Assignment P3
For CS6750 HCI

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1 QUESTION 1

1.2 Invisible Interface Creation Support

The three principles I will be describing regarding invisible interface creation are: (1) Discoverability (2) Consistency (3) Feedback.

1.2.1 Principle 1: Discoverability

The **discoverability principle** can be used to support the creation of an invisible interface by displaying user friendly and intuitive design. If the interface has features and functionality that are easily detectable and understandable by the user, the interface becomes more invisible as the user is thinking less about the interface itself. As for **bridging the gulf of execution**, discoverability allows the user to have a hint as to what the action on the interface will do. Specifically, having such hints (i.e. tooltips) makes the gulf of execution smaller as the user has a better idea of what the action will do helps bridge at the **"identify actions"** phase. As for **bridging the gulf of evaluation**, discoverability allows the user to have immediate response at the **"interface output"** phase. When the user executes an action they've been hinted at, the interface will display the result of that action helping the user learn the interface and making it more invisible along the way.

1.2.2 Principle 2: Consistency

The **consistency principle** can be used to support the creation of an invisible interface by mitigating causes of confusion and reducing cognitive load for the user. For interfaces that serve similar functionality purposes, it would help to keep the actions required to achieve similar/the same goals consistent. As for **bridging the gulf of execution**, consistency would help bridge mostly at the **"identify intentions"** and **"identify actions"** phases. If the interface is kept consistent and is visually familiar, the user will most likely assume the intentions will be similar and the actions to execute that intention will also be similar to

other interfaces. As for **bridging the gulf of evaluation,** consistency will help bridge at the **"interface output"** phase. If the output looks similar to the results of their actions on other interfaces, they can interpret and evaluate their result with more confidence.

1.2.3 Principle 3: Feedback

The **feedback principle** can be used to support the creation of an invisible interface by providing helpful information after the action is executed allowing the user to learn the interface making it more invisible overtime. As for **bridging the gulf of execution,** feedback will help bridge at the **"identify actions"** and **"execute in interface"** phases. If the interface provides sufficient and efficient feedback for user actions, the user will be able to determine if the action they're executing is the one they intended to do. If it wasn't, the feedback will help them learn how to achieve the goal correctly. As for **bridging the gulf of evaluation,** feedback will help bridge at the **"interface output"** phase. If the interface's output after an action is executed is detailed and correctly displays the user's desired result then the user can take this feedback to know they achieved their goal successfully. If the output isn't what they expected, the user can take this feedback and know the next time they try to do this task, they shouldn't do this particular action or series of actions.

1.3 Participant View of the User Interface Creation

The two principles I will be describing regarding the participant view of the user through interfaces are: (1) Structure and (2) Simplicity.

1.3.1 Principle 1: Structure

The **structure principle** can be used to emphasize the participant view of the user by providing an interface that is consistent and easy to navigate regarding the context of the user. At the same time, having a solid structure will allow the user's abilities and thought processes to be more well-defined and straightforward. When an interface has an intuitive structure, there is less competition for attention and less cognitive load required to complete a task.

1.3.2 Principle 2: Simplicity

The **simplicity principle** can be used to emphasize the participant view of the user by making the interface more approachable by the user. If the user is able to

simply interpret how to use the interface or understand what information the interface is conveying with low cognitive load and interact with the interface in the context where they need it. The simplicity of an interface will mitigate potential convolution in trying to determine what the interface does and what actions need to be done to complete the task.

2 QUESTION 2

2.1 The Interface Selection and Description

The Precor Treadmill interface I use at the gym is intolerant of errors. I go to this gym regularly but it is run down a bit so I wouldn't be surprised if the treadmill was a little behind its time. The mechanics of the machine work as expected however the interface that I interact with to start and stop my workout has been quite error prone. The interface has "Quickstart", "Select Workout", "Set Duration" options along with the big red "Stop" button - seemed straightforward enough.

2.2 The Interface's Response to User Error

The interface is fairly simple with limited options to start the workout. However, if I accidentally tap the "Stop" button that is located directly next to the "View Detailed Stats" button, the machine immediately stops and resets all the metrics (distance, calories, duration, average heart rate) back to zero.

2.2.1 How easy is it to commit this error?

It is very easy to commit this error. So far, I've come across two different ways to commit this error:

1. Accidentally tap on the "Stop" button when I had intended to "View Detailed Stats"
2. While I'm running, my hand bumps the big red physical button (the emergency button) which is located on a handlebar front-and-center below the console..

This error is easy to commit as I am preoccupied with running and constantly moving my hands.

2.2.2 Penalty associated with this error?

The penalty associated with this error is that it causes my workout to be interrupted and ends with inaccurate measurements of my workout. I am forced to restart from the beginning and I am not provided with the option to "undo" the stop execution or "redo/resume" from my previous workout state.

2.3 Avoiding User Error Through Constraints

Using Norman's "physical" type of constraints, a redesign of the physical button could be helpful. Currently, one press of the button will cause the treadmill to stop. However, if there was a physical constraint requiring the user to press and hold the button for three continuous seconds, this would avoid the user error of inadvertently hitting the button while running.

2.4 Avoiding User Error Through Improved Mappings

Improved mappings on the treadmill's interface could be used to avoid errors by being more comprehensive towards human interaction. Currently the interface only has a Stop and QuickStart option for the workout. However, if the user wanted to pause the workout, there isn't a button directly mapped for that intended action, leading the user to select Stop instead. Having clearly mapped "Stop/Finish Workout" text to indicate that this button will terminate the session and "Pause/Resume Workout" text to indicate that this button will temporarily stop the workout with the option to resume will give the user better direction.

2.5 Avoiding User Error Through Improved Affordances

Improved affordances on the treadmill's interface could be used to avoid errors by being more explicit on what the buttons are used for and how to use them correctly. Currently, the interface has two buttons (1) touch screen button on the console (2) physical button on the middle handlebar. Each of these buttons will execute the stopping when touched at the slightest. If the buttons were changed to be a lever to dictate the state as: Pause or Finish or as discussed in **2.3:** a press and hold button, the user error frequency would decrease as the affordance the button has hints at a different way to execute the action.

3 QUESTION 3

One game I love to play with family and friends is Super Smash Bros Ultimate on the Nintendo Switch console. I am far from an expert but it's just a fun multiplayer game easily learnable to anyone looking to play.

3.1 Slip

If you've ever played Super Smash Bros, you know the broad range of characters and move combinations available to the player. I typically play with sword characters and more often than not, use Ike. Ike has a powerful (if used correctly) Side+B move that does an attack parallel to the map with the ability to charge. If used at the right moment, this attack can do some damage to my opponents. However, if I am in the air close to the edge of the map and I intend to do a Up+B move to attack downwards but slip and do a Side+B, my character will be shot across the map with no chance to jump back onto the platform.

This slip with Ike is 99% detrimental as even if I had just respawned into the game and did the Side+B instead of the intended attack in the air, my character would lose a life…. even with 0% damage! I've noticed that this slip typically occurs due to the slight discrepancies between a straight up movement and a slightly angled up movement using the joystick, causing the attack to be registered as a Side rather than Up. This then causes the intended Up+B to be a Side+B instead. I would **suggest** the interface allows the user to also use the keypad controls rather than the joystick so that there aren't any grey areas between an Up and a Side movement. Currently the keypad controls are used for taunts and not character movement, so allowing this as an option would help lower the amount of slipping (at least for novice players like myself).

3.2 Mistake

In Super Smash Bros Ultimate, there's a character called Little Mac. He's a boxing character with powerful attacks (again when used correctly). Little Mac specifically has a charge up punch that, if timed correctly, can cause a KO on the opponent. When Little Mac does enough damage to his opponents , you'll see the KO sign pop up on the screen. This indicates that you need to use the charge punch before the meter expires. However, if you've never played with Little Mac before but have seen others use him, you won't know how to actually use the super punch. When my friends use him for the first time, I'll see them press a

variety of buttons until Little Mac executes the attack, but because they didn't know which button to do the attack, they waste the KO due to mistiming the attack against the target.

In order to prevent this mistake in the future and allow newer players to benefit from Little Mac's capabilities, I would **suggest** the interface display the button needed to be pressed to execute the attack. This could be a setting the user turns on in the game itself to allow for extra help.

3.3 Challenges (neither slips nor mistakes)

Super Smash Bros Ultimate has a game setting that allows the usage of items during a match. Some of these items are really helpful and enjoyable to play with, others not so much. When you introduce the additional complexity of items, there are certain scenarios you cannot avoid. For example, there is a bomb item that when thrown, will explode and damage anyone within a specific radius. The only way to not get affected by the bomb is to already be outside of the bomb's reach. This is a challenge as it's not something you can knowingly avoid by not slipping but also something you can't learn to maneuver around by limiting mistakes.

4 Question 4

4.1 Interface With Usage of Good Representation of its Underlying Content

For this section, I've selected Framer's prototyping interface as a good representation of its underlying content.

4.1.1 Connections Between the Representation and Underlying Content

I recently started working with a small start-up team. I work as the front-end engineer and collaborate closely with our user interface/experience designer. We use a web application "Framer" to design the application interface. Framer has a strong connection between the representation and the underlying content. The interface allows the user to specify the hardware platform the application is being designed for, directly representing what the display on the device will look like.

4.1.2 (Q) In What Ways Does the Representation Exemplify at Least Two Criteria of a Good Representation?

The Framer prototyping interface exemplifies this by:

1. **Making relationships explicit.** The Framer interface provides individually customizable components to be used when prototyping. The user can easily identify what each object is and separate its functionality from others.
2. **Bringing objects and relationships together.** Again, in Framer there are various objects the designer can use to prototype their application interface. Framer does a good job at making these objects accessible through a click-and-drag motion to tie the objects into the application interface the designer is prototyping.

4.2 Interface Without Usage of Good Representation of its Underlying Content

For this section, I've selected Netflix's mobile application account settings page as an example that does not use a good representation of its underlying content.

4.2.1 Mismatch Between the Representation and Underlying Content

4.2.2 (Q) In What Ways Does the Representation Violate at Least Two Criteria of a Good Representation?

The Netflix mobile application account settings page interface violates this by:

1. **Not making relationships explicit.** When I go to click the Account option in my profile page on the application, I expect to see some information or modification options regarding my account. However, the Netflix interface doesn't provide any relationship between the relationship and the underlying content, my account. There are no settings available to be viewed or modified.
2. **Not exposing natural constraints.** In Figure 1, I've provided screenshot images of the Profile page where the user has the option to select "Account" and the "Account" page. This interface design implies that clicking "Account" would direct me to an informative page regarding my Netflix account. However, you can see in Figure 1 what the Account page actually looks like. There is just text notifying me to go to the Netflix Website to view my account information. There should be a constraint on

the Profile page indicating that the account information is elsewhere to avoid the extra step of me clicking into the Account page. Better yet, have the existing "Account" button on the interface ask the user if they'd like to redirect to a web version of their Netflix account on a mobile browser application (Chrome, Safari, etc).

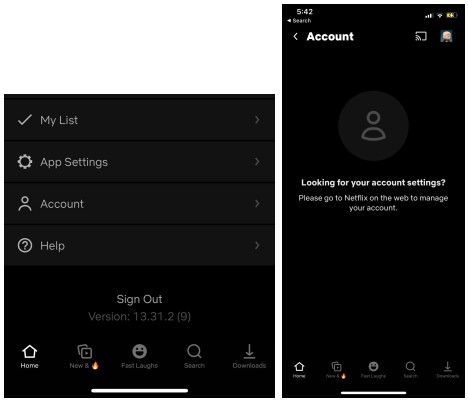

Figure 1— Left: Options provided at the Netflix Mobile Application Profile page. Right: the display when "Account" is selected.