Assignment P2:
CS6750 Spring 2019

Dan Higgins
Daniel.higgins@gatech.edu

Direct Manipulation (from Lesson 2.3)

Question 1

In answering this question, we will be focusing on tasks related to online student registration.

Describe one of the processes by which people look up and enroll in classes at Georgia Tech

To enroll in a course in GA techs online Master's Program you must execute the following steps: (1.) Login to the GA Tech Portal (Buzz Port) (2.) select the Registration OSCAR link this is represented by a Padlock Icon (I don't know why the Padlock, nor do I know what OSCAR stands for) (3.) Select Student services and financial aid (4.) Select Registration (5.) Select Look up classes (6.) Choose the term from the dropdown (7.) Select Advanced Search; the Basic Search functionality is not helpful in narrowing down the results. (8.) Select (using Shift-Click) your interested Subject(s) for me Computational Science, & Computer Science. (9.) Select the Campus as Online. (10.) Click Search. This provides a list of courses and the available courses will have a selection check box. (11.) Select the check box for the desired classes (12.) Hit Register! If it is not clear through the description, this process has a massive gulf of both execution and evaluation.

Describe a redesign of the system that more significantly leverages direct manipulation

"Direct manipulation is the principle that the user should feel as much as possible like they're directly controlling the object of their task" (L.

Hutchins, Hollan, & Norman, 1985) To that end our redesign will use an interface metaphor supporting course registration. Courses, Class Room and Students are represented as icons and are meant to mimic these items in the physical world. When a student logs in his or her identity appears on the desktop as an avatar (icon) with a small animation on arrival (this mimics an expectation of arriving to register). Hovering over the student avatar reveals additional info about the student and potentially some registration constraints if they exist. (The user's mental model may seamlessly trigger the hovering action as the arrival provides an animation of the student avatar suggesting that this avatar may have something to tell me.) Once logged on available Courses for that logged on student are provided and can be selected, dragged and dropped onto a Students Class Room to cause the registration process to initiate. The "semantic distance" which is the user's goal of registration and their expectation on how to do this in the system is minimized by the use of another animation mimicking the desired activity (of dragging the course to the classroom). The "Articulatory distance" is the expression of how hard it is to attain the goal of registration in the system. This distance is minimized by using familiar and well-known design techniques such as drag and drop that users are comfortable with, and the redesign keeps their prior expectations aligned.

Additionally, it is important to note that: "Direct manipulation design is not just designing a system with direct manipulation but Designing interfaces that feel more direct."(Joyner, 2017) Our redesigns use of animation helps in cases where the metaphor may not convert directly in a physical sense.

Describe two specific benefits of this redesign.

Given our redesign, the user is better able to cross the gulf of execution and evaluation. This is accomplished by narrowing both the semantic and articulatory distances with the use of direct manipulation and constant feedback on the activities being performed. The redesign benefits new students registering by providing an intuitive non-intimidating interface which gives consistent feedback during execution and provides confidence that the actions taken were correct with

feedback on confirmation as well. Additionally, the system benefits current students with greater efficiency by minimizing the steps needed to register and offloading cognitive load by only showing those courses the student is eligible to register for during the registration process.

The benefits of the redesign can easily be measured quantitatively by looking at the number of complaints or problems registering (i.e., trouble tickets) using the old system vs the new. And the qualitative benefits of the system could be measured with a simple student survey.

Question 2

The task that I have selected is text editing, and the interface I have chosen is Vi. Vi is a powerful tool for editing text files, but it has a somewhat cryptic and complex interface. To me, this interface is now invisible. However, this transparency is created through learning and not through design. Let's describe some of the components of the interface that initially require you to spend a lot of time thinking about them. First, to work in the interface, you must be aware of the different editing "Modes." There are three of these modes: Visual Mode, Input Mode, and Command Mode. Second, the interface behaves differently in each of the modes and often provides no feedback to tell you what mode you are in creating a wide gulf of execution. Third, in addition to not easily knowing the mode, you are in the keyboard inputs/commands are also not intuitive, and commands in each mode behave slightly differently providing poor affordances. So, for example, if you press the "l" key while in Visual Mode. You might think you are going to put an "l" in the text file you are working on, but this would not happen as you must be in Input Mode for that to work. The Visual Mode is for visually moving the cursor and selecting text. So knowing this you now might guess that pressing "l" would move the cursor to the "Left" (l or left) but no again selecting "l" moves the cursor to the right! If on the other hand, you are in Command Mode, selecting "l" would do nothing because when in this mode you must follow all commands by selecting the <enter> or <return> key. And when confused with all these commands and modes the interface provides no assistance to help the novice user.

Now after many years of using the Vi interface, I find I don't even think about the different modes. Gaining this expertise came at a high cost of practice, practice practice. When using the interface, it does not help to teach you instead you must read a manual. I eventually learned to see the modes not as separate parts of the system but simply as steps towards achieving the task at hand. And I also become aware of Vi's developer, Bill Joy and his rationale for why he coded the system the way he did. Understanding why things work in a certain way lends greatly towards simplifying the usage and improving the user experience. This, however, is, unfortunately, the direct opposite of tip 5 "Talk to your users" in this case the user (me) spent time figuring out what the interface developer was thinking. For example, the keys that move the cursor in visual model <h>-Left <j>-Down <k>-Up <l>-Right are the default position for your right-hand fingers when typing on a qwerty keyboard. (These keys are a fast and efficient way to move the cursor if you know how to type.)

Let's now, briefly describe how we might redesign the interface to get you to the point of invisibility more quickly. All text editors have significantly improved over the years reducing both the gulf of execution and the gulf of evaluation by applying many of the techniques discussed in lesson 2.3. Improving the semantic distance of achieving a task through the using direct manipulation techniques such as copy, cut and pastes with a mouse or with hand gestures on a tablet or phone. Vi now has some clones the most famous being Vim (Vi Improved) this implementation retains all of the quirks discussed above but provides invisibility to the novice users by hiding the complexities of the interface (some modes are moved in and out of automatically) yet the redesign still offers experts the means to maximize efficiency by using the modes manually.

Human Abilities (from Lesson 2.4)

Question 3

Using a smartwatch to navigate a route as a pedestrian

I have a Garmin Smartwatch which provides features for navigating a route. The primary consumers of the watch are outdoor enthusiasts and athletes of all levels. In this discussion we will focus on a pedestrian

walking a route but indicate that the watch also provides features to support hiking, biking, running, skiing, golfing, paddle boarding, etc.

Visual: The visual aspects of navigation are excellent, and the watch screen uses a technology that does not wash out in direct sunlight ensuring high-quality feedback and improving visual sensory input (i.e., no need for squinting at the display). The watch also offers multiple modes to show visible progress on a route: A "map mode" provides an overview of your progress by overlaying your current position and a trackback over the route to your destination with an arrow indicating the current direction you are moving and the ability to zoom in or out (also helping older audiences). The "course mode" provides you with turn by turn instructions with large icons indicating the direction of navigation left, right, forward, U-turn, slow bend, etc.' and text information reporting the distance to the next navigation change point as well as overall progress on the route. (Note: color is not required to understand the interface.)

Auditory: The watch has numerous auditory indicators such as beeps at mile markers or specific elevation's which can be informative if you traverse the same route often. Although these features are not specific to navigation, they can be helpful indicators of progress. Although the beeps can be a bother to others if walking in a group and it is not possible to distinguish a beep for the distance from a beep for the elevation without looking at the watch screen.

Haptic: During navigation, the watch provides a vibration to indicate an approaching turn. This feedback is particularly useful as it offloads the task of remembering to check your progress until some change in direction is imminent.

Possible design improvements for each of these modalities include

Visual: An excellent addition would be to provide turn by turn directions using "Google Maps" and "Street view" The current navigation does not provide "Street" level information. For example, the current navigation

would say turn left in 50 feet. Not Turn left in feet 50 onto Main St. It should also be noted that if the user only wanted essential turning information this additional cognitive support could be turned off.

Auditory: Supporting multiple modalities by joining an audio track with turn by turn directions via a Bluetooth headset could be quite useful. Additionally, providing an immediate auditory summary of the next approaching turn and your current progress by touching one of the five hard buttons on watch would also be useful. This would give the user control over the pace that information is being provided.

Haptic: The haptic feedback is currently quite good and not overloaded with to many vibrations. The addition that I would find useful would be a more prolonged and potentially persistent vibration if a turn were missed. This would be particularly useful for people participating in a walk/run that had a course that should not be altered.

Temperature: Additionally, temperature both body and ambient temperature could be used to facilitate navigation. For example, if someone's body temperature was raised after a rigorous part of a hike a less strenuous route could be recommended. Or if the ambient temperatures were dropping or rising at a rate that looked like getting to the destination would be a safety issue a warning to be provided. This warning and change in navigation could be particularly useful to mountain hikers or backcountry skiers.

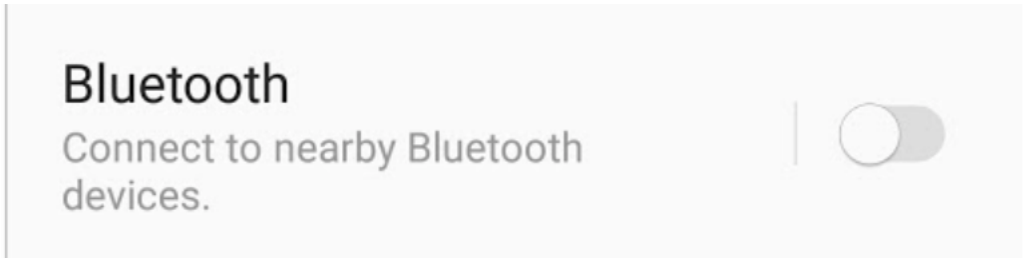
Question 4

Let the modalities complement each other

Example Violation: The Bluetooth device selection on my cell phone violates the interface design "Let the modalities complement each other." The specific modalities that conflict are visual and textual (verbal) clues. What is confusing with the current design is if you want to select a particular Bluetooth device to connect to when the Bluetooth is already on you must navigate through what appears to be a Bluetooth on/off

toggle switch.

Allow me first to explain that when the Bluetooth is off this is not a major problem as there is a complimenting text message to the left of the toggle that says, “Connect to nearby Bluetooth devices.” Indicating that clicking here will take you to nearby devices which it does in addition to turning on the Bluetooth. So, as a user the text and the toggle (although not optimal) are satisfactory as it is clear (I believe) if I click there, I will turn On Bluetooth and be redirected to a Bluetooth devices selection screen, and this is what happens.



However, if the Bluetooth is already on the message changes from “Connect to nearby Bluetooth devices.” to simply saying “On” which does not indicate (to me) that if you can click on the “On” you will be taken to nearby devices. Instead, it indicates (to me) because of the toggle if you click here you will toggle off the Bluetooth. In actuality, if you click on the “On," you will be taken to a list of nearby Bluetooth devices.

Redesign: A simple redesign would be that when the Bluetooth is off the message is grayed out (indicating disabled) and the message text could say “Toggle On to connect to nearby Bluetooth Devices” this would force you to select the toggle and then after toggling on the Bluetooth power you would be redirected to the nearby devices list. Secondly, if the Bluetooth were already on the message would appear as a button

(indicating clickable) and would say “Connect to nearby Bluetooth devices." Now the visual button and textual modalities would compliment each other.

Giving the user control of the pace

Example Violation: The screenshot utility that I use has a feature that after a snapshot is taken an icon with the snapshot is placed on top of the desktop allowing you to drag the icon image and drop it into another document, for example, a presentation tool like PowerPoint or a Word. I find this to be a convenient and useful feature of the utility. However, the violation of giving the user control of the pace occurs if after a few seconds (which is undefined) the user does not drag and drop the image icon it will disappear, and the snapshot will be saved to a default location. Now to retrieve the snapshot you must navigate to this location which I can never seem to remember where that location is.

Redesign: There are a few simple updates to this utility application that would give the user additional control of the pace. First providing a configuration option that enables the user to set the delay before saving, including the possibility of always staying on the desktop until dismissed. Additionally, a countdown timer could also be superimposed on top of the display providing solid feedback to the user as to when the image would be dismissed. And third, if the image was clicked by the user before the timer reached zero, it would stay on the desktop until dismissed.

References

Joyner, D. (2017). Human-Computer Interaction. Retrieved from https://www.udacity.com/course/human-computer-interaction--ud400

L. Hutchins, E., Hollan, J., & Norman, D. (1985). *Direct Manipulation Interfaces* (Vol. 1).