with the interpretation of objects 'as if' they were texts" (Gell 1998, 6). We can see here a common ground between STS and Gell's work—in the blurring of the boundaries between living persons and physical objects—by considering a network in which things and people merge seamlessly. This similarity is most obvious if one looks at the actor-network tradition, especially in Michel Callon's work in the 1980s (quickly followed by Madeleine Akrich, Bruno Latour, John Law, and Antoine Hennion), in which the distinction between human actors and natural phenomena is broken down.⁸ Of course, the causal agency of physical objects, of nonsocial things and processes, played an important role in social sciences long before the works of Gell or the STS authors. But Callon's principle of *general symmetry* (which expanded David Bloor's principle of symmetry—I will come back to this later) was new because of the need it expressed to pay specific attention to the role played by artifacts.

Michel Callon, by describing networks of heterogeneous associations, relied on terms different from those previously used by sociologists. For him and his colleagues at the Centre de Sociologie de l'Innovation in Paris during the late 1970s and the early 1980s, sociological and technical considerations needed to be linked and not dissociated. The similarity with

Alfred Gell's claim that "in relevant theoretical respects, art objects are the equivalent of persons, or more precisely, social agents" (Gell 1998, 7) can hardly be clearer. Both series of work insist on the need for a better treatment of things in social sciences (and one reason why this book discusses the issue once again is that the debate is still going on).

So, to summarize the converging and diverging aspects, this book relies on anthropology's biographical depth of focus on a subject matter, which can be called "social relationships" or "culture," by looking at relationships between humans and physical objects—but with a focus on technical objects. I agree with Gell and other British anthropologists that culture has no existence independent of its manifestation in social interactions. I explore how to analyze "culture" as something *materially located* inside artifacts or inside human beings and along a timeline. Using frameworks imported mainly from authors in science studies listed two paragraphs back, I attempt to theoretically define the nature of these locations. Although I use a framework that puts humans and nonhumans at the same level of analysis, I also believe that there is a fundamental difference between artifacts and human beings, and that it can be defined if one treats both kinds of actors in terms of the same analytical vocabulary.

Art as Collective Action

So far, I have explained that this book is about culture and artifacts, and that both the data and the analysis are presented inductively with a close distance between the two in order to keep theoretical arguments grounded. I underlined the focus on physical objects throughout the study (for which I use the word *artifacts* in an exclusive way), and I mentioned my choice to work at a biographical level, anthropology-like, of observation. I also emphasized that the analysis is not about social relationships in general between humans and artifacts, but about social relationships between an artifact and something or someone outside it.

In this section, I would like to briefly discuss how I ended up using this approach. A basic idea, derived from my own practice of computer music, is that art is about *doing*. Art is certainly about many things, and I wouldn't contradict someone who puts the emphasis on meaning, but as an amateur composer and performer I always saw strong similarities between what I was doing in music and what I was doing in other situations of my life. I remember feeling uncomfortable when reading publications on art that focused on abstract meanings or individual "genius" explanations about the birth of works of art.

For instance, compared with my scientific activity as a specialist of China, computer music is about testing and writing software, recording sounds, rehearsing, and then giving a performance in front of an audience, whereas sinology is about reading and writing, editing information, rehearsing, and then giving a lecture in front of an audience. The difference between the two is not very big. Besides, the audience, mostly people in their twenties, looks the same, and the feeling of accomplishment after having either written a song or an article is similar.

Maybe for these reasons, I have often paid attention to comparisons between art and science. I found it interesting that Alexander Graham Bell, in an emotional letter to his father, compared the invention of the photophone to the birth of a baby (see the section titled “Male Birth and Baby Machines” in Sterne 2003, 180–181), and that an African carver mentioned by Alfred Gell considered he had borne children by making a mask (Gell 1998, 46). I also saw similarities between scholars who emphasized the idea of art as an act of doing, such as Gell or Becker, active respectively in the anthropology of art and the sociology of art, and STS scholars such as Callon and Latour, who wrote about science in action and published their analyses within the same period of time.⁹

The new sociology of technology’s founding book (Bijker et al. 1987) and Becker’s major work on the sociology of art (Becker 2008), read together, present strikingly similar argumentation. Both discuss their arguments in a way that suggests that what is being discussed is not limited to technological knowledge or art, but can be applied to other systems of professionalized knowledge.

In *Art Worlds*, Becker insists on the idea of art as collective action (Becker 1974, 2008) and the heterogeneous functioning of this kind of organization. He demonstrates how any work of art is always the result of collective action. As mentioned earlier, Becker discusses what he calls *conventions* and how patterns of forms of cooperation make art activities possible; most interestingly, he shows how this type of knowledge is embedded in physical objects and helps people to act together. He also shows that this way of organizing human activity is not limited to art worlds by illustrating his arguments with, for example, conventional symbols for men’s and women’s toilets in the chapter on conventions (Becker 2008, 44).

At about the same period of time, sociologists of technology borrow insights from the sociology of science in order to move “away from the individual inventor (or “genius”) as the central explanatory concept, from technological determinism, and from making distinctions among technical, social, economic, and political aspects of technological development”

(Bijker et al. 1987, 3).¹⁰ SCOT scholars insist on using “a ‘multidirectional’ model, in contrast with the linear models used explicitly in many innovation studies and implicitly in much history of technology” (Bijker et al. 1987, 28);¹¹ Becker says art should not be treated as “relatively autonomous, free from the kinds of organizational constraints that surround other forms of collective activity” (Becker 2008, 39).

Here is Becker’s general statement, centered on the concept of “art worlds.”

Art worlds consist of all the people whose activities are necessary to the production of the characteristic works which that world, and perhaps others as well, define as art. Members of art worlds coordinate the activities by which work is produced by referring to a body of conventional understandings embodied in common practice and in frequently used artifacts. The same people often cooperate repeatedly, even routinely, in similar ways to produce similar works, so that we can think of an art world as an established network of cooperative links among participants. . . . Works of art, from this point of view, are not the products of individual makers, “artists” who possess a rare and special gift. They are, rather, joint products of all the people who cooperate via an art world’s characteristic conventions to bring works like that into existence. . . . Art worlds do not have boundaries around them, so that we can say that these people belong to a particular art world while those people do not. I am not concerned with drawing a line separating an art world from other parts of a society. Instead, we look for groups of people who cooperate to produce things that they, at least, call art; having found them, we look for other people who are also necessary to that production, gradually building up as complete a picture as we can of the entire cooperating network that radiates out from the work in question. (Becker 2008, 34–35)

Here again, where Becker illustrates the fact that his model can be used even in the case of an individual artist such as a writer (Becker 2008, 1, 23–24, 192–194), Bijker shows how, even in the case of an individual inventor, social constructivist analysis produces fruitful results (Bijker 1995, 101–197).

Another example is how sociologists of science noticed that scientists’ accounts of scientific activity were concealing the nature of the activity that gave rise to research reports, in the same way that sociologists of art noticed that artists often lie about their work. In many ways, the introductory remarks in Bruno Latour and Steve Woolgar’s STS classic *Laboratory Life* can apply to artistic activities: “The fact that scientists often change the manner and content of their statements when talking to outsiders causes problems both for outsiders’ reconstruction of scientific events and for an appreciation of how science is done. It is therefore necessary to retrieve

some of the craft character of scientific activity through in situ observations of scientific practice" (Latour and Woolgar 1979, 28–29). The necessity of showing how craft practices are organized through *in situ* observations is obvious in both fields.

I now consider briefly two older frameworks, which preceded those just mentioned in sociology of art and sociology of technology: respectively, the strong program of David Bloor and the grounded theory of Barney Glaser and Anselm Strauss.

Truth, Falsity, Chinese, and Non-Chinese

Most of the STS publications I have discussed so far can be seen as extensions of David Bloor's "strong program." At the beginning of the 1970s, Bloor stated that sociologists needed to be impartial to the truth or falsity of beliefs related to science, and that the same type of explanation had to be used in both cases (Bloor 1976). Before then, there was a tendency toward explaining beliefs in terms of the way in which they were perceived by social scientists as corresponding to reality: true beliefs were true, and false beliefs were to be explained by psychological or social factors. In Bloor's words,

The main feature of the Program is the so-called "symmetry postulate." Both true and false, and rational and irrational ideas, in as far as they are collectively held, should all equally be the object of sociological curiosity, and should all be explained by reference to the same kinds of cause. In all cases the analyst must identify the local, contingent, causes of belief. This requirement was formulated in opposition to an earlier prevailing assumption, still defended in many quarters, which has it that true (or rational) beliefs are to be explained by reference to reality, while false (or irrational) beliefs are explained by reference to the distorting influence of society. (Bloor 1999, 84)

Michel Callon's proposition of general symmetry, mentioned earlier, is a generalized version of Bloor's principle of symmetry. Callon states that the same type of explanation must be used for all elements of a heterogeneous network (devices, social groups, natural forces), without any *a priori* preference given to one kind of element (Callon 1986, 1987). The same applies to Pinch and Bijker's arguments that sociology of technology should treat "technological knowledge in the same symmetrical, impartial manner that scientific facts are treated within the sociology of scientific knowledge . . . The success of an artefact is precisely what needs to be explained. For a sociological theory of technology it should be the *explanandum*, not the *explanans*" (Pinch and Bijker 1984, 406; see also Bijker 1995, 75).

Generally speaking, during that period of time, sociologists of science and technology were getting rid of dichotomies. The idea of limiting relationships to a restricted range of sociological categories had to be abandoned (Callon 1987, 95), and problem solving had to encompass the recognition of what counts as a problem together with the methodologies used to solve it (Bijker 1987, 168). Today, it is largely accepted that science and technology are studied in an integrated way without a priori distinctions. Differences that may exist gain contrast during the study, and not before doing the research.

For specialists of China, the question of symmetry and the unsettling of binary oppositions (through the reconstruction of the practices through which these divisions emerged) is reminiscent of a difficulty in distinguishing what is “Chinese” and what is not. It is a problem that is China’s own—that is, what representations it has of itself—but it is also an issue for scientists working in sinology.

At the moment, sinologists often rely on this a priori distinction—Chinese versus not Chinese—to decide what is “related to China” and what is not, which also implies what they will be studying and what they will not be studying. If such decisions make sense at a practical level (one cannot study everything), the closer China scholars get to contemporary China, the more difficult this position becomes. For instance, if one considers climate change, an issue STS scholars often use as an illustration, we see how it challenges the divisions of human and nonhuman, nature and culture, and subject and object, but also the division of West versus China, “us and them,” when local policies in terms of environmental protection also affect other countries.

As I will come back to these questions later, I would like to briefly discuss why I believe the time has come for sinologists to join, more thoroughly than they have done until now, the scholarship of social constructivism in interrogating the boundaries between the most foundational categories of our scientific practice. In order to perform this task, insights from two other traditional frameworks in social sciences, the grounded theory (GT) and the actor-network theory (ANT), are useful.

In a nutshell, grounded theory was developed at the end of the 1960s by Barney Glaser and Anselm Strauss (Glaser and Strauss 1975). Contrary to the impression the name gives, it is not a theory but the idea that theories should be grounded: the data and the explanations one is producing about the data must remain closely related. The publication of Glaser and Strauss’s now classic book was a reaction to a tendency in sociology to begin with hypotheses that were to be verified by data collection. GT insisted

on inductive processes of research and argued that data collection should precede (as much as possible) the formulation of any kind of theoretical arguments about it.

Actor-network theory is an approach that was developed at the end of the 1970s and beginning of the 1980s by scholars in the field of science and technology studies, led by the Centre de Sociologie de l'Innovation (CSI) at the Ecole des Mines in Paris.¹² ANT emphasized the idea that, in explanations of technological change, the social should not be privileged, and it provided a new kind of social theory with a specific interest in the agency of nonhumans (see, for instance, Callon 1986 on scallops; Akrich 1987 on photoelectric lighting kits; Latour 1988 about a door-closer).¹³

Although GT and ANT were initially developed in different settings at different moments, they share common viewpoints that are visible, for instance, through their references with the Chicago School of sociology¹⁴ (later, their respective achievements were also brought together in the social worlds framework of STS; see Clarke and Star 2008 for an overview¹⁵). Both share the word *theory*, although they are not theories in the proper sense of the term but specific kinds of methodological approaches. GT is “a style of doing qualitative analysis” (Strauss 1987, 5), and ANT tells us “how to study things . . . [But] it says nothing about the shape of what is being described with it” (Latour 2005, 142).

As I will illustrate later in the book, sinologists can have a good start by blindly following the original strategic advice of GT and ignoring, as much as possible, the literature of theory and facts on the area under study¹⁶ (Glaser and Strauss 1975, 37), or by using Michel Callon's generalized version of the principle of symmetry from Bloor and not giving a priori preference to one kind of element: it is not the job of China specialists to decide what is Chinese and what is not, or what is important to Chinese culture and what is not. First, one chooses a topic (I would say anything related in one way or another to China is fine), then, at a second step of the research process, as STS scholars did with true beliefs and working technology, differences that may exist will gain contrast during the study and not before doing the research.

In other words, part of what this book will attempt to do is to imitate the way STS moved from science *in theory* to science *in practice*, in order to get closer to Chinese culture in practice. The questions of “Chineseness” or the importance of the research topic are to be discussed not *before* the research starts but *during* the research process and then included in the final report. Although these remarks may appear basic to many social scientists, they imply that many China specialists need to organize their researches differently.