# CS6750 Assignment P2

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## 1 QUESTION 1

### 1.1 Task 1

The task is to adjust the height of my height adjustable desk. The goal is to lift the desk from the sitting to the standing position so that I can work while I am standing. The interface is the raising and lowering arm which is also called manual crank (Figure 1). The object is the desk being adjusted to the standing. In terms of directness, my interaction with the crank is to rotate it clockwise and while I am rotating the crank, I can see the object which is the desk is raising. However, my natural perception of lift a thing is to pull it up rather than rotating it. Therefore, I feel that I am manipulating the desk at a distance through the crank even though the physical distance between the crank and the desk is very short. In terms of invisibility, I spent about 30 seconds thinking about the crank and how I can accomplish my task with it for the first time. I first wanted to see where the crank was extended and noted that it was inserted into a gearbox and also noticed that one side of the gearbox was connected to the sync rod which was fixed across the underneath of the table. I started to identify the extended part of the crank may be connected to the sync rod so that any changes to the crank side of the desk should be synced to the other side of the desk. This should be the semantic distance, as mentioned in the lecture, where a user tried to figure out how hard it is to know what to do. Once I identified the action, which was to rotate the crank, and I executed that action. I tried to lift the crank up which turned out not moving at all. No movement is the output or feedback of which I interpreted to discern the meaning. The output told me that the crank cannot be lifted. After all the observations and the attempt, I became to have confidence that I need to rotate the crank. However, I did not know which direction to rotate the crank. I then tried to rotate the crank counterclockwise. The crank was not moving. My interpretation of this immediate output is that I should rotate the other way around. And as I rotated the crank clockwise, the desk was rising. As I use the crank to adjust the height almost every day, I learn how to interact with this interface and now I feel like the crank is very easy and efficient to use.

Therefore, if a user is a novice at it or never used it before, this is completely unlike the task of lifting a physical desk interface.

*Figure 1*

### 1.2 Task 2

The task is to adjust the driver's seat of my car. The goal is to adjust the seat to a position where I feel comfortable to reach the steering wheel with my arms, to reach the gas and brake with my legs, and I feel that my back is well supported and I can have a good vision of side-view mirrors and the rear-view mirror. The interface is the seat control panel (Figure 2) embedded on the driver's door. The object is the driver's seat. In terms of the directness, I am not directly manipulating the seat, instead, I am adjusting the seat through the control panel. The control panel is in a seat shape that mimics each part of the seat – head, back, and the bottom seat. The designer wants the action of adjusting the seat on the panel to mimic the action of adjusting it on the physical seat. So the design is very natural so that I can easily know what to do to accomplish my task. For example, to move the seat forward, I know I can try to push the bottom seat control forward just as I would do to the physical seat. And when I pushed the control, I got instant feedback by observing the seat was moving. I don't need any prior knowledge to attempt to do what feels natural. The interface that best exemplifies the direct manipulation makes the user feel like directly engaging with the control of the physical seat. In terms of invisibility, I spent about 5 seconds thinking out the interface and directly jumped onto the task of adjusting the seat. The interface for adjusting seat becomes invisible through a good design which is a

good highlight of the use affordance mentioned in the lecture. The visual design of the seat control is just how it is supposed to be used. The direction in which the user manipulates the seat control is completely synced to the direction to which the seat moves. There are 4 more buttons near the seat control as you see in Figure 2. The M button is to memorize the current seat position and the number button represents the corresponding seat position that is memorized in the system. They are supplemental functions to the seat control. After I became an expert on the interface through learning, I find it a very convenient and efficient way to accommodate the needs of multiple drivers to use one car. For example, I save my seat position to number 1 and my wife's position to number 2 so next time we simply press one button if we switch to drive.


*Figure 2*

### 1.3 Task 3

The task is to change the state of the stove on a gas stove. The goal is to turn on the stove. The interface is the knob and indicators around it. The object is the stove. I have the pre-existing knowledge of how the gas stove works where an igniter system ignites the burner that turns on the flame and the gas keeps it burning. To turn on the stove, I pushed in the knob and turned it to the "Lite" position (Figure 3). In the meanwhile, I heard the clicking which comes from the igniter, and then the fire was on. I needed to turn the knob to whatever setting (numbers) on the interface to stop the clicking sound. There is a distance between my interaction with the knob and the stove. I was manipulating the stove at a

distance through the knob. The prior domain knowledge of how the gas stove works helped me to understand the steps to turn on the stove – igniting the flame and then let the gas in. And the "Lite" indicator with a fire icon next to the knob sends me a message that I should turn the knob to that position. However, there is no way for me to know that I need to push in the knob first and then turn the knob to the fire position. This is a big articulatory distance as mentioned in the lecture. It is hard to do what I know to do. Plus, the knob interface does not exemplify a direct manipulation to make a user feel like directly engaging the control of the stove. In terms of invisibility, I was instructed how to do it when I tried to turn on the stove for the first time since my parents thought I needed to have the knowledge before I started. My parents were right. Because the interface is not designed for the user who is a novice at it. After years of cooking, the interface becomes invisible to me when I turn on or off the stove. This is a good example of an interface becoming invisible through a user's learning.


*Figure 3*

### 1.4 Task 4

The task is to put every word in my mind into the text document on my computer. The goal is to finish this paper. The interface is the keyboard. The object is the paper. If I physically write down words on a piece of paper, I use a pen to write down the letters rather than tapping the button with my fingers on a keyboard. There is an obvious distance between my interaction with the keyboard and the paper itself. I am manipulating the paper at a distance through the

keyboard. However, the design of the keyboard makes the distance not as far as we thought. In terms of semantic distance, it is not hard for me to know what to do when I see the letters and numbers on the keyboard. And in terms of the articulatory distance, it is not hard for me to tap the button as I thought I should do for the corresponding letter. Also, there is direct engagement. The screen shows the letter in the paper as I tap the letter on the keyboard. I have a qualitative feeling that I am directly engaged with the control of the paper. In terms of the invisibility, I spent significant time thinking about the keyboard as I started using the keyboard. It was almost impossible to focus on the task when I was still rusted on my typing skills. Back then, for me, writing with a pen on a physical paper was more efficient than typing words via keyboard. As I become more and more skillful at using the keyboard, the keyboard becomes an extension of my hands and of course, typing words becomes more efficient than writing with a pen for me.

### 1.5 Task 5

The task is to switch windows on full-screen mode on the mac pro. The goal is to switch to the window that I want and make it present on the screen. The interface is mac pro's touchpad. The object is the window on the screen. To accomplish the task, I need to swipe from one side to the other side with three fingers on the touchpad. This feels direct because the window that I wanted flew in from the side from which I swiped the touchpad. Just as David mentioned in the lecture, direct manipulation is also about designing an interface that lends itself to interactions that feel more direct.

## 2 QUESTION 2

I use Microsoft excel regularly which has become invisible by self-learning. I used to spend a lot of time learning its features and functions before I did my tasks.

### 2.1 Components of the interface

On a high level, the graphical interface of excel includes Ribbon, Quick Access Tool Bar, Cell Name Box, Formula Bar Buttons, Cell Contents, Formula Bar, Column Letter, Row Number, Active Cell, Tab List, Window Controls, Zoom Bar, Status and Page Layout as shown in Figure 4.

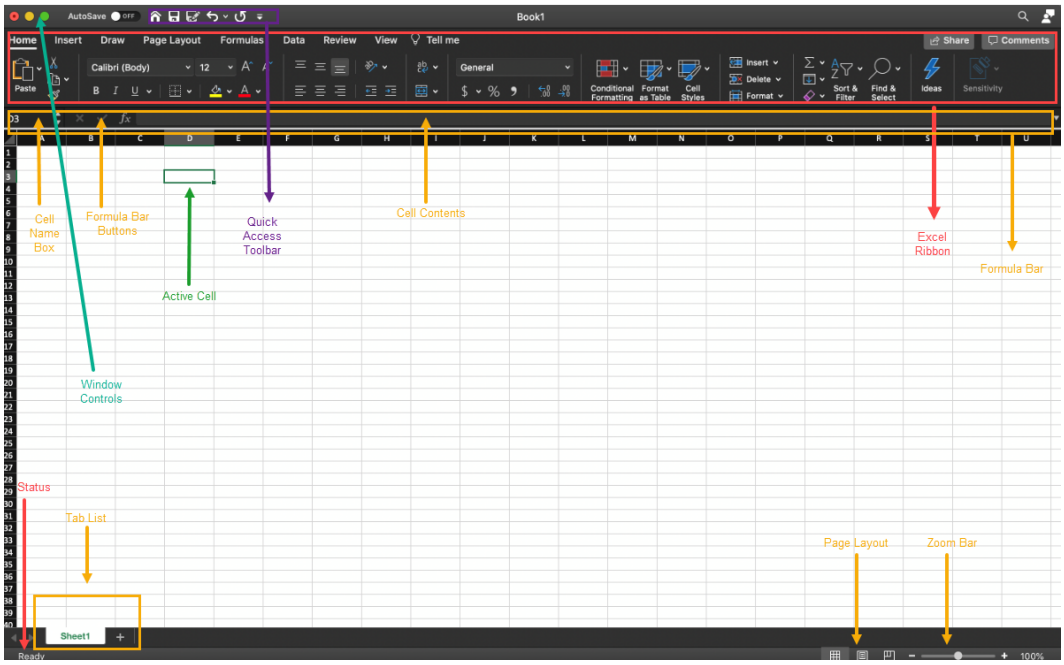


*Figure 4*

### 2.2 Thought process now

The learning curve is steep when I started to use it. I am now an expert user after years of learning and practice. As I become familiar with the common features and functions, I can mostly focus on the task but still need to search for solutions online. When I receive a task, I need to know what the goal of the task is and figure out what are the key steps to accomplish the goal and try to map the excel capabilities to the specific step in my mind. In the meanwhile, I search in my memory for similar tasks that I have done in the past. If I don't know or cannot remember where to find a specific feature, I search for my task online. There is a very broad community of excel users. I can easily find good references that are directly or indirectly relevant. The excel interface provides a place called “tell me what you want to do” next to a bulb icon. You can type in your goal and it takes to the related feature or function. For example, if you type "insert a table" in the box, it returns the functions related to the table such as "add table" and a smart lookup option. If you click on the smart lookup, it provides the relevant articles from the web search. The article that has a step by step guidance with screenshot or video is very helpful.

### 2.3 Redesign the interface

If I wanted to redesign the interface, I would add a more illustrative notation for each feature and function and the user can see it when hovering the mouse over the icon. I would also add short videos to demo each feature and function and even the combination of the features and functions for complex tasks. The user can find the videos on the top of the result list from the “tell me what you want to do” box. All these ideas come from the important factor for designing invisible interfaces as David mentioned in the lecture. It is to let your interface teach. The goal is to teach the user a more efficient way to perform the actions.

## 3 QUESTION 3

I would like to use an advanced treadmill as an example. The treadmill has a big touch screen in front of the user. The screen home page provides a series of tiles and each tile represents a function. For example, the tile shows the time the user has spent on the current running task or the distance the user has accomplished, or the user’s heart rate and calories burnt. These tiles give the user direct feedback on the progress of the current exercise and a real-time user's body performance. To extend the function from a visual perspective, I am thinking to have an option to connect to another user's treadmill with each user's permission. In this way, users can see the real-time progress of each other or even do a live exercise through the embedded video camera so that people have an impulse to stick to their goal or challenge themselves. The treadmill is also equipped with a Bluetooth audio speaker so that users can listen to music from their smart devices. With Bluetooth, users can also connect their wireless earpieces to the treadmill console to watch TV shows or YouTube or chat with their friends via video camera as mentioned above. Encouragement is important during exercise. I would add a human voice in response to the progress of the exercise. For example, sometimes users do not want to stare at the screen, the treadmill console can tell users their progress along with some encouraging words such as "good job" in the human voice. The pulse sensors on the treadmill are used to collect users' body performance. The sensors require good contact between users' skin and pulse grips for at least 15 seconds. To extend the function from a haptic perspective, I would add a function where the treadmill can adjust users' exercising plans such as reducing the inclining and speed based on the analysis of users' real-time heart performance. Thermoception is a human's ability to sense heat

and cold. I would use the pulse sensors to monitor the user's body temperature as well and the user can see the real-time temperature on the screen. If the temperature is too high, the screen provides alerts and turns on the embedded fan that is placed in front of the user.

## 4 QUESTION 4

### 4.1 Offload tasks

English is not my primary language. As a working professional in the U.S., I use Microsoft outlook every day. When I draft an email in outlook, I spend a lot of time checking words or grammar online so I cannot entirely focus on the content of the email. Also, when I draft a short email in a quick turnaround, I forget to use the spelling and grammar check function in outlook because it is not automatically triggered. In the end, I always find mistakes after I send out the email. I am hoping if I can offload the task of phrasing and error-checking to outlook. If I get to redesign the interface, I would add the autocomplete feature which provides the recommendation of the rest of the phrase or sentence immediately after I type a few words. And outlook lets the user decide whether to use the recommendation. I would also add the auto checking for spelling and grammar, and let the system mark the error and provide recommended corrections on the side of the interface where the user can choose to use or ignore.

### 4.2 Give the user control of the pace

I read news from the NEWS app on iPhone. The app provides me with news and stories from various platforms. Some platforms that do not add ads to the article are easy to read through, however, some platforms that have ads embedded into the article are not user friendly, such as People.com. The ads are in the picture format so they make the news page very long and busy. The ads have nothing to do with the news or the story and the ads are not relevant to me. The platform should provide the user the control of the ads. The out of control of the ads causes anxiety and raises cognitive load so that the user cannot focus on the news or stories themselves. The redesign is to add a filter or option for the user to control the ads. Once the user confirms to stop certain ads, the system should block similar ads for the user going forward.