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EECS 598 - Human Computer Interaction
Assignment 3: Interactive Systems Evaluation

Assignment Summary

My focus continues to be the process of receiving and sending a text message with one hand while in the process of walking. As before, this focus assumes the prospective stakeholder is in a socio-economic situation in which they can afford a touch screen cell phone which may or may not have special features for inputting text with one hand. It also assumes the prospective stakeholder has the physical ability to use the mobile device with the intended controls. The specific goal I am interested in is sending a text message using one hand, without errors and without running into physical barriers.

My contextual inquiry was illuminating in a variety of ways. The user reported that the choice between using one hand versus two hands to input text is largely made in response to environmental variables such as motion, cleanliness, and body position. He related that the choice is not conscious, and it is not influenced by a desire for speed or efficiency. The user experienced frustration with existing technologies and recurring errors, and he expressed a desire for features that are easy to learn and adopt.

User Requirements

1. The user must be as effective in sending accurate text messages while inputting text to respond to a text message with one hand as with two hands.
    - This is grounded in my interpretation that speed with one hand over two is not necessarily something he pays attention to (T01-1), but he often finds himself restricted to using one hand. For example, when walking between classes (T01-2) and needing to perform physical tasks (T01-3). He also experiences the same “general effectiveness” with either configuration; therefore, a new product should not make the effectiveness change greatly between the two configurations (T01-411).
2. The user must be able to access either the entirety of the screen or the necessary targets needed to send the message with less adjustment compared to the current method or none at all.
    - This is grounded in the interpretation that it can be difficult to reach the top of the screen and the current solutions are unwieldy, so he doesn’t use them. (T01-4, T01-5, T01-6).
3. The user must not endure (report) any more pain or discomfort from using one hand than with using two with the new proposed design in comparison to the old method.
    - This is grounded in the interpretation that using one hand or two hands is not a conscious choice, and it shouldn’t be a choice that is influenced by discomfort (T01-10).
4. The user must be able to learn and execute sending a text message effectively (without error), using the new proposed design, such that they desire to use the new proposed design again.

    - This is grounded in my interpretation that existing technologies seem “clunky,” and “gimmicky” and have an “initial hurdle of getting used to [the existing method]” that is “off putting.” (T01-5, T01-7, T01-9).
5. The user must be able to correct errors as or more effectively as the old method, using the newly proposed method.
    - This is grounded in my interpretation that he had to go out of his way to implement keyboard shortcuts to avoid his own common typos, because of the process of correcting his errors, due to a lack of proofreading. (T01-13, T01-14, T01-15)

Design Considerations

My current paper prototype exhibits several new features to address the major concerns raised in my contextual inquiry. The design focuses on making it easy to reach all of the buttons which addresses requirement 2 directly, and requirement 3 indirectly. This is under the assumption that the user will primarily use their thumb. In pursuit of this focus, the keyboard is hand-sensitive, meaning it shifts all of the icons to the side closest to the user’s thumb. The icons momentarily increase in size when they are tapped, so the user knows which character they tapped, the keyboard is resizable, and there is an additional notification bell on the home screen that is closer to the user’s thumb. The keyboard layout and special characters is very similar to the existing technology which addresses requirements 4 and 5. Because the design is not very different, it is no more difficult to learn than the existing technology, and because the back button and autocorrect are familiar ways to correct typos.

User Study Description and Results

The format of my simplified user studies was as follows: I collected three participants, and I assigned them the task of responding to a text message with the string “hello.” I did not give any other instruction, and as the participants each completed the task, I noted the following comments and breakpoints below.

Participant 1:

- Confused by the extra button to indicate a notification
- Took a while to figure out the slider
- Suggested that the slider (to adjust the size) should have three horizontal lines to give it the familiar tactile feedback look
- Suggested either using a touch lock to prevent adjusting the slider by accident or making the keyboard size a settings option
- Remarked the Wizard of Oz method had slow feedback
- Found that the send button requires an inconvenient stretch of the thumb

Participant 2:

- Liked the bell notification icon, found it easy to touch with smaller hands

- Liked the shifted keyboard, found it easier to hit keys accurately with one hand, “less of a struggle”
- Found the slider confusing at first, suggested the use of horizontal lines to indicate a slider
- Suggested the send button should be on the other side, remarked that as long as it’s close to the top it is not in danger of being pressed by mistake

Participant 3:

- Didn’t immediately know where the send button was until they saw the paper airplane
- Didn’t know whether to click on the notification or find their messaging app
- Had no idea what the slider was
- Liked that all the letters were on the side of the keyboard for their tiny thumbs
- Didn’t recognize the bell icon

Results Summary

The participants noted some important issues with the interface, specifically the slider was confusing to understand. They noted that the slider icon did not match with the real world image of a slider that has tactile grooves that indicate movement. They also noted that the send icon was too far away from the thumb. Overall, they perceived the prototype positively and appreciated that the icons were shifted to one side or the other. The specific Heuristics that the users noted are expanded on in the following section.

HCI Expert Heuristic Evaluation

The format of my heuristic evaluation was as follows: I described the intended usage with an HCI expert, and I assigned them the task of responding to a text message with the string “hello.” I joined the expert in assessing the prototype for any of the following usability issues.

Evaluation of 10 Heuristics

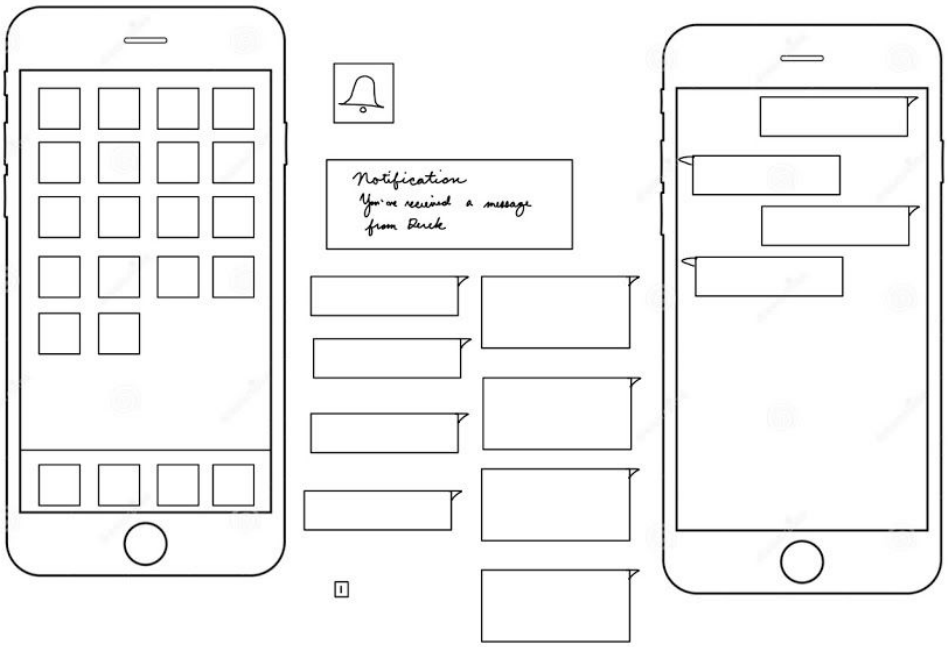
1. Visibility of system status - 2 (Minor usability problem)
    - The letters increase in size as you type them, to ensure that you know which character you typed. However, this increased icon size may block an adjacent character, impeding typing.
    - Tapping on the notification banner or the notification bell icon changed the screen to the texting application.
2. Match between system and the real world - 3 (Major usability problem)
    - The slider did not look like a slider that you are used to. It didn’t have the three horizontal bars that indicate some kind of tactile feedback.
3. User control and freedom - 0 (Not a usability problem)
    - There is a back button to undo errors.
4. Consistency and standards - 1 (Cosmetic problem only)

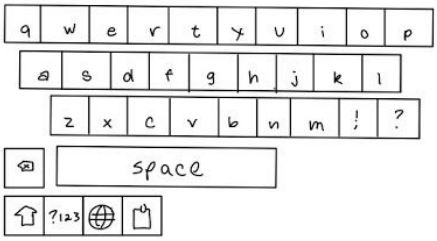
    - When the keyboard increases in size, the position of the send button changes which is inconsistent.
5. Error prevention - 0 (Not a usability problem)
    - The send button is located far away from your thumb, so it makes you take longer to send
6. Recognition rather than recall - 2 (Minor usability problem)
    - The keyboard does not depart significantly from current standard technology.
    - The new notification bell is not a readily recognized icon, so you might need an explanation of what it was.
7. Flexibility and efficiency of use - 0 (Not a usability problem)
    - The new notification bell icon adds another way to reach the messaging app and open the window to respond to the message.
    - Because the new design does not differ significantly from the current technology, new users and experts would perform no worse with the new design
8. Aesthetic and minimalist design - 0 (Not a usability problem)
    - The paper prototype demonstrates a usable interface that adds functionality without cluttering the user space with more features.
9. Help users recognize, diagnose, and recover from errors - 0 (Not a usability problem)
    - The letters increase in size as you type them, signally that you typed the correct or incorrect character.
    - Consistent with existing technologies, the new design will update the typing box as the user types, so that will also signal to the user if they make a mistake.
10. Help and documentation - 0 (Not a usability problem)
    - The new design will include setup information to help new users.
    - This evaluation method is not sufficient for assessing this issue.

Results Discussion

In response to the user studies, it seems that a new iteration would benefit from major changes to the slider icon/resizable feature. One proposed change would make keyboard size adjustment a settings option, because it may not be something the user wants to change often. Another option would be to add the familiar three horizontal bars to the slider, so it is more easily recognized. This would help the new iteration follow requirement 4 because it would provide ease of learning. To more closely follow requirement, the send button should be located on the thumb side of the keyboard, to avoid an uncomfortable stretch.

Paper Prototype


Notification
You've received a message from Derek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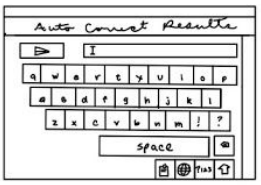
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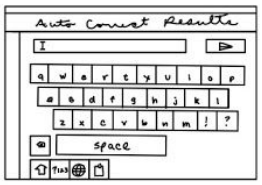
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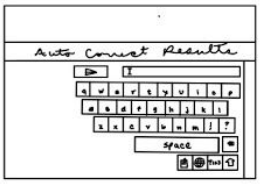
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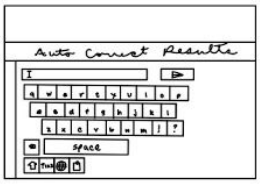
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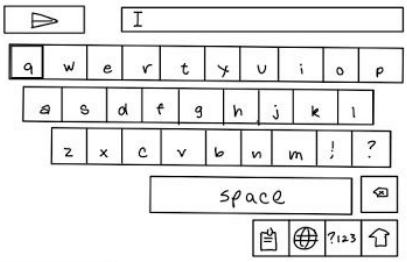
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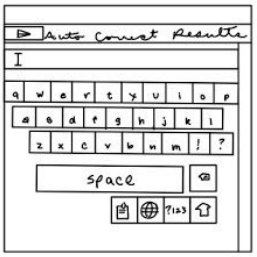
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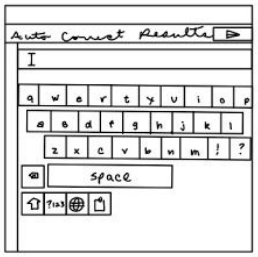
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