Assignment P2 (Summer 2021)

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1 QUESTION #1

1.1 Compose a table of 4 tasks, the goals associated with that task, the interfaces with which you interact to perform those tasks, and the object of your interactions.

Task	Goal	Interface	Object
Start dishwasher to clean dishes	To have clean dishes	Dishwasher panel: Cycle buttons, start button.	Dishes
Clean counters with all-purpose spray	To have clean counters	Spray bottle: Nozzle, bottle, Handle, Trigger. Cleaning cloth.	Counters
Clean floors with Swiffer	To have clean floors	Swiffer: Handle, trigger, pad, bottle of solution.	Floors
Fill Keurig water reservoir using kitchen faucet	To prep the coffee maker to make coffee	Faucet: spray head, handle.	Water

1.2 For the four tasks you came up with, discuss the level of directness and invisibility of the interaction.

There are two underlying phenomena that give rise to the feeling of directness: 1.) Distance and 2.) Direct Engagement.

Distance: A short distance means that thoughts are readily translated into the physical actions required by the system and that the system output is in a form readily interpreted in terms of the goals of interest to the user. The following table summarizes the Distance of each task:

Task	Directness – Distance: How far is your interaction from the object of the interaction?
Start dishwasher to clean dishes	This interaction is not very direct. First the dishes have to be loaded and the detergent filled. Then several buttons have to be pressed (set wash cycle, set timer, press start button, etc.) before the dishes start to be cleaned.
Clean counters with all-purpose spray	This interaction is fairly direct. A single trigger is pulled on the spray bottle, cleaner is sprayed on the counter. Then a cloth is used to clean counters.
Clean floors with Swiffer	This interaction is direct. A single trigger is pulled on the handle of the Swiffer. The Swiffer is moved back and forward to clean floors.
Fill Keurig water reservoir using kitchen faucet	This interaction is direct. The handle of the faucet is turned to start the flow of water in one step.

Direct engagement: The second aspect of directness concerns the qualitative feeling of engagement, the feeling that one is directly manipulating the objects of interest. The following table summarizes the Direct Engagement of each task:

Task	Directness – Direct Engagement: To what extent are you directly manipulating the object rather than manipulating it at a distance through the interface?
Start dishwasher to clean dishes	This manipulation is not direct. The manipulation of the dishes is done at a distance through the dishwasher panel interface.
Clean counters with all-purpose spray	This manipulation is direct. The counters are being manipulated directly though the spray bottle.
Clean floors with Swiffer	This manipulation is direct. The floors are being manipulated directly though the Swiffer.
Fill Keurig water reservoir using kitchen faucet	This manipulation is direct. The water is being manipulated directly though the faucet

Ultimate goal is for interface between user and task to become invisible from the minute the user starts using it. The following table summarizes the Interface Invisibility of each task:

Task	Invisible Interface: How much time did you spend thinking about the interface rather than the task? If you focus mostly on the task, did the interface become invisible through learning or through good design? Was there a time when you thought more about the interface than you did now?
Start dishwasher to clean dishes	This interface is not invisible. Interface is a panel on the front dishwasher. Significant focus is needed to ensure the correct buttons are being selected on the panel. Little focus is placed on the dishes.
Clean counters with all-purpose spray	This interface is invisible. Little focus is directed at the spray bottle, focus is primarily on the counters that are being cleaned. This interface is invisible through good design, the spray handle is intuitive to use. I do not think there was a time when I thought about the interface more than I do now.
Clean floors with Swiffer	This interface is invisible. Little focus is directed at the Swiffer, focus is primarily on the floors that are being cleaned. This interface is invisible through learning. A button has to be pressed on the handle to spray cleaning solution on the floors. It takes some coordination to know when to spray the solution and when to scrub the floors.
Fill Keurig water reservoir using kitchen faucet	This interface is fairly invisible. Some focus is needed to turn the faucet handle to select the right temperature of water. This interface is invisible through learning. It takes some coordination to know where to turn the handle to get the right temperature of water.

2 QUESTION #2

2.1 Select a task that you do on a regular basis that has become invisible by learning.

I am selecting curling my hair with a curling iron.

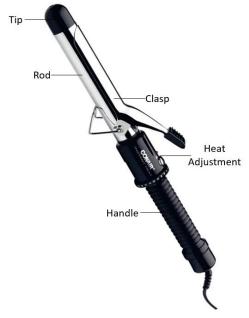## 2.2 Describe the components of the interface you used to think about a lot.

Figure 1—Curling iron with labeled components of interface.

The following are the components of the curling iron interface:

- *Handle:* Where the user primarily holds and controls the curling iron.
- *Heat Adjustment:* Where the temperature setpoint is designated by the user.
- *Rod:* What the hair is wrapped around, where the heat is applied to the hair.
- *Clasp:* The component that secured the hair under tension around the Rod of the curling iron. The amount of tension the hair is under is controlled by how much the user presses on the clasp.
- *Tip*: Where the user holds the curling iron while twisting the hair around the Rod.

When first learning how to curl my hair with a curling iron, I focused mostly on the curling iron instead of my hair. The components of the curling iron interface I focused on the most were the clasp and the tip. The clasp can be difficult to use because a specific amount of pressure has to be applied by the user to the clasp to hold the hair under the right amount of tension. Too little tension and the hair will slip out from the curling iron without being curled. Too much tension and the hair won't be able to be twisted around the rod of the curling iron. The tip can be difficult to use because of it's proximity to the rod – it is very easy to burn your fingers, especially when twisting the hair around the barrel.

2.3 Describe your thought process now, and especially explain why you no longer have to spend as much time focusing on the interface.

After many years of curling my hair multiple times a week, I spend little time thinking about the clasp or the tip of the curling iron interface. I spend little time thinking about the clasp of the curling iron because I have learned how much pressure to apply to be able to twist the hair around the rod of the curling iron without losing grip of the hair. I spend little time thinking about the tip of the curling iron because I've learned how to balance one finger on the tip of the curling iron and be able to twist hair around the rod. This ensures I don't burn my fingers while curling my hair.

2.4 Describe how you might design or redesign the computational interface to get you to the point of invisibility more quickly.

To reach the point of invisibility more quickly I would redesign the clasp and the tip of the curling iron interface. For the clasp I would reduce the amount of pressure the user could apply, this would reduce the risk of losing grip of the hair. The clasp could also the automated so the pressure would be automatically applied by the curling iron, removing the burden from the user. For the tip I would make the tip longer and add grip to the tip to reduce the risk of fingers slipping on to the rod. Another solution would be to create the functionality where a button could be pushed on the handle and the rod would twist on its own. This eliminates the need for the user to balance the curling iron at the tip while twisting the hair around the rod.

3 QUESTION #3

3.1 Select one task from the provided five task domains:

I am selecting the task of using a smartwatch to navigate a route as a pedestrian.

3.2 Describe how each of the three provided types of human perception (visual, auditory, haptic) are used to give the user feedback.

- *Visual:* Show the user upcoming turns and distance to destination.
- *Auditory:* Tell the user a turn is upcoming. Tell the user whether to turn left or right.
- *Haptic:* Alert the user with vibration that a turn is upcoming.

3.3 For each of the three types of human perception provided (visual, auditory, haptic), design how that type of perception could be used to give feedback about something that does not currently use that modality.

- *Visual:* Show the user potential hazards or roadblocks upcoming on their route such as sidewalk construction or debris on the sidewalk. This information could be provided from an app like Google Maps or Waze.
- *Auditory:* Inform the user of different landmarks they are passing and provide fun facts along the route.
- *Haptic:* Alert the user with an intense vibration if they have missed their turn.

3.4 Briefly name a different kind of human perception and describe one way it is or could be used for feedback in your chosen task domain.

Another type of human perception is pain. It was previously believed that pain was simply the overloading of pressure receptors, but research in the first half of the 20th century indicated that pain is a distinct phenomenon that intertwines with all of the other senses, including touch.[2]

Pain could be used to alert the user to danger immediately approaching on their route such as walking into a major intersection or high elevation like a cliff. This would be a light prick or shock on the wrist. The shock would only be used in extreme circumstances and would not cause lasting damage.

4 QUESTION #4

4.1 Select two tips for reducing cognitive load from the lecture videos.

The following two tips for reducing cognitive load were selected from the lecture videos:

1.) Use multiple modalities: Ex present visually and describe verbally.
2.) Give the user control of the pace: when pace is pushed, stress is placed on user.

4.2 For each tip, select an interface from your everyday life that violates the suggestion. Briefly describe the interface, and then describe violation of the tip.

Tip #1: Use multiple modalities – Headphone feedback

I have wireless headphones I use to listen to music while I work out. There is a single button I press and hold to turn them on and turn them off. When this button is pressed a single sound is played through the headphone to confirm the headphones have turned off or turned on. However, the sound when the headphones are turning off and the sound when they are turning on is very similar. Also, there is no other feedback to tell if the headphones are on or off.

Tip #2: Give the user control of the pace – Garage keypad

To open my garage door I have the ability to enter a code on a keypad on the exterior of my house and the door will open. Once I press the first digit of the code I have 5 seconds to enter the rest of the code before the keypad times out and I have to start over. This happens often if I have my hands full or I'm managing multiple tasks.

4.3 Briefly redesign the interface to incorporate the tip into its design.

Tip #1: Use multiple modalities – Headphone feedback

To redesign the interface and incorporate this tip I would add an indicator light to the exterior of the headphones to provide visual feedback. The light would turn on when the headphones are on and turn off when the headphones are off.

Tip #2: Give the user control of the pace – Garage keypad

To redesign the interface and incorporate this tip I would allow more time for the user to enter the code so they are not rushed and prone to make errors.

However, because the keypad is a matter of security, it makes sense to not allow an infinite amount of time to enter the code. Another option would be using a fingerprint scan. This would be a one touch "code" and be easier to enter within a 5 second window.

5 REFERENCES

1. Hutchins, E., Hollan, J. D., Norman, D. A., & University of California, S. D. I. C. S. (1985). Direct Manipulation Interfaces. Amsterdam University Press.

2. Wikipedia contributors. (2021c, June 3). *Sense*. Wikipedia. https://en.wikipedia.org/wiki/Sense#Pain