Investigating Performance and Usage of Input Methods for SoftKeyboard Hotkeys

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Interação Humano-computador
2021-05-19
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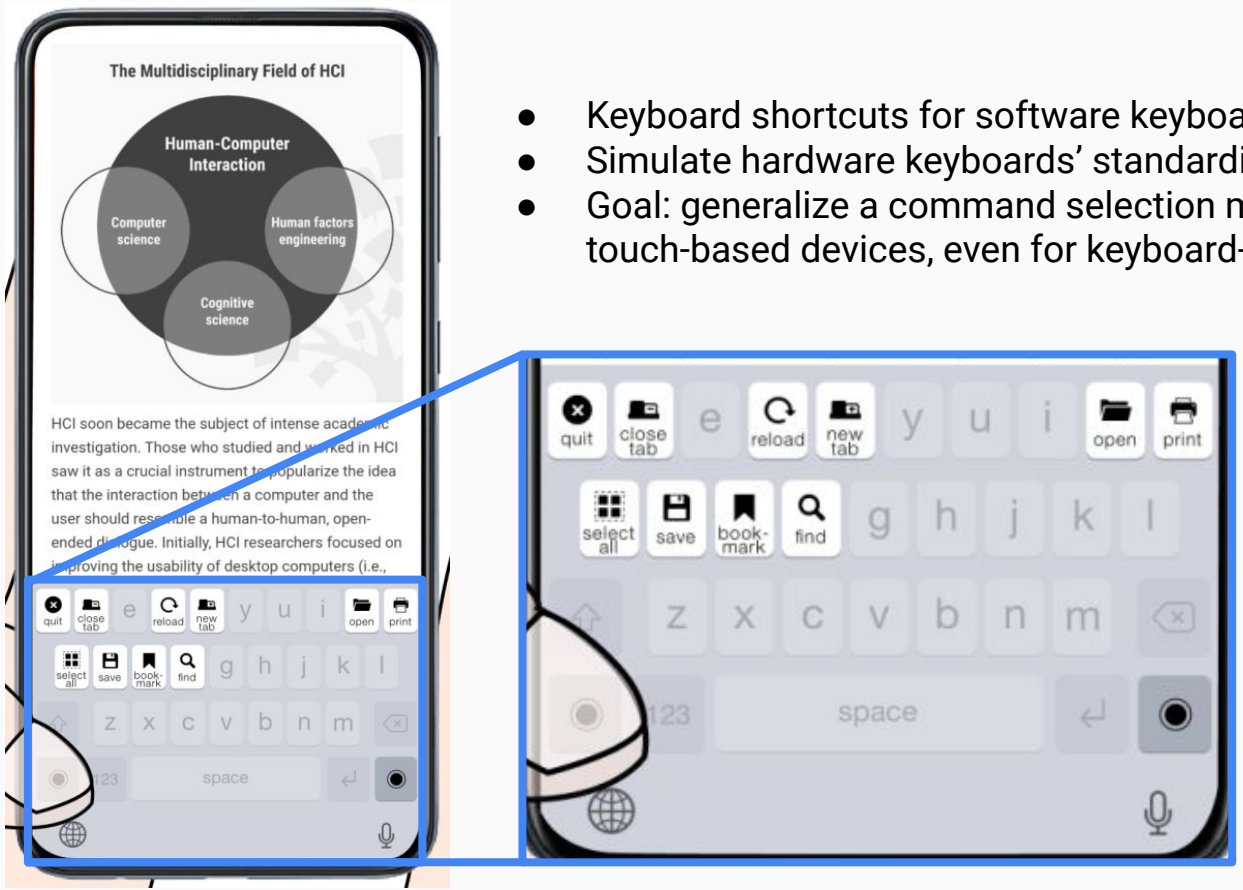
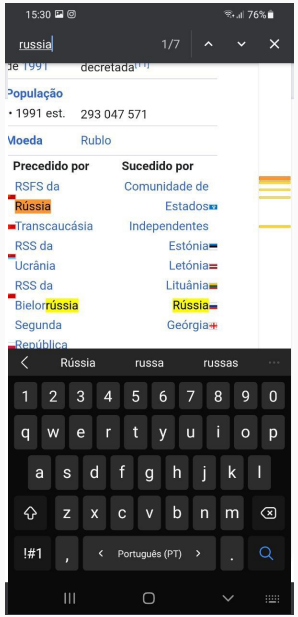
Softcuts: Software Keyboard Shortcuts



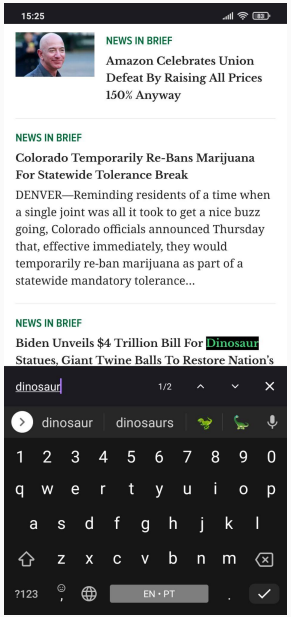
- Keyboard shortcuts for software keyboards
- Simulate hardware keyboards' standardized shortcuts
- Goal: generalize a command selection mechanism for touch-based devices, even for keyboard-less applications

Why Softcuts? Example: Search buttons on Android applications

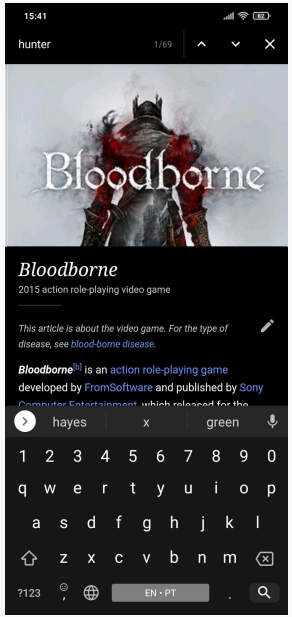
- It can be hard to find shortcuts, since they are in different places depending on the app
- It'd be useful to use desktop shortcuts on mobile devices



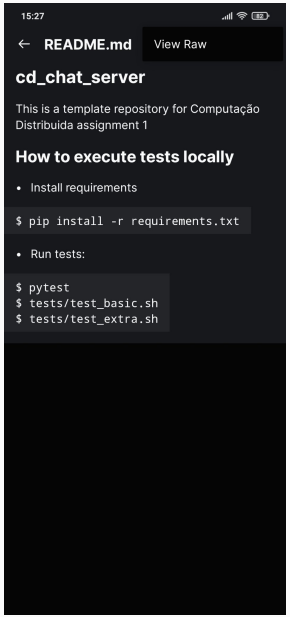
Chrome



Firefox



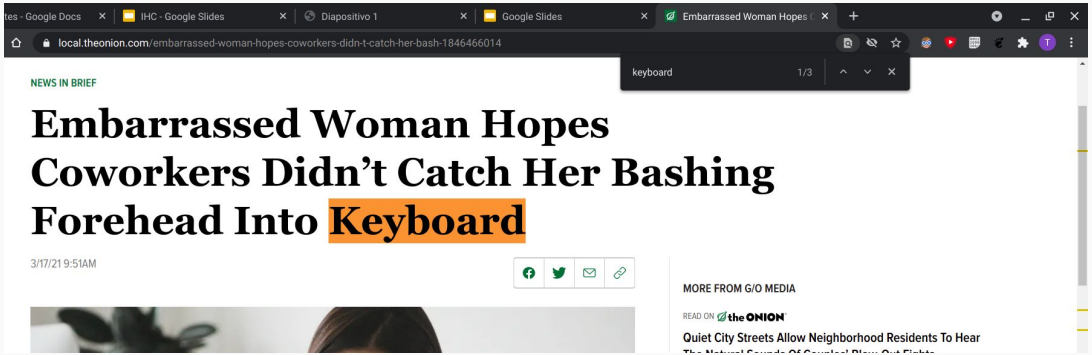
Wikipedia



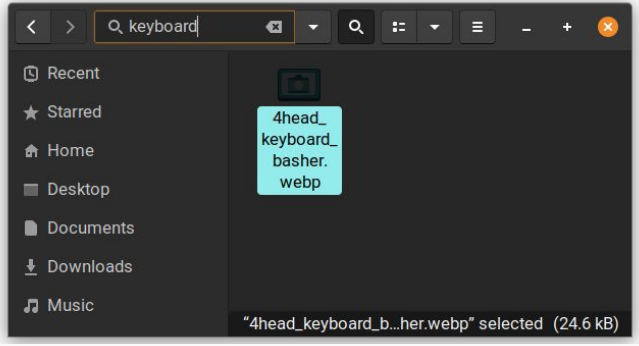
GitHub

All applications used on Android

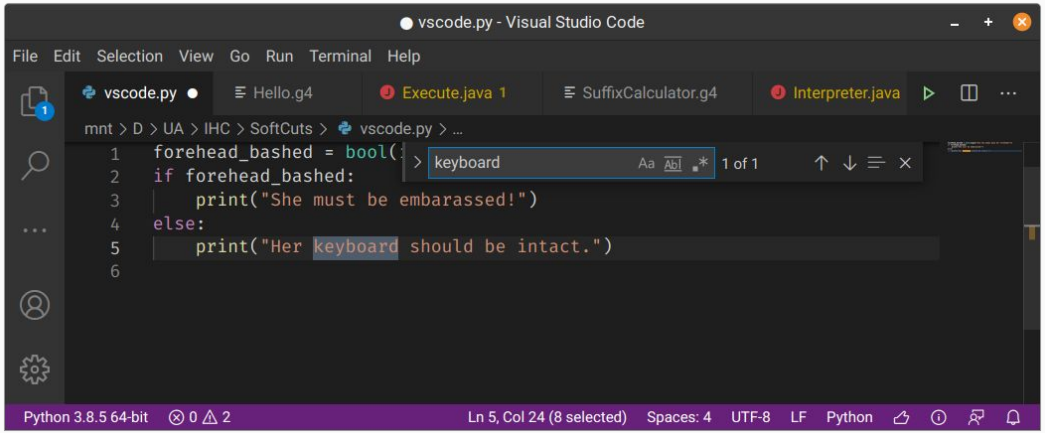
Why Softcuts? Example: CTRL+F on desktop applications



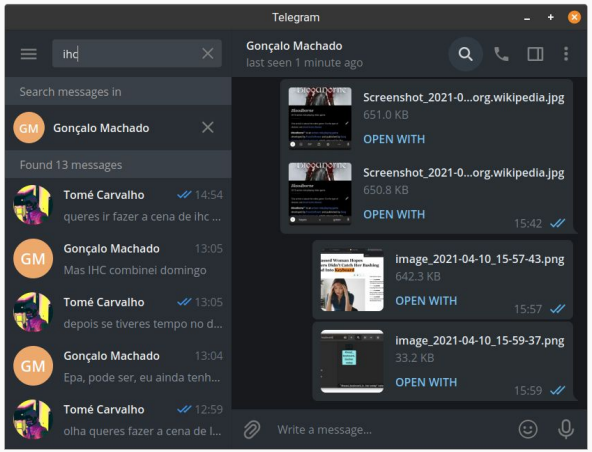
Chrome (browser)



Nautilus (file manager)

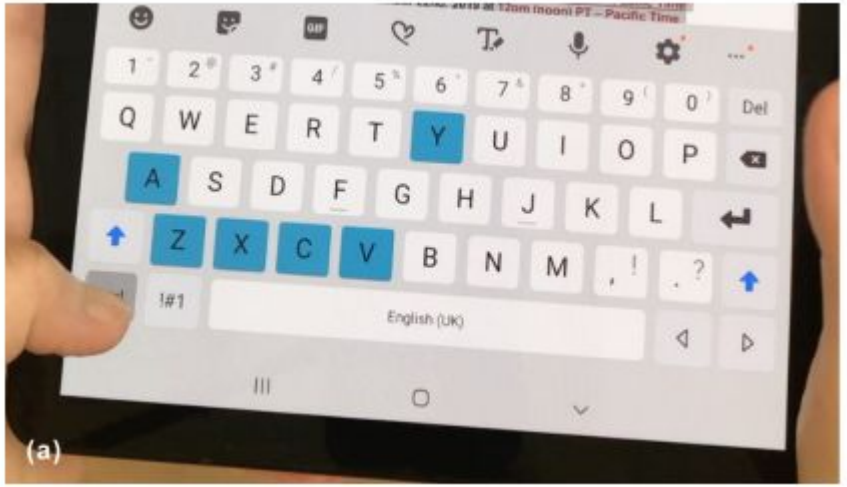


Visual Studio Code (text editor)

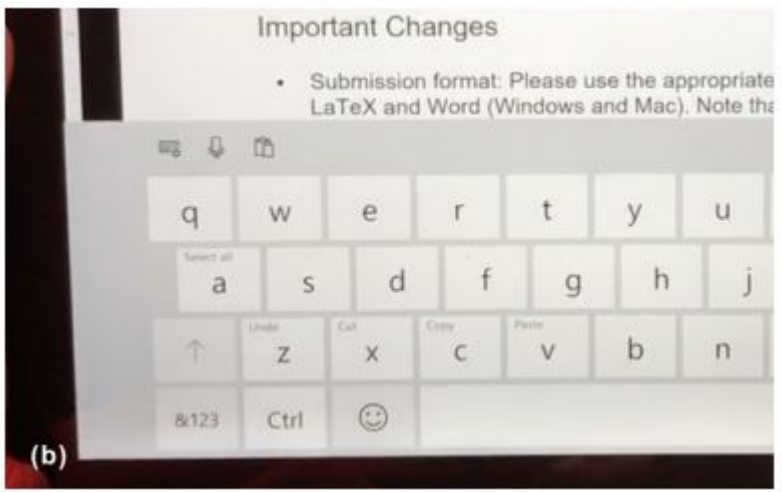


Telegram (instant messaging app)

Existing implementations of SoftCuts

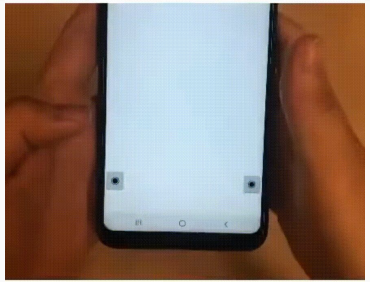


Samsung Galaxy S

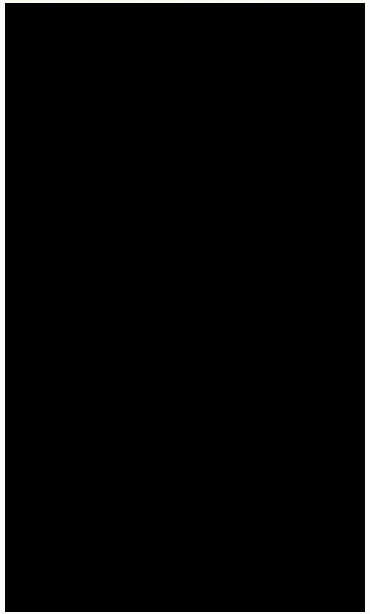


Microsoft Surface

Input Methods

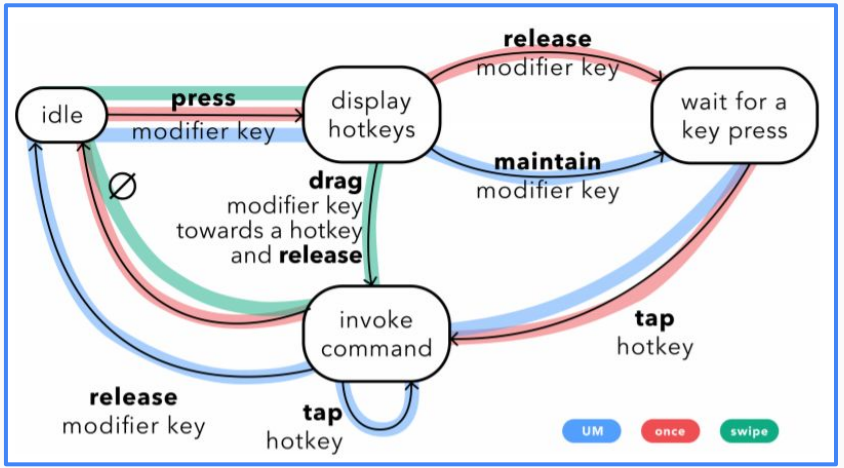


UM: User Maintained



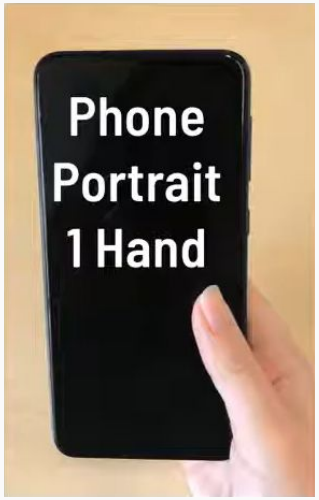
Swipe

Once



State diagrams for each input method, showing that the three methods can be used concurrently

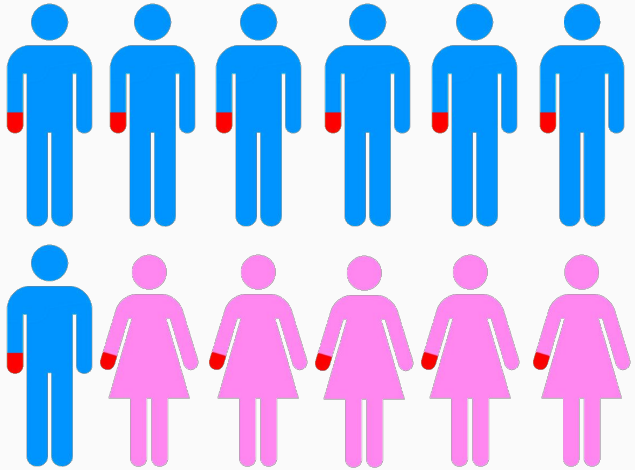
Configurations



The following configurations were removed due to physical constraints:

- Tablet one-handed
- Phone Landscape one-handed

First Experiment: Performance of Input Methods - Demographics and Apparatus



Age: 18 to 30 (Mean = 25.1)

Monetary reward: 7.50 USD

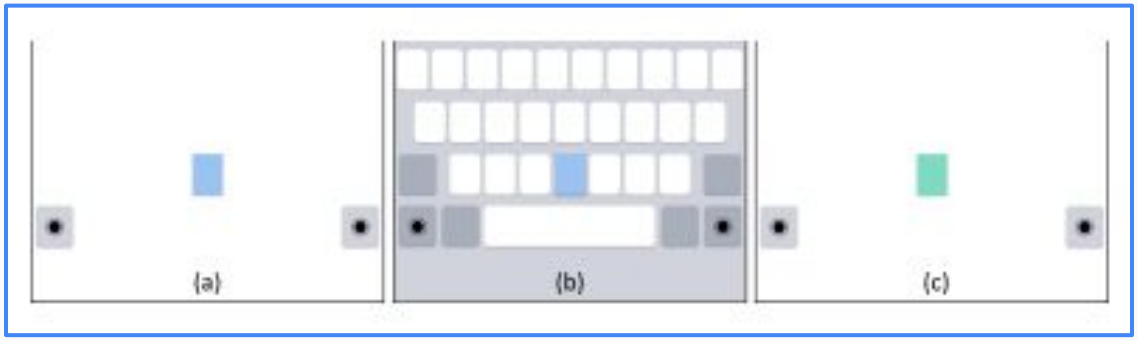
Experimental software written in Java using Android Studio

Testing devices

Samsung A10
6.2”, 168g

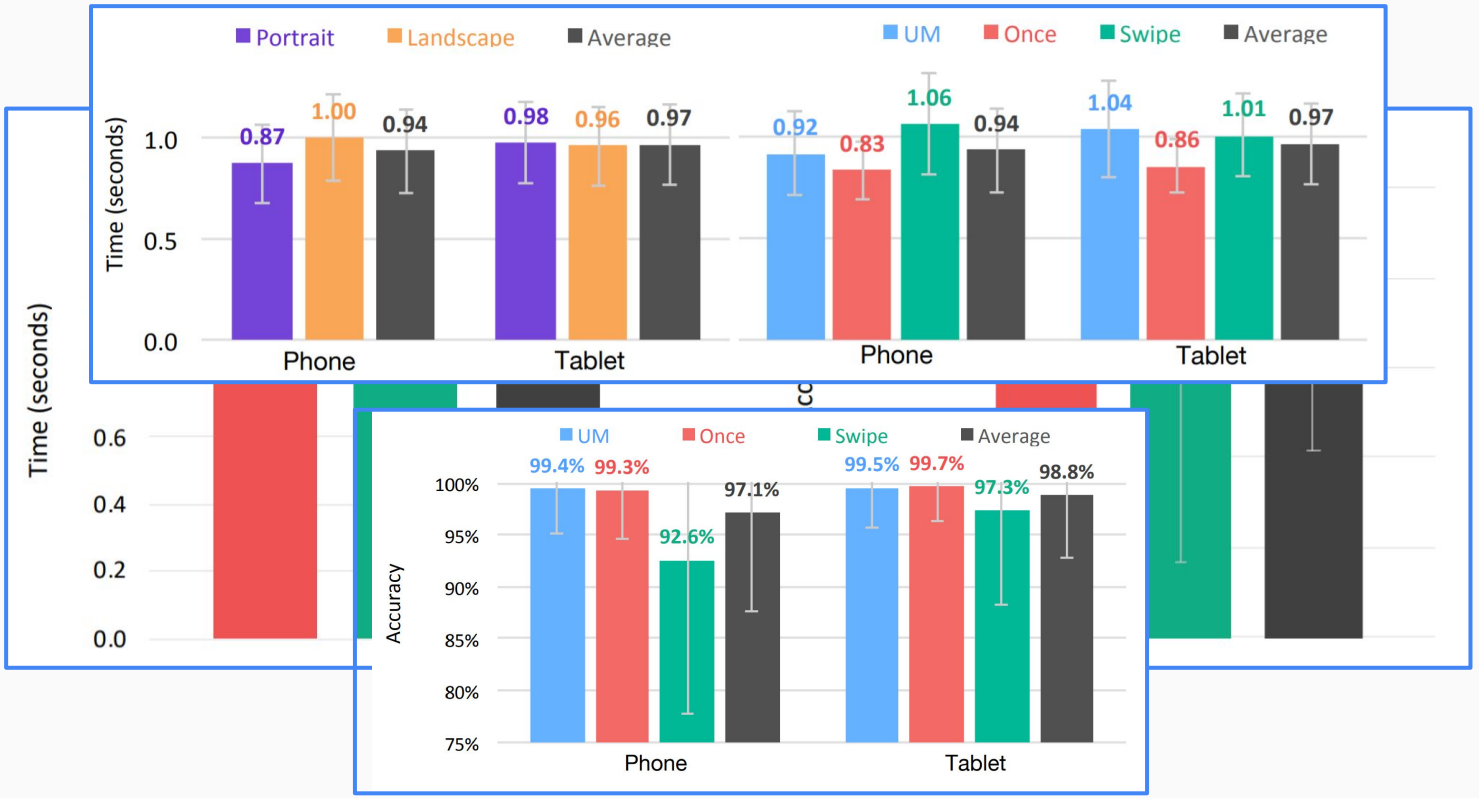
Samsung Galaxy Tab 4
10.5”, 483 g

First Experiment: Performance of Input Methods - Procedure



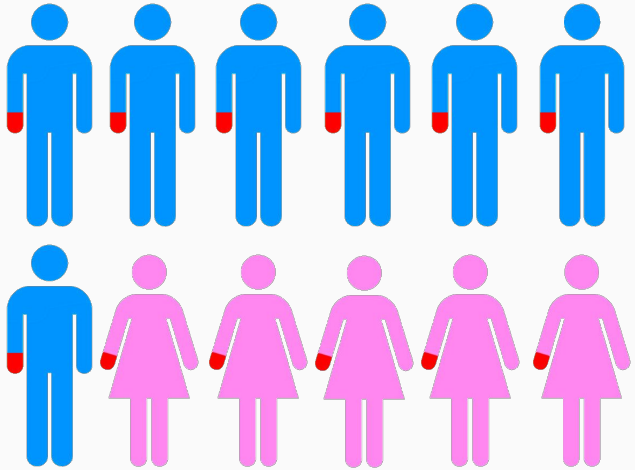
- Participants were asked to perform repeated series of command executions, with a given input method and configuration
- Note: User-maintained + one-handed wasn't used, since UM requires the usage of both thumbs

First Experiment: Performance of Input Methods - Results



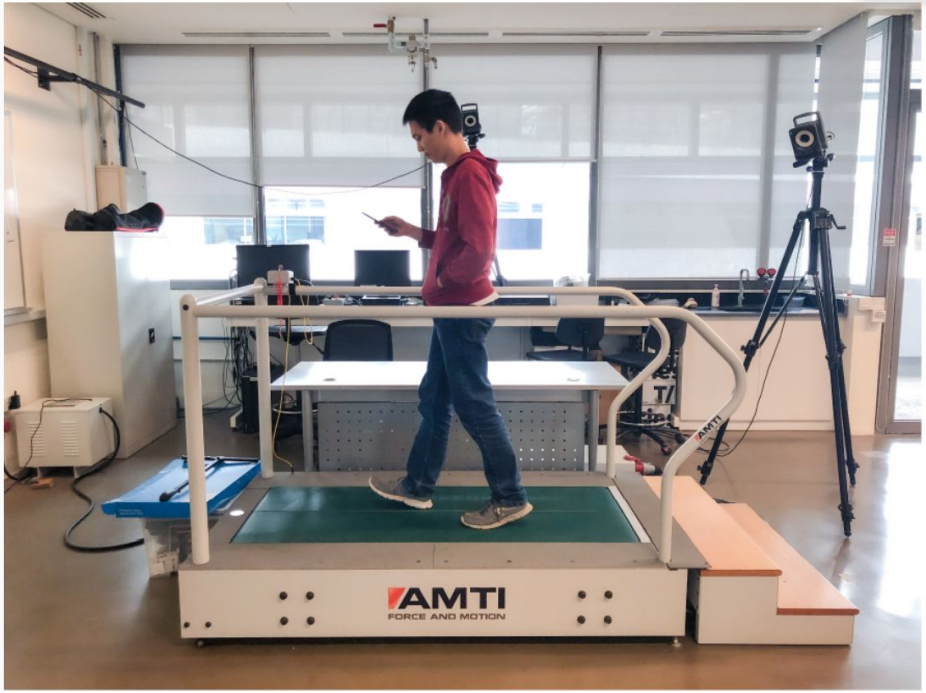
Two-handed results

Second Experiment: Usage of Input Methods - Demographics and Apparatus



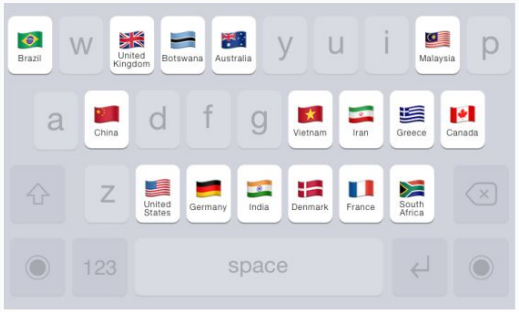
Age: 21 to 28 (Mean = 24.2)

Monetary reward, testing devices and software used are the same as the first experiment



Experimental setup for the treadmill conditions

Second Experiment: Usage of Input Methods - Procedure



Phone: portrait layout

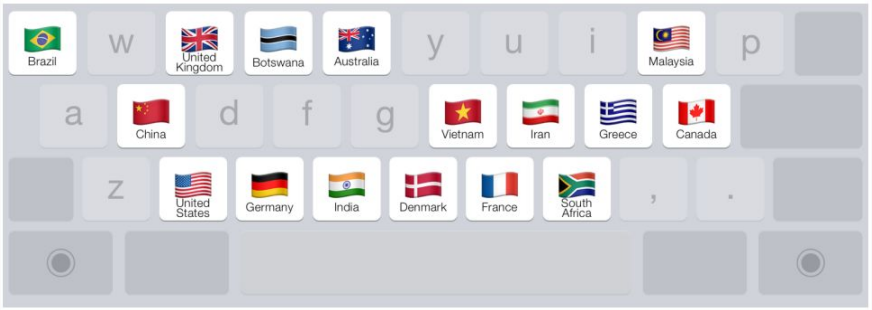


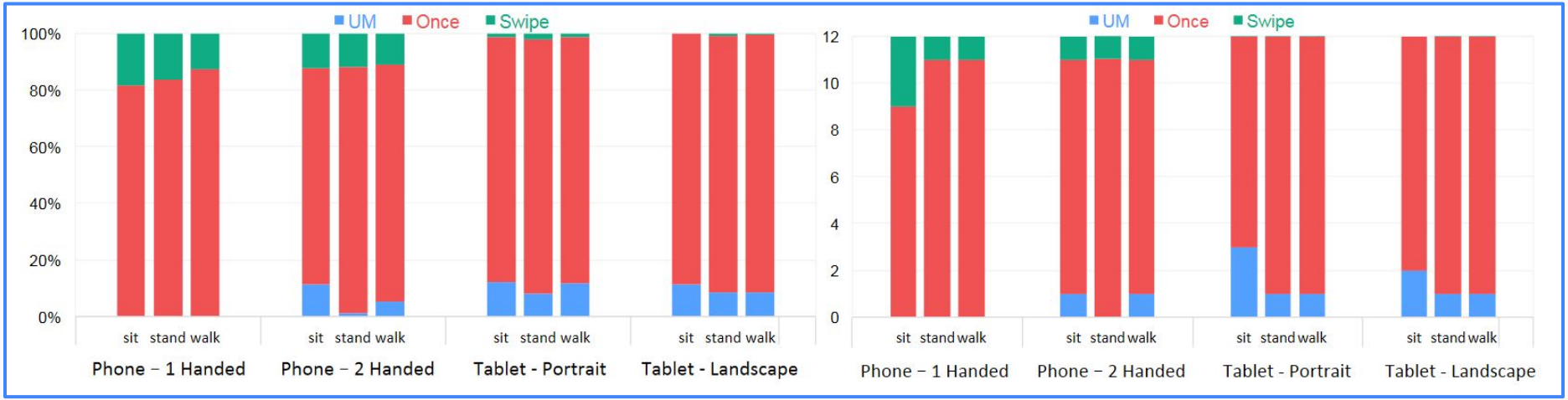
Table: landscape layout

- There would appear a target command on top of the screen
- Participants would press the modifier key and the correct command using any of the three Input Methods available
- For Phone conditions, the Handedness was the main factor
- For Tablet conditions, the Orientation was the main factor

Second Experiment: Usage of Input Methods - Results

Accuracy

Preference



Conclusions

1. Once: fast, accurate, by far most participants' favorite
2. Some enjoyed Swipe on the phone, despite its worse performance
3. Some liked UM on the tablet (one stated that gripping it while using UM felt natural)
4. SoftCuts in the real world:
    a. No interference between the 3 input methods
    b. No need to memorize the mapping between hotkeys and commands (SoftCuts displays the name of the commands)
    c. Uses previous knowledge from physical keyboards
    d. Low cost: Only necessary to implement CTRL/Command key in keyboard
    e. Keyboard-less scenarios: modifier button always displayed so users could use commands at all times;

Bibliography

- https://dl.acm.org/doi/10.1145/3379503.3403552
- Investigating Performance and Usage of Input Methods for Soft Keyboard Hotkeys