

# COGSCI 120 Project 1 Report: Contextual Interviews with Cellular Phone Users

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## Introduction

Cellular phones have changed the way people communicate. One no longer has to be stationary to talk on the phone, but instead can make quick contact while traveling or during other activities. Phones incorporate such features as alarms, calendars and phone books. How well do these interfaces work for people? How easy are they to learn, and how facile is their use once mastered? To answer these questions about phone book features specifically, we observed several users interacting with this feature of their phones.

## Contextual Interviews

We approached each of four randomly selected users and asked if they would mind doing a few simple tasks with their cellular phone while we observed and asked questions. We had them read and sign an observational consent form, and we explained the context of our study. We then asked them to add a new entry to their phone book, then to look up that entry as if to call it, and finally to erase the entry. During the interview we watched what the user was doing, asked them to explain or repeat steps we missed, and asked questions about things we did not understand.

### User 1 (Nokia 3390)

**Adding an entry.** He keyed in the number without entering any special mode or menu. Next he pressed the arrow keys to change the function of the “navi” key (marked with a blue line) from “call” to “save”. He entered a name by cycling through the letters assigned to each number key and pressed the navi key to save the new entry.

**Looking up an entry.** First he pressed the down arrow to bring up the phone book. He then keyed in the first letter of the entry he was searching for. This brought up an entry beginning with that letter; he then cycled through entries using the arrow keys until the entry desired was shown. Pressing the navi key at this time would call the number.

**Erasing an entry.** He pressed the navi key to activate the main menu, then selected “phone book”. This brought up a menu of actions. He scrolled down the list and selected “erase”. The next menu offered two options: “one by one” and “erase all”. He selected “one by one”, then found the entry as before and pressed the navi key to erase it.

### Comments

The user was expert; he performed the requested actions quickly and was able to explain what he was doing. However, his expertise was arcane; many of the actions he took were clearly not easily discoverable. For example, it is far from obvious that pressing the arrow keys after keying in a number would change the function of the navi key; there is no such indication. It is also not obvious that pressing the down arrow would activate the phone book.

Erase mode is dubious. The user must wade through several menus before erasing anything, and once in erase mode, the navi key’s action remains “erase” until the user presses “C”. Accidental erasures are a real possibility since the navi key usually calls an entry rather than deleting it.

## User 2 (LG 510 flip phone)

**Adding an entry.** He opened his phone and keyed in the number, then brought up a menu he called “option”. From this menu he selected “save”. In the save dialog, he cycled through icons such as “home”, “mobile”, “pager”, “fax”, and so on, finally accepting “office”.

Next he had to key in a text label, which required pressing a key to enter what he called “English mode”. He said this took a while to figure out because the interface gives no indication of how to do it. In English mode, pressing the numeric keys cycles through the letters printed on them. After keying in the text label, he saved the entry.

**Looking up an entry.** He brought up a different menu and selected “phone book”; from the resulting menu he selected “find entry”. He keyed in the letters in the entry, but explained that in this dialog he only had to press each key once—the phone automatically determined the letter by comparing to labels in the phone book entries. He said this was hard to get used to. He also said this automatic matching didn’t always work and sometimes he had to scroll through the entries to find the one he wanted.

Once he had keyed in the label, he pressed a key to bring up the entry. It still took a few seconds to bring up the entry, during which a progress indicator climbed to 100%. He blamed the slowness on the 2-year-old technology. He also said he usually uses the last 10 numbers dialed in, last 10 dialed out, and last 10 missed calls in lieu of the more complex phone book, because “you usually end up calling the same few people over and over anyway.”

**Erasing an entry.** He again selected “phone book”, then “find entry”. This time, instead of keying in the text label, he used the “entry number”, a direct numeric index to the entry. This was instantaneous, unlike the search feature with the progress indicator. With the entry showing, he brought up the option menu, selected “erase entry”, then selected “yes” on the confirmation dialog that came up. He reflected that this was the first time he’d ever erased an entry; when asked, he said he knew how to do it because he’d spent time exploring the features of the phone.

### Comments

The reported failure of automatic matching may have been due to collisions in the label space (“LEE” and “JED”, for example, both correspond to “533”). Oddly, though the phone had correctly matched the label as he keyed it in, the search took an appreciably long time; it seems the entry would have to be uniquely identified in order to do the matching, and so the search should have been finished by the time the label was entered. The inadequacy of this search feature is the most likely reason the user bothered to remember the entry number, which is extraneous cognitive load.

## User 3 (Nokia 3390)

**Adding an entry.** The user inserted the number by dialing it and pressing the navi key twice in quick succession, calling the number and quickly hanging up. He then saved the entry from the list recently dialed numbers.

The user had some difficulty keying in the name. The phone was in “spell mode”, which meant every keypress resulted in one letter instead of cycling through the letters printed on the key. He changed the setting of the phone and then had no problem inserting the name.

**Looking up an entry.** He pressed down on the scroll key, activating the phone book. Then he keyed in the first letter of the label he was searching for, by pressing the numeric keys repeatedly as usual. This brought up an entry beginning with that letter; he then used the arrow keys to find the entry he actually wanted.

**Erasing an entry.** The user navigated to the phone book menu, scrolled down to erase, then selected “one by one”, and repeated the same process as before to find the entry. He erased it and pressed “C” to go back to the home screen.

### Comments

Dialing a number and quickly hanging up is an interesting, probably unintended way to save it temporarily; many cellular phone users do it. User 3 used this as an intermediate step to creating a phone book entry, probably because he was unaware of the way User 1 tackled the task—using the arrow keys to change the function of the navi key to “save”, which is simpler and faster.

## User 4 (Nokia 3390)

**Adding an entry.** First the user had to unlock his phone. Next he attempted to activate the main menu but accidentally locked the phone again. He unlocked his phone once more, then pressed the navi key to activate the main menu, from which he chose “add entry”. He keyed in the number, then keyed in a label by cycling through letters.

**Looking up an entry.** He pressed the down-arrow key to activate the phone book. He then keyed in the first letter of the label to jump to a nearby entry and used the arrows to find the one he was looking for.

**Erasing an entry.** He pressed the navi key to activate the main menu, then chose “phone book”, then “erase”, then “one by one”. He repeated the same process as before to find the entry, then pressed the navi key to erase it.

### Comments

The lock feature prevents any unintended consequences from keys being pressed while the phone is, say, in a pocket. The downside, of course, is that it must be deactivated before one can use the phone. We have no reason to believe the accidental locking was attributable to any defect in the interface; it was probably a simple case of user error.

## Discussion and Conclusion

The speed with which expert users carry out common tasks is a testament to successful cellular phone design. People generally use a single phone frequently and exclusively, so time spent learning quick ways to do common tasks pays off in the long run. However, when features aren’t easily discoverable, people often find suboptimal ways to accomplish goals and never learn the shortcuts. During this project, in fact, two of our group members learned a simpler way to create phone book entries in the Nokia phones they’ve been using for some time.

Keying in text with the numeric pad is cumbersome. With the cycling method, repeated letters are especially awkward because one has to pause for some period before pressing the key again. The automatic spelling mode is an interesting alternative, but its costs seem to outweigh its benefits: having to remember two ways to do the same task is harder, and some strings (such as “LEE” and “JED”) cannot be disambiguated from one another with just one keypress per letter. Worst is the surprise for the novice user when pressing a key repeatedly sometimes cycles through letters, and other times results in multiple letters. Even experts can easily make mistakes in this situation, which stalls the interaction as focus switches from doing the task to diagnosing the error.

Cellular phone design must balance several factors including discoverability, time-saving features, size, and complexity. Most phones have only a few buttons in addition to the numeric keypad; because these keys must have many functions, they are often minimally labeled. More keys would allow for better labels, making features more discoverable, but would increase clutter in an already cramped space. Features like automatic spelling can speed up text entry, but also increase complexity and make errors more likely.

Despite limited input and output capabilities, expert users are fast at common tasks. The keypad and the display are small, and users often hold them close and oriented toward their own eyes. These factors combine to make detailed observation of actual use difficult. To the extent we learned which keys were pressed when, it was because we asked and were told or shown in slow-motion.

## Suggested Improvements

- A fully functional incremental search would replace two features—jumping to entries by just the first letter, and the cumbersome “off-line” search—providing just one powerful and convenient way to find entries.
- A single method for text entry would solve some of the problems we saw. A modeless quick-entry feature might work; at the least, there should be a way to tell which mode is active.
- In the design of the LG 510 we would leave entry numbers out entirely.