Technology Is Culture: Two Paradigms

ZIMMERMANN, Basile

Abstract
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Reference

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TECHNOLOGY IS CULTURE: TWO PARADIGMS

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ABSTRACT

The author discusses the relationship of technology to culture in the People's Republic of China. Basing his discussion on his experiences in Beijing between 2001 and 2004, the author suggests that the two paradigms of accumulation of decisions and struggle against difference can be used to describe technology in its relation to culture, including—but not limited to—popular electronic music in Beijing.

During field research I conducted in Beijing last year, I introduced Max/MSP real-time audio development software [1] to a Chinese musician friend [2]. While we were discussing the commands that are to be used with a certain category of objects ("start," "stop," "read," "write," etc.), he asked me: "So I have to write 'stop.' I cannot write ting ['stop' in Mandarin], right?"

"Of course," I replied, smiling. "Max/MSP does not speak Chinese, it speaks English." What a strange question, I thought. As I continued to ponder the question, however, I wondered which was stranger, the fact that my friend asked if he could use his own language to write in Max/MSP, or the fact that I was surprised at his question.

The issue of the Chinese language in relation to computer technology is a complicated one. For the purpose of the discussion below, I will focus on only a few aspects related to the technological process that lies behind this question. First, Chinese writing, like almost everything else with computers, is encoded. For example, with a computer using Unicode hexadecimal encoding [3], the character for the word "center" is encoded &\#x4e2d;. In its normal written form, it looks like Fig. 1, a character that resembles a square with a vertical stroke through its center. The difference between &\#x4e2d; and Fig. 1 is that in the first case the computer considers the data as text, while in the latter it sees it as an encoded entry that has to be displayed by its corresponding Chinese character.
Fig. 1.
The character for "center" or "middle" in written Chinese (computer screenshot, BiaoKai font).
(© Basile Zimmermann)

Why is Chinese writing encoded using English writing? because computer technology was designed by English-speaking people; because English is, in a way, the computer's "mother tongue." It has learned English as a first language and has to learn any language that differs from English as a second language.

This situation is related to a basic aspect of tools in general. Someone having a spoon will be able to eat ice cream without much trouble. What if one has a fork instead? Eating ice cream will not be as easy. How about trying it with chopsticks? As we can see, tools are intended to help us perform certain tasks, and there can be a difference between what the user wants to do and what the user was expected to want to do. Computers, synthesizers, software and all technological objects embody decisions made by the people who designed them. Those choices and decisions are, of course, related to many factors, including what the tools were designed to be used for, who was supposed to use them, commercial and technical constraints, errors and many other points. In this context it is important to remember the very obvious but often forgotten fact that technology is anything but neutral, especially when it comes to cultural issues [4]. Enabling a computer to write Chinese characters is in a way similar to transforming a fork (or chopsticks) into something that can be used for eating ice cream.

Forgetting How to Write

In today’s People's Republic of China, one often hears people complaining that they have forgotten how to write one or another Chinese character. Writing in Chinese is indeed difficult, and people have always commented on this issue, but last year I noticed that complaints were often followed by the explanation: "I use the computer all the time; I don’t remember how to write by hand anymore." There are many issues that can be debated about writing Chinese on a computer. Significantly, I do not hear English-speaking friends complaining that they no longer remembered how to write English after they began to use a computer. While they also may have complaints about computers, this is not one of them. The difference is related to the major differences between English
and Chinese (there are 26 alphabetical letters to remember in the first case and several thousand characters in the latter) and, more significantly, the way Chinese is entered into a computer. While the concrete differences between the structures of the two languages and their relation to human memory efficiency are pretty obvious, the second aspect---that of the technology itself---is more difficult to grasp.

While there are several different methods for inputting Chinese, most people I have observed writing on a computer in China during the last 10 years have used an ASCII keyboard interface and dedicated input software based on pinyin, the official, Roman-alphabet transcription of the pronunciation of the Chinese characters [5]. With this input method, full knowledge of the strokes that constitute a character is not required. One only needs to be able to type it using its phonetic transcription (Fig. 2a) and recognize it in a selection of possible choices (Fig. 2b). (Many Chinese characters share the same pronunciation and can only be differentiated by written means. This does not, however, cause misunderstanding, because meaning is usually obvious due to the context.) As can be seen, this essential prerequisite of Chinese writing---full knowledge of the strokes---is put aside.

Fig. 2.
Using Chinese-language input software (computer screenshots, Windows XP [French edition]).
(© Basile Zimmermann)
(a) Step one. Writing "zhong," the pinyin transcription for the character in Fig. 1.
(b) Step two. Selecting the character from among those sharing the pronunciation zhong.
In order to comprehend the process, imagine the following: every time one writes an English word on a computer, one can only enter the first letter; the input system then asks the user to choose from a selection of words. One presses "D" and then is prompted as follows: "Please choose between (1) data, (2) do, (3) discuss, (4) details, (5) David [press right arrow for other words]." People using text editors are already familiar with this kind of automatic process, which is often used to enter data and other frequently required information.

When writing Chinese, the system works surprisingly quickly. Characters can be written more rapidly than they can by hand, and a Chinese person entering Chinese on a computer is as fast as an English-speaking person typing in English. One cannot say that it does not work nor that it is inconvenient or too slow. The question I want to ask is: What is changing here? First, it appears that my Chinese acquaintances are forgetting how to write their own language [6]. Second, they can write faster and benefit from many additional functions when using the computer. Is this a good thing? Or is it a bad thing? While it is not my goal here to answer the "good or bad" question [7] I would like to emphasize on the process of change related to the cultural content of today's technology as used in artistic creation.

The Accumulation Process

Let us now turn to sound technology. In Beijing, in April 2004, I was speaking with a Chinese DJ, exchanging ideas about a dance remix he was working on. He asked me to show him how I would proceed to improve a synthesizer sound I had criticized. I sat in front of his computer and I chose a plug-in from his huge plug-in collection, which I then inserted into the main melody track. I adjusted the parameters according to my taste, and we listened to the result. I stood up and said, "This is more or less what I would do." He sat back in front of his computer and adjusted one or two parameters, leaving the others untouched.

To better understand what precisely was happening on a technological level, we can replace the plug-in with, for example, an acoustic guitar. I play a song on a guitar, then I pass it to someone else saying, "This is more or less what I would do." How many of my decisions, my personal musical feelings, are left in the guitar? None. In the example above, however, all the choices that I made are left within the application. Unless my DJ friend changes all the parameters again, part of his work is mine.

The discussion above illustrates clearly one of the most striking cultural issues that emerge when working with today's technological tools: accumulation [8]. People's decisions, choices, mistakes, whatever we choose to call them, are stored within the technology. In turn, users, among them artists, are collaborating with the virtual presence of the (often many) people whose actions have been embodied, temporarily or permanently, inside the tools.

Where technology---computers, airplanes, etc.---seems to go faster and faster [9], human beings are unable to keep up. A few years ago, one single person could completely understand a computer's operating system. Less than 50 years ago, the pilot of an airplane
was not only a pilot but could also repair the plane, make modifications and sometimes even design a new one if so disposed. Today things are different: No one person can fully understand all the components and the operating system of a computer, just as no pilot (nor even an engineer) can master all the aspects of an airplane. It is too complicated by far. A dozen engineers (if not more), each specialized in a certain field, put their expertise together to design an airplane; in other words, when applying today's technology, one has to rely on the work of others, to collaborate with them [10].

In December 2003, late one night I went to a Beijing club that had hired my DJ friend for a party. While I was listening to his set, I closed my eyes: German minimal techno. I know the DJ is Chinese, very Chinese I would say, considering the facts that he has never been abroad, has a traditional local background, studied traditional Chinese arts and does not speak a foreign language. What did I hear that made me know who was playing? Nothing.

Now let us compare this situation with that of a friend of mine in Geneva, Switzerland, who plays guqin (China's oldest stringed instrument) extremely well. I have heard him play several times---always Chinese traditional music. Had I closed my eyes during one such time, would I have been able to guess the presence of a Swiss artist? Probably not. Where the German minimal techno track tells us the music is German, the ancient Chinese guqin (and the melody being played) tells us the music is Chinese. The content of a piece of music is related to the instruments that were used to play it. Chinese traditional music is Chinese partly because the instruments are Chinese.

Is it possible to have Chinese music when the technology comes from the West? Can we imagine Chinese computer music if the computer is American? Where do we situate the difference, if there is one, between electronic instruments and traditional ones?

One important difference lies in the number of virtual presences inside the tools. The Swiss musician, for instance, collaborates with the composer of the tunes, the ancient makers of the guqin and the historical figures behind the invention of this instrument and the melody---that is, quite a lot of people. The DJ, on the other hand, collaborates with the German composer, the designer of the vinyl LPs and the turntables, the engineer who recorded the sound samples used by the German composer in that particular song, the designer of the drums recorded by the previous engineer, the designers of the different computers involved, the designer of the loudspeakers, the engineer who made up the sound effects of the audio mixer that is being used to mix the LPs, the people who wrote the algorithms of the master plug-ins that were used to finalize the sound of the tracks and so on---many of these being contemporaries of the DJ playing that night.

Quite obviously, the number of people collaborating with the DJ situation is greater than the number of people collaborating with the guqin player. In other words, a greater accumulation of decisions has occurred, and more virtual actors are involved, in a way similar to what has happened with today's modern airplanes. Where the pilot pilots the decisions of the dozen engineers who designed the airplane, the DJ pilots the decisions of the many people who contributed to producing the records and tools he uses to mix.
The Struggle against Difference

An interaction well known to almost anyone who has ever sent an e-mail in Mandarin involves the receipt of an illegible message: "I am very sorry Xiao Wang, but your message is nothing but a bunch of corrupted data. Could you please send it a second time?" If the person is an old hand, he or she might add, "I believe you sent the characters in Big5 format; could you try GB2312? Or maybe if you have access to a computer running Windows XP you can send it in Unicode format, which should do the trick. If that still doesn't work, please send a screenshot. Or just print it and I will give you my fax number, that might be easier."

While we cannot help but note that people do not experience these particular text-encoding problems with English, we are slowly approaching technology's most critical cultural issue in connection with the accumulation and overcoming of human ability to keep up—the struggle against difference that occurs every time what a user wants to do is confronted to what the designer of a tool expected the user to want to do.

This issue is particularly obvious in examples of text-encoding problems. In an "Important Safety Notice" accompanying the new wheel system of a bike that I purchased in Beijing at the end of 2003 (Figs 3a and 3b), we note that while the letters of the English notice are displayed normally, in the French, Spanish and German notices, all letters that differ from those used in English are either displayed as unknown format or corrupted (while there are other language problems in this notice, I will focus on the encoding issue).

![Image of a warning sign with text in different languages]
Fig. 3.
Front and back of a note attached to a new wheel system of a bike purchased in Beijing in September 2003. (© Basile Zimmermann) "Important Safety Notice" in English, German, French and Spanish. All characters that differ from English are corrupted or displayed as in unknown format.

In Fig. 4, an e-mail in Chinese I received from a friend, only Western numbers and punctuation marks are displayed normally, while the rest of the characters are shown as "unknown format." (here displayed as question marks)

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Fig. 4.
An e-mail in Chinese received by the author in December 2004. (© Basile Zimmermann) All Chinese characters are displayed as in unknown format, i.e. as question marks, by the Mail application in Mac OSX, while the Western punctuation and the date (the 22nd) are displayed normally.
Although the Unicode standard is now widely used and matters are improving for non-English languages, it is interesting to note that in these three illustrations—which are, based on my experience as a European and sinologist, representative—only characters that differ from English undergo encoding problems. This relation is systematic where technology meets culture: The greater the cultural difference between the user and the decisional content embodied in the tools, the greater the potential for conflict. In the examples above, the more different the language, the more corrupted the message.

Virtual collaboration will work so long as we "agree" with the people who designed the technology. In other words, one can pilot an airplane only so long as one agrees with all the decisions embodied in that formidable technological tool. If one does not, well, one has to modify it, or much better, make one's own airplane. This example is similar to that of the spoon above, with the notable difference that it is easier to design one's own spoon than one's own airplane or computer. In the last case, human collaboration overcomes a single human being's limitations, therefore any decisional conflict between the user and the decisions embodied in the tool becomes complicated to solve.

The Chinese musician mentioned at the beginning of this article has downloaded a number of others' works into Max/MSP, with the idea that it would help him understand how to use the software. While testing and playing with those patches (a "patch" is the specific name for a piece of software written in Max/MSP), he recorded several songs. When I listened to his songs, I noticed that I could identify two main stylistic categories.

The first one comprised beautiful, experimental songs, with slow changes and a kind of hypnotic feeling. The second category sounded more "techno"; 4/4 rhythms, clear changes at the end of each bar: standard ---and very good---dance music such as we can hear in clubs all over the world. The songs of the first category were made using a Japanese musician's patch, based on a particular object in Max/MSP called waveform~, which allows one to view and edit the content of an audio buffer, and which is quite handy for making an interface to play with loops, and to change their size and speed, which was the main use of this patch. The songs of the dance category were made using several step sequencer patches written by German and American musicians based on groove~, matrixctrl and multislider objects, which are useful in Max/MSP if one is to build an interface that will allow the user to choose "steps" where the computer plays the content of an audio buffer.

Just as most of us are able to distinguish a piano from an electric guitar when hearing music, I could identify a waveform~ object inside the patch used to compose the song. Discussing his songs, my friend said that he was impressed with Max/MSP. His only regret was that he could not write patches himself, because he would have liked to be able to change some parts of those he had downloaded, notably to improve one particular patch by adding another patch's functions to it.

Westerners often expect Chinese contemporary artists to do something different, something "Chinese." If the musician above chooses not to incorporate traditional Chinese cultural elements (as contemporary Chinese artists often do to please foreigners [11]), but to create something of his own, his first step should be to modify the Japanese,
German or American patches in order to run two at the same time, as he told me he wished to do. To do this, he needs to master Max/MSP. Then, to gain access to a better control of his machine, he should also learn C++, which would allow him to write specific software objects not available in the Max/MSP environment (as the German programmer actually did). If the ASCII keyboard and the mouse, not to mention the operating system, were a problem, he would also benefit greatly from a full research laboratory like the one at Xerox Palo Alto Research Center (PARC), California, at the end of the 1970s, where important parts of today's computer technology were created.

What strikes me in the case of popular contemporary Chinese electronic music is the almost total absence of difference with the West. Of course, many Chinese artists listen to Western recordings and want to make something similar [12]. Electronic music, as we know it, is a Western style of music, not a Chinese one. Still, now that, through globalization, Western technology has conquered the world, the role of tools appears very problematic.

The Chinese musician to whom I introduced Max/MSP is brilliant. He is very talented in music and his command of English enables him to read manuals in English [13] (compare such facility with that of a Western musician able to read manuals in Mandarin), and he is the kind of person friends call up whenever they encounter technical difficulties. However, he cannot download a patch written by Chinese people, because none are available [14]. He cannot use Mandarin within the software, because there is no such option in the commands. He cannot use Chinese computer technology, because it does not exist [15]. He uses an American keyboard interface (Fig. 5) to interact with the computer because there is no Chinese keyboard to perform the same task [16]. Finally, he can never gain full control over his instrument (i.e. his computer), because it is far too complicated, as is the Boeing 747 to a pilot.

To sum up, I believe that the two paradigms suggested above can be useful as basic concepts to better understand today's technology and culture issues. *Accumulation of decisions* and *struggle against difference* describe two important hidden rules of the
articulation of technology related to the cultural changes we are observing everywhere on
the planet, including, but not limited to, electronic music and Chinese cultural issues.
Technology, in a way, is culture. A CD or tape recording of an American pop song
played in Shanghai can be seen as a virtual Western musician playing in China. An
advertisement in which the use of a well-known audio or visual software plug-in is
evident is the result of a collaboration between the designer of the ad and the engineer
who wrote that particular piece of software. The emergence of an unexpected pop-up
window or unexpected incompatibilities in the formatting of text files are but embodied
marketing decisions imposed by the designer of a product upon customers with the
knowledge that once a "decision" is embedded within the technology, most users will not
be able to access and modify it.

Focusing on artistic creation, the most obvious and interesting corollary is probably the
increasing shift in the creation process from the main artist to the people who produce the
tools, and its consequences for many questions such as innovation or copyright issues.
From a cultural point of view, the question of absence should perhaps be studied more
thoroughly. Modern technology looks very much like a new form of cultural aggression,
with a strong push toward standardization. Since most technology comes from the West,
and we know that any art involving technology involves de facto reliance on the
decisions of the producers of the tools, wherever we have Western technology, we have
partly Western technological art.

In other words, an absence of local technology, as exists now in China in the digital arts,
implies an absence of local culture in the artists' works. Looking at contemporary arts that
make important use of Western technological tools, one can wonder whether the Chinese
will have to reinvent the technology itself to be able to surprise us with new concepts
analogous to eating with chopsticks or using characters to communicate [17].

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References and Notes

1. See <www.cycling74.com>.

2. Westerners play an important role in promoting contemporary Chinese artists in China. Many Chinese artists have become famous in China only after they have received prizes abroad, leading to "how-to-please-foreigners" attitudes. See Geremie R. Barmé, In the Red: On Chinese Contemporary Culture (New York: Columbia Univ. Press, 1999). In order to avoid this phenomenon, especially annoying if one is interested not in so-called "art quality" but in artistic creation processes, I do not name the artists I refer to.

3. About the Unicode standard, see <www.unicode.org>. Similar examples exist for French. When one composes a web page in HTML, for example, the French accent aigu, as in "é," must be written &eacute;. In both cases, the encoding itself is composed of standard alphabetical letters used in writing English.


5. Chinese writing is by no means phonetic; Chinese characters are semantic in their content, and there is no systematic relation between a character and its pronunciation. One has to know it or check a dictionary using components of the character, such as the number of strokes.

6. Mark Warschauer, in his book Technology and Social Inclusion: Rethinking the Digital Divide (Cambridge, MA: MIT Press, 2003), mentions an unpublished manuscript by Chinese scholars about "computer-based reading and writing materials developed in a primary school in Shenzhen with early results that suggest children are learning to write via computer much faster than they do by hand," p. 144. The cognitive issue, however, i.e. what the children actually did learn, is not discussed. It is very clear to me that those children were indeed not able to write by hand, or, in other words, that their knowledge of Chinese script had been significantly reduced by their use of the computer.

7. While people often wonder whether Chinese script is really convenient to use, Lothar Ledderose argues that it "was the most powerful instrument to foster cultural coherence in China, because it records the meaning of words rather than their ever-changing pronunciation. This required the creation of thousands of distinct characters;" Lothar Ledderose, Ten Thousand Things: Module and Mass Production in Chinese Art (Princeton, NJ: Princeton Univ. Press, 1998) p. 4. Ledderose points out that although the Chinese need several years to learn how to write, they are not only able to understand each other by written means despite speaking different dialects but they can also read texts that are a thousand years old, whereas "Europeans have to learn a new language
every time they want to read something written five hundred kilometers away, or five hundred years before," p. 23.


10. For the very enlightening example of the airplane, see Victor Scardigli, "Forces et faiblesses du tout-informatique: Y a-t-il encore un pilote dans l'avion?" *Le Monde Diplomatique* (October 2003) p. 30. About technology and complexity, see the works of Thomas P. Hughes.

11. This remark is based on my own observation; the dubious role of Westerners in the promotion of Chinese artists is, however, a well-known topic, see also [2].


13. At that time there was no Chinese version of the user's manuals for Max/MSP. At the end of January 2005, however, "beta-translations" of both Max and MSP manuals realized by Taiwanese musicians were released on the Internet.

14. Considering the information I gathered in dedicated forums (both in English and Chinese), at that time, there was close to no one using Max/MSP in mainland China. However, the situation seems to be changing slightly since the release of a Windows-compatible version of Max/MSP (previously only available on Macintosh) at the end of August 2003, and the pirated application that followed a few weeks later (I saw one running on a musician's PC in Beijing at the beginning of 2004). It is interesting to note that together with the translation of the manuals mentioned in the previous note, Max/MSP is now much more within reach of Chinese musicians than it was in the past.

15. According to a recent study, while China is very competitive in manufacturing, new technologies---especially complicated ones---are always imported from the West. See Cong Cao, "L'industrie chinoise face au défi technologique: Les investisseurs étrangers sont les premiers pourvoyeurs de technologies," *Perspectives Chinoises*, No. 83 (June 2004) pp. 4--17.

16. New interfaces using a graphic tablet on which one can write by hand Chinese characters that are analyzed instantly by the computer have been selling in China for
about 5 years, but at the time of writing, as far as I know, very few people used them for daily tasks involving a computer.

17. An interesting study would be one of the game of Go in relation to computer programming. At the time of writing, where a modern computer can be a threatening competitor to a professional Western chess player, the very same machine is not able to defeat even an amateur Go player.