Abstract:

My iPhone is paired with the Bluetooth in my wife's car. This is useful when I am driving her car, however has undesirable effects when I am not in her car because my phone automatically pairs with the Bluetooth every time her car is on near me.

Qualitative Evaluation:

I conducted an online survey to evaluate my prototype and received 65 responses. I first learnt that about 90% of the smartphone users use either an iPhone or Android which enables me to focus on a solution predominantly with those phones in mind. An overwhelming majority of users (82%) preferred to control the order in which their smartphone pairs with Bluetooth devices. However, this was contingent upon an easy way to accomplish the same as demonstrated by the drag & drop feature in my design.

If the phone is paired with a Bluetooth device the participants preferred to override that and connect to a different device using both voice and display commands, if they are available. However, between voice and display, the users preferred display over voice. This makes sense as the users might undertake these actions in social settings which would render audio messages awkward.

Once the phone has paired with a Bluetooth device the participants preferred to receive that confirmation through all means – sound, display and haptic. This was surprising because sometimes getting a beep, display message and a vibration at the same time could be annoying and confusing. I would expect that the users prefer only one mode of confirmation. However, when the users are in the middle of a task such as speaking to someone using a Bluetooth device and their phone wants to pair with another device, a majority (76%) of them preferred to be asked that question via display. This is expected because when they are using their phone, a display option is the least intrusive because they can ignore the same without anyone knowing about it. Consistent with the above behavior the participants mentioned that they preferred to respond to a question about pairing to another device via the display mode, if they are using their phone with another device.

When asked how they would like to receive a confirmation message that their phone has paired with a device after leaving the current pairing mode, the users preferred to receive that message via all modes. This is a surprising finding because a vibration or a beep would indeed affect their current task if they are speaking to someone.

The biggest take away is to keep the interface simple, easy to use and consistent with similar applications. I believe the affordances such as push buttons, drag & drop are welcome by the users and easy to explore. I wish I had included a clear description of my prototype along with relevant screen shots, so that the participants could have evaluated better.

Predictive Evaluation:

As a user I would first turn on the device and go to Bluetooth settings to pair my phone with the same. This is in expectation that smartphone users usually go to settings to manage their devices. If the phone has paired with multiple devices in the past then the user can drag and drop the device names in the order of preferred pairing. However, this behavior has to be made apparent by creating affordances that

enable the user to drag and drop. In addition, this feature has to be consistent with similar smartphone applications, so that the users intuitively know how to respond. Once the user has paired their phone with a device, they would expect some kind of a confirmation to indicate that the pairing was successful. This is consistent with many smartphone applications that provide voice, visual and haptic feedbacks. Also, receiving the confirmation offloads the cognitive load from the user to the interface, the lack of which would make the user wonder if the pairing was successful or not.

Once the user has set their preferred pairing order and started using their phone with a device, if someone turned on another Bluetooth device that is higher in their priority list then I would not expect the phone to leave the current pairing mode abruptly and pair with this new device. In such situations, I would expect the interface to ask what the user prefers to do. This way, I don't have to cognitively monitor the status of the current pairing. Also, I would expect that the interface asks this question via multiple modes and enables the users respond in any mode. Overall, if the user is using their phone with a device any change to that should happen only through the conscious actions of the user triggered through questions from the interface. Moreover, if the user presses an incorrect key or fail to respond the phone should maintain the status quo and continue to function with the current device without causing any interruptions. All of the above should be accomplished with affordances and common sense features so that the users don't have to spend any time in learning how to respond and don't get surprised while encountering those for the first time. Specifically, responding to those questions shouldn't require any more cognitive load than what's required at that instant.

Evaluation Summary:

About 23% of the participants indicated that they don't use a Bluetooth device. In my need finding exercises, I didn't glean on why they are currently not using Bluetooth devices. This is important to understand because of the obvious benefits of using such devices. I would like to further understand this behavior of the users to see if my interface would motivate them to start using such devices.

In performing these evaluations, I have discovered that my design didn't have enough affordances that signify what actions are possible. This is important to take the cognitive load off from the user to the interface. Moreover, the user will indeed come across the features of the interface only when there is a conflict in pairing with two Bluetooth devices, so it is essential that the user know in advance what features are possible. I hope to tweak my design so that all the possible actions are very intuitive without requiring the user to refer to a manual. In addition, my design included only the drag and drop feature to specify the preferred order of pairing and didn't consider other ways to do so such as using voice control. Also, my design incorporates different modes of communication and feedback with the user such as visual, haptic and voice. My current design doesn't provide the ability to turn a particular mode off. Based on the results of the evaluations, I think it would be better to tweak my design so that the users have flexibility in selecting their preferred mode of communication with the interface and turning other modes off.

After making changes to my design I would like to perform both qualitative and empirical evaluation. However, I would like to do this in two steps where I would evaluate it qualitatively first and then incorporate those results into the prototype for empirical evaluation.