

Assignment P2 (Summer 2021)

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1 QUESTION 1

After reviewing my activities for about an hour I compiled a list of tasks that I either started or accomplished during the period (see below in Table 1).

Table 1—List of Tasks Performed

Task	Goal	Interface	Object
Setting an alarm	To signify the end of the one-hour study exercise	Android Clock App	The set alarm
Email human resources	To get clarification about a job position	Chrome Browser, Gmail web UI	The composed email
Complete a cover letter	To get a different job	Microsoft Word	The completed cover letter
Playing a computer game	Distraction and entertainment	The Age of Empires II user interface	The instance of the game / the current game state
Preparing a quick meal	To satiate hunger	Instrument panel on toaster oven	Bagel dog
Finding a song	Listen to music	Spotify app	The streamed music
Watering plants	Keep my plant alive	Faucet, Glass	The plant

1.1 Setting an alarm

At the beginning of the one-hour long exercise I set an alarm on my phone to indicate the end of the time period. The smartphone utilizes a touch screen that allows for seamless interaction and is one of the clearest examples I found of ‘direct manipulation.’ On this particular Android phone you can enter the clock

application by directly pressing on the clock widget on the main screen. The action of pressing helps to bridge the 'gulf of execution' as the action is what the user would expect experientially, from having used point and click graphical user interfaces before, but also is a form of 'direct manipulation' as it mirrors how we would want to directly manipulate the interface – if we want to enter the program we push, just like we might push to enter a doorway or point in the direction of where we intend to go.

Due in part to the simplicity of the task the interface is nearly invisible. To add an alarm, we press the '+' button which would make sense to both novices and experts. The interface then provides a clock face that once again uses 'direct manipulation' as you can rotate the hands of the clock to the appropriate time, which directly mirrors the setting of a clock. Because of this simplistic design I did not have to think about the process and did not spend much time on it at all. When I first started using Android phones, I learned the process quickly. The interface is mostly invisible by leveraging universal real world human interactions (pointing and entering) and experiences (centuries of clock design).

1.2 Completing a cover letter

Despite my technical skill with computers and decades of time spent using the application, I still find the Microsoft Word interface difficult to use. The interface has changed multiple times over the years, and though I would consider the current iteration an improvement over previous designs, each successive reinvention and reorganization increases the 'gulf of execution.' The act of typing itself is a continuation of the interface of a typewriting machine – so it is familiar - but does not meet the definition of 'direct manipulation' as there is nothing innately intuitive about the process and it does not mirror any natural, real world action.

The object (the cover letter) is neither distant nor manipulated in a completely direct fashion. A few features exist that allow us to 'directly manipulate' it with a touchscreen computer, such as pinching to zoom in and out, but most of the manipulation is done by finding a specific tool and using the tool to change the document; conceptionally this is how humans interact with the environment, but

there is no physical corollary past that. Most of my time was spent fighting the program, attempting to design the document in the way that I wanted or needed, while using the set of tools in a mostly indirect way.

1.3 Searching for a song

I used the Spotify app on my smartphone to play music. When you open the app there is a list of recently played or suggested albums that you can select. To choose an album you select it by pressing on the icon which is a clear example of 'direct manipulation' as it is a fundamental way for humans to choose (by pointing or touching). I would not consider the Spotify interface invisible; it is designed essentially how you would expect, however. The time spent on completing the task and finding the song you are looking for is minimal and there was very little cognitive load due to the automatic suggestions in the application.

1.4 Playing a computer game

During the review I played a quick game of Age of Empires II. The game has gone through little or no change since its release around 1999. The interface is similar to the user interfaces of many real time strategy games, so information is displayed in similar ways lowering the 'gulf of evaluation' and the game has similar mechanics to most games of the time, which keeps the 'gulf of execution' low for experienced and semi-experienced users. There are two main ways to interact and provide commands, through the use of the graphical user interface buttons and through use of short cut keys – these commands result in changes to the state of the game, such as grouping units, building buildings or collecting resources.

The directness of manipulation is low. Like Microsoft Word, a beginner would select tools to cause changes in the object (the state of the game) and for most sub tasks you encounter during the game there is little connection to its real-life counterpart. For example, mining gold, cutting lumber, sending an army into battle, and so on all use the same or similar commands to each other, but none directly related to the real world. Despite this the interface is essentially invisible to me and I usually spend no time considering it. I can recall when I learned how to play the game, I spent a much a larger amount of time using the buttons where

now I exclusively use short cut keys. The interface is invisible through a combination of both learning and design – the design allows you to pick the game up quickly when you are a novice, but also allows you to expand past it using things like shortcuts when you are an expert.

2 QUESTION 2

I have been playing guitar for approximately twenty years and though I would not count myself as an expert, I am proficient enough and experienced enough that the physical interface of the guitar has essentially become invisible. When learning an instrument, you have to be intently focused, employing a combination of visual, auditory and haptic feedback, to try to reproduce the sound you want or a sound that is even acceptable. I had to stare at the fretboard (and back at the teacher, chord book, or reference) to affirm the placement of my fingers, regarding both shape and location. I had to be concerned with the pressure I was applying with my fretting hand. While holding that position with one hand I had to learn how to strum, pick or fingerpick with my opposing hand, which required consideration regarding frequency, rhythm, pick angle, and dynamics. On an electric guitar, the sound changes depending on which pickup you play near, and the tone knobs and switches are always kind of confusing.

My thought process while playing has shifted; the cognitive load that existed when I started has faded and my thoughts are now of the specific sounds and music I want to produce rather than the physical interface I have to struggle with. The muscle memory now exists to make chord shapes, to change chords quickly and so on. My knowledge of basic music theory has improved, as well, which translates to understanding the interface more thoroughly.

Altering the interface of the guitar could completely change the physical nature of the sound produced, so these suggestions should only be considered in the context of making the interface invisible quicker. A beginner's guitar could be self-tuning, to reduce cognitive load. It could be somehow modular, where you could reduce the number of strings to reduce the clutter of the interface. It could come with tone presets to reduce the confusion of trying to dial in certain sounds. The strings could be replaced, and keys added to the frets instead, so you could learn the

finger placement without getting caught up on strumming and holding the string correctly. A fretboard could be designed to light up in certain patterns to highlight the structure of a chord, allowing the interface to teach. The guitar could come in a nonstandard tuning, such as an open tuning which allows you to focus on rhythm, strumming, picking and less on the fretting hand, which is essentially chunking the problem up for the user.

3 QUESTION 3

The task I selected to examine is that of preparing a meal. There are multiple methods to accomplish the task, whether using a microwave to heat a TV dinner or defrost food, or an oven to bake something. There are also multiple sub tasks that exist, such as picking out ingredients or knowing when to add them. The most basic of these interfaces that I have encountered, and the ones that I use almost exclusively are gas and electric stove tops. The interface itself is often simple, a dial indicates which stove top you are turning on or igniting and the dial is labeled from off to high or zero to ten (essentially some arbitrary scale). The rest of the interface consists of your cookware and the implements you are using to manipulate the food.

3.1 Visual feedback

There are many forms of visual feedback when preparing a meal on a stove top. The dials are labeled to indicate which burner you are attempting to operate along with the scale to determine the amount of heat the stove will produce. A gas range will immediately spark indicating it is attempting to light the gas, eventually producing a flame and an electric range will, after some delay, glow red.

A new visual based feature that would improve the stove top interface, could be the inclusion of LEDs to immediately indicate the stove top you are turning on. Since the scale on most stoves are arbitrary ranges, a stove top that utilized a digital interface that showed the actual temperature you were setting it to would help standardize the cooking process.

3.2 Auditory feedback

Auditory feedback is produced through-out the process of turning on a stove and cooking a meal, but essentially all the noises require you to have experienced the process one or more times. When a gas range attempts to light, the spark will be accompanied by a loud clicking noise and the electric stove top has a similar internal click indicating it is powering on. Another, albeit unintentional bit of feedback is when a pan slightly deforms due to heat. Other typical noises that are common in cooking would be the sound of a 'roaring boil' and the sizzling of food – these would be examples of secondary indicators or cues we learn over time that still provide information about the process, task and interface. A simple auditory feature that could be added to aid in feedback, is an alert that occurs if you accidentally leave a burner on with nothing on it, or an alert to indicate that the burner is at the temperature that you desired (like a preheated oven).

3.3 Haptic feedback

Haptic feedback is seemingly less common (or less obvious) than visual and auditory feedback, but still useful in the act of cooking. The most obvious is manipulating the dials to turn on and off the stove top. Feeling the heat emanating off a stove top or putting your hand over an oven to check if the appliance is functioning correctly (though this may be considered thermoception). Consistency is important element in the preparation of food and pressing down on a steak can be a useful indicator of its doneness. While preparing food you may also select ingredients, like fresh produce based on its feel, to determine its ripeness.

A haptic feature that could implemented on a stove top, could be something as simple as a dial that vibrates as you turn it; the degree of vibration would be an indicator of the temperature you are setting it to. This could be especially useful on an electric stove where you do not have the immediate feedback of seeing the size of the flame created. This could also help those with poor vision who cannot read the dial, or for users with dials with numbers/information that has worn away.

3.4 Other Senses

The most obvious set of additional senses associated with cooking would be taste, smell, and thermoception. Some of these were touched on previously, but taste helps give you feedback that you can use to modify the food you are cooking, such as tasting it to determine if you need to add salt. Thermoception provides feedback that lets you know if your food is done or if the stove top is working in the first place. Smell also helps you determine if food is bad or good, can indicate whether something is almost done, and even can remind you that you have something cooking if you forgot.

4 QUESTION 4

4.1 News Media Websites

In my experience many of the news corporations that produce video and print stories, will bundle the two together when you attempt to access the webpage for a news story. Typically, the layout of the page is extremely cluttered, filled with ads, and the interface of the video will break the formatting of the page. When you start to read the story, the page sometimes continues to change (moving the text around) and usually an advertisement will play. Finally, a video version of the story will auto play or a video that is not germane at all will play instead. This interface design makes it difficult for the user to achieve their goal of reading a news article and violates the concept of 'emphasizing essential content while minimizing clutter.'

The use of multiple modalities (text and visuals) would typically be a feature, but they both compete for your attention and interfere with the processing of information violating the concept of 'letting the modalities complement each other'. It can be argued that it also violates the rule of 'allowing the user to choose the pace', as the video will typically auto play ads and content. The simple solution to this is to have a link in the story to a video player on another dedicated page (where you can watch the video version of the news), so that it does not interfere with the article. A setting that allows a user to choose if they want the articles they click to be video or text would improve the user experience. Turning off auto play and limiting the use of advertisements would also help greatly.

4.2 Netflix autoplay

Netflix has the habit of violating both 'emphasizing the essential content while minimizing clutter' and 'letting the modalities complement each other.' When you navigate through the Netflix user interface, looking for content to watch, the service will sometimes auto play the trailer for the show you're currently looking at, or start the first episode without being prompted. If you are stopping to read the series synopsis or discussing whether you want to watch the television show at all, the distracting video will play behind the writing. This makes it difficult to hold a conversation and difficult to read the snippet of information about the show. The dual modalities of the trailer's audio and video and the writing are at cross purposes and do not compliment each other. They also serve to clutter the environment with noise and clutter the user interface with competing visuals. The simple solution would be for Netflix to turn off the auto play feature and add a menu item where you can select to play the trailer if you so desire.