An Exploration in Interface Design for the Chinese Migrant Worker Population

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The design and implementation of this project has already, and will continue to, uncover specific interaction design experiments that will be carried out with Chinese participants. This paper is part of a larger effort to gain practical and specific insight into the usability of various products in China.

Abstract

This sketch aims to better understand the process of designing products that fit the Chinese cultural framework, and keep attuned to China-specific design issues by addressing a specific social concern facing modern China.

This project targets migrant working mothers living in China's urban centers and proposes a system for them to communicate with their children who remain at home in rural villages. A specific design problem is used as a vehicle to uncover more fundamental and broadly-applicable issues of designing for the Chinese. A design sketch of this system is presented, as are the more fundamental issues that our design process uncovered. These issues include difficulties in Chinese character input, interfaces on a Chinese scale, and the Chinese people's sense of privacy.

Keywords

Concept Design, Interaction Design, Input, Prototyping, User Research.

Project/problem statement

While there are many problems to be solved in China, we chose to address the need for communication between migrant workers and their children left behind at home. While these workers lack exposure to computer-based tools, they welcome changes to better

Figure 1. Migrant workers commonly come from rural villages with little means of outside communication. *NOTE: This photo is not ours. Final version will be one of our own.*

Figure 2. They frequently come to cities without their children. To maintain familial ties, the call home. Many factors impede their ability to communicate with their children. *NOTE: This photo is not ours. Final version will be one of our own.*

their lives and thus, they make willing subjects. Their weaknesses—e.g., low rate of literacy—amplify their detachment from western design issues and make them interesting subjects.

These workers' migration has raised social concerns in China. There are 114 million Chinese migrating to urban centers to find work [1]. Many of these migrant workers are parents who leave their children at home in the villages in the care of the children's grandparents. From interviews, they confided that their main problem was parenting their children from afar. They believed that better means of communication with their children would help alleviate this problem.

As modernization of China proceeds, few efforts are specifically focused on the migrant worker population. The goal of this prototype is to improve the quality of communication between a migrant worker parent and his/her children while they are separated.

Background
- Neema Moraveji – Interaction Designer
- Rania Ho – User Researcher
- David Huynh – Interaction Designer
- Leizhong Zhang – User Researcher
- Phase 1 (April 2005 – June 2005): Choose a scenario, interview stakeholders, and sketch a solution.
- Phase 2 (June 2005 - October 2005): Identify specific design issues and conduct user studies.

Previous Relevant Work
Chinese cultural traits that inform user interface design have been researched widely, and the number of studies grows every year as China gains in importance to Western technology companies. These studies, such as [3], are largely ethnographic, anthropological, or psychological. Less focus has been on user studies with interactive devices. The inaccessibility of the target users is most likely the reason for this. A summary of the conceptual differences between classic Chinese and Greek schools of thought, mental models, and relationships with the outside world is presented in [6].

As many parties are affected and interested in the phenomenon of urban migration (e.g., local and national governments, local construction companies, telephone companies), there has been a great deal of sociological and economic research on the migrant worker population in China [1, 5]. These studies are largely aimed at understanding reasons for migration, consequences, economic factors, and policies that deal with this phenomenon. Design considerations for communication between migrants and their families back home have not been studied from an interaction design perspective.

Research Findings
An initial interview was conducted with a migrant worker in her 30s who works as a domestic helper in a private home in Beijing. She has two children aged 11 and 14 whom she has left back in her village with her in-laws. Her husband is also a migrant worker in Beijing. He lives and works on a construction site.

Remote Parenting: Our interviewee said she spent 90% of her phone conversations with her children and only 10% with her parents. She made it clear that parenting her children was her primary concern. Therefore, the primary users of our communication system located in villages will be children and young adults.

We simplified the design of our system by not requiring usernames or passwords. As a result, some level of privacy of the user has been sacrificed, but we feel that this sacrifice is warranted given our interpretation of Chinese notions of privacy.

Figure 3. Entrance to a typical produce market where we chose to design for.

Figure 4. A typical public newspaper display where various people come for their news.

Synchronization: In order to call her children, our interviewee needs to call one day ahead of the regular market day and ask the shopkeeper in charge of the public phones to inform the children to wait near the public phones at a certain hour on the market day when she plans to call back. Unpredictable schedules often reduce communication between parents and children to one call per month. Minimal parental presence in the children's lives as a result of such infrequent communication makes parenting difficult.

Literacy: Migrant workers have varying levels of literacy. They are not always familiar with Pinyin, the Romanization of the Chinese script.

Familiarity of Surroundings: Live-in housekeepers rarely explore the area surrounding their workplace. However, they do know where the local food market is.

Surveys indicate that China has 114 million migrant workers [1] and 39,000 towns [8] in total. Each town is frequented by inhabitants of a dozen surrounding villages for the services of its market, public telephones, and such. We estimate that each town's public telephone serves as the rendezvous point of communication for the children of about 100 families. We estimate about 500 parents share the public phones located near local produce markets.

Challenge
Our findings motivated the design of a system that
- allows for asynchronous communication
- is affordable by migrant workers given their economic conditions
- is usable given migrant workers' various levels of literacy and lack of exposure to technology
- is accessible for migrant workers unfamiliar with their surroundings
- scales up to the sub-population of Chinese migrant workers and to China's vast geography

Solution
Process
The most helpful research conducted leveraged our geographical location. The design process was informed by personal experiences of the group, two stakeholder interviews, and focused user studies.

As the research team is based in Beijing, shared personal experiences from all the researchers helped to increase the general collected knowledge on the migrant worker phenomenon, lifestyles of housekeepers in urban centers, Chinese telecommunication standards, rural phone use, and so on. As it is difficult to gain much of this information during the course of rapid prototyping (e.g. villages can take days to reach), our collective experience proved valuable.

In addition to the interview with a housekeeper, a field visit was paid to an elementary school for migrant workers' children in the outskirts of Beijing. The school's Dean was interviewed at length. After the interviews were performed, several designs for kiosks were proposed and focused user studies were performed with female migrant workers who are hired as custodial staff in the research facility.

Design and Resulting Design Decisions
In order to make communication more accessible and affordable to migrant workers, we decided to design a system of public, shared voice-mail kiosks at markets in towns and cities (Figure 3). These kiosks let parents

leave messages for their children, and vice versa, in an asynchronous manner. We also augment voice-mail with videos so as to enrich the communication between parents and children, thus increasing parental presence in villages where the children reside. With video, parents can also visually inspect their children, their school work, while hopefully feeling better connected.

A storyboard of the intended system is shown in Figure 10. In locating the kiosks in local food markets, the system can piggyback onto public newspaper reading displays, already prevalent in China (Figure 8). These displays are already prevalent throughout China and well-understood by the population as the source for localized, public information (Figure 4). Rural towns also use the same newspaper display system.

A parent wishing to communicate with his/her children must initiate the first contact by using our system to call home and leave a voice-mail message. To do this, the parent enters the public phone number of his/her home village (or of the nearest town with public phones) as well as his/her full name (Figure 9). This combination identifies the recipient(s) of the first message, namely the parent's family at home, as well as serves as the rendezvous point of communication between the two parties for all future messages.

The combination of the home public telephone number and the parent's full name alone grants access to the voice-mailbox of that family. No username or password is required. Such departure from conventional account access paradigm sacrifices privacy for simplicity. This design choice is justified by our observations that the Chinese are used to trading privacy for other benefits, such as cost or simplicity of use.

A Pinyin-based input system cannot be used in this context, so we turned to handwriting-recognition, which is feasible given our user studies.

Compared to entering the phone number, entering a Chinese name is more difficult to design for. Pinyin is not widely recognized by migrant workers. So, Pinyin-based input methods used pervasively on desktop computers cannot be used. We turned to hand-writing recognition as the next promising technology. Task B1 from our user study below indicates that a tablet PC interface might be suitable for Chinese name input.

Management of voice-mailboxes in our system is simplified by not providing the feature for deleting messages. Each message is stored for a fixed time interval. This design choice also prevents one's messages from being deleted by someone else. This is crucial for such a system as ours in which accounts are not protected by passwords.

The most unique portions of this work are in its context: the evaluation of technology in the context of this specific user segment, the social context of the family and urban settings, and the leveraging of Chinese cultural cues. The usability studies validated some claims; next steps include participatory design.

User Studies
Three small usability tests were performed on each of 20 participants to validate assumptions about literacy, readability, and input. All participants were female, migrant workers who held housekeeping jobs. The participants were not employed in a private residence (as our intended users are), but in a place of business. One factor that may have affected the results was that all the participants were accustomed to working among computers and other technology devices. They may not have been as intimidated by technology as a domestic
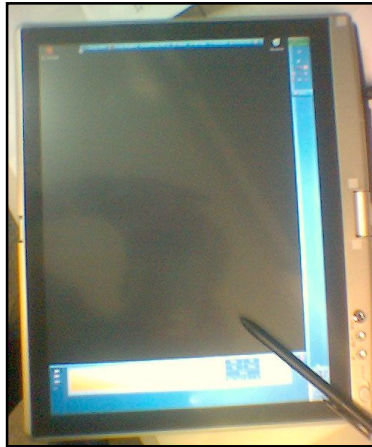
Figure 5. On task A1, users hesitated little when asked to write their name and hometown with a stylus onto the standard Tablet PC interface.

Figure 6. On Task B1, 14 of 20 users could not easily find the location of their hometown on a 3'x4' map of China. A list format, as tested in B2, is preferred.

worker in a residential scenario. None had any experience using a tablet style PC and stylus.

The first task, A1, was intended to see how a stylus and tablet can best support Chinese character input for this user segment. There is a common Chinese practice of writing ideographs in the air with a fingertip. This technique is used when describing characters to others or remembering the number of strokes in an ideograph. We initially explored the idea of letting users write their names with their fingertips in the air. The resulting strokes would be analyzed by a camera, or transferred onto a tablet. But as there was a question about technical feasibility, user study B1 was administered with users entering characters with a stylus. For this task, a commercial Tablet PC was used (Figure 5). Participants were asked to write their name in Chinese characters using the stylus. We predicted that participants would be able to enter Chinese characters on the electronic system easily after some initial hesitation. The study revealed that most participants had no problems using the stylus.

Another point in administering A1 is related to the fact that all the participants seemed unhesitant to use the device. We acknowledge that this could be because a person who is seen as professionally superior to them was requesting that they perform this task.

We also acknowledge that, in our test, character recognition proved to be less than 50% accurate. This may have an affect on future designs.

The next issue was for a user to glance at the display to check the kiosk for new messages. One design displayed the names of hometowns which have recently

sent messages atop the kiosk (Figure 7a). Another design displayed a map of China with geographical indicators of the origins of new messages. Two tests were performed to verify if users could identify the town nearest to their hometown that has a public phone. In the first task, B1, participants were asked to identify the location of their village on a map of China (Figure 6). The second, B2, participants were asked to pick out their hometown on a list of towns. Observations from administering task B1 concluded that 14/20 subjects did not easily find their hometown on a map of China. They relied heavily on text descriptors on the map. However, on task B2, all users were able to quickly find their hometown in a list. Therefore, our design eschews spatial knowledge of their hometown and uses a list format instead.

Results
The next step for this study is to create and test a high-fidelity prototype. First, a kiosk would be installed at a market. Replies to user messages would be stock messages from the system. This would simplify implementation and focus on usability issues. Later, rural kiosks would be installed and the interface would be tested with children.

As the original aim was to uncover usability and design issues by designing for a real scenario, we present issues that will be studied in detail as a next step.

Scale: A huge population with relatively small number of unique names; extensive settlement networks range from very poor to very rich; many local dialects.
Chinese character input: What is the best interface for Chinese character input and error-correction?

There are many possible avenues of exploration related to designing for emerging markets, specifically in China.

Shared access: How do Chinese privacy and sharing norms apply to communal devices? We have observed that Chinese people have less restrictive privacy concerns as compared to Westerners. How can this idea of privacy inform design?

Conceptual Understanding of Data: Can we design interfaces for users to conceptually understand virtual messages? Concepts would include performing operations (save, delete), navigating, keeping mental lists, and understanding the implications.

Designing for Chinese Novices: How is designing for Chinese novices different than designing for novices in general? How can we communicate the usefulness of a product before it is actually used?

Literacy: How do designs for character-only readers differ from ones designed for users who know pinyin or even for those who are illiterate? Does the process of designing icons for Chinese culture differ from designing icons for a Western audience since the Chinese language is derived from pictograms?
Socioeconomic Extremes: How should designs for the same culture differ by socioeconomic level? What are the personas for these levels?

Social Hierarchy: What is the best way to design user studies and interfaces without social status affecting outcomes?

In our study, one of the two administrators was a foreigner and both of them were full-time employees. The subjects seemed to cooperate without reluctance. We attribute this behavior to the social hierarchy inherent in the Chinese culture: one always submits to the command of one's superior. One helpful measure was to hold conversation and interviews in a private setting (e.g. home or empty hallway). For testing on the "high-tech" Tablet PC, it helped to keep explanation of the device (and it's implied monetary worth) to a minimum, instructing users to "just write on it as they would a piece of paper". Participants were not paid or given rewards for their time, and there didn't seem to be an expectation for such.

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Figure 7a. This list of rural towns, grouped by province, is a method of quickly glancing at the kiosk to know whether or not you have a new message.
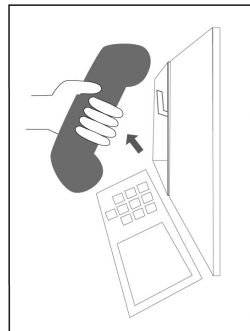
Figure 7. A stand-alone version of the kiosk.

Figure 9. Close-up sketch of kiosk with stylus.
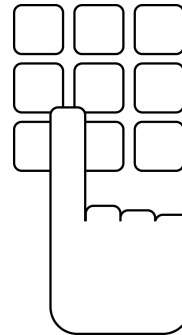

Figure 8. The kiosk sketched into a typical public newspaper display. Smaller versions of these displays are commonly located near markets.
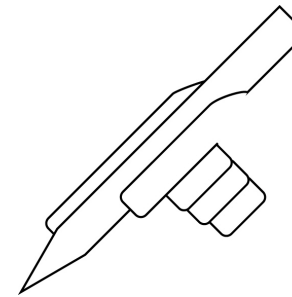
Figure 10. Overall design storyboard, steps 1-5.
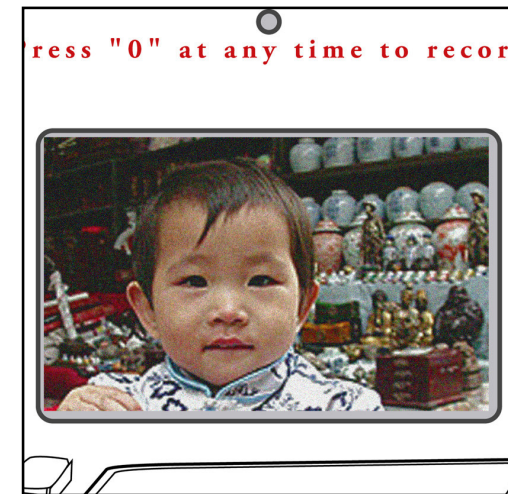

1. Pick up the earpiece to begin.

2. Dial the number of the family's hometown.

3. With the supplied stylus, write the name of the parent on the tablet.

ress "0" at any time to recor

4. Any stored messages are played one after another. Hang up the earpiece to complete or press '0' to record a video reply.

ress "0" at any time to recor

5. After pressing '0' and seeing a countdown, see your image as you record. Speak into the phone to record your voice. Hang up to complete.