Video Game User Interface Design Project

Lucas Bongers
1202472
Hamilton, Canada
bongerlj@mcmaster.ca

Devon Gasparotto
1205881
Hamilton, Canada
gaspadm@mcmaster.ca

Ryan Lambert
1218407
Hamilton, Canada
lamberrj@mcmaster.ca

Daniel Cefaratti
1212130
Hamilton, Canada
daniel@mcmaster.ca

ABSTRACT

UPDATED—December 15, 2016. This paper documents a proposal for a newly designed role playing game (RPG) user interface (UI). The UI will focus on the inventory management system but will also include a game screen with a map and fast travel abilities, and settings menus. The paper the details a software survey performed on 4 other games in the genre; Fallout 4, Final Fantasy VII, Diablo 3, and World of Warcraft. The strengths and weaknesses of the interfaces of these games are evaluated and documented, and are used to improve the design of the new system by borrowing ideas from the things done well, and avoiding pitfalls illuminated by the study of these other games. Following this, a usability test to evaluate the effectiveness of the new system is outlined, along with the results obtained by having 4 participants use the system and answer the questions detailed in the usability test. Finally, the implications of the study results are broken down in an effort to determine what was successful about the system and what needs to be improved.

INTRODUCTION

A well designed interface for a video game has a large impact on user retention. Players spend hours looking at this interface and have expectations as to how it will behave. However, the interface is often seen as a secondary consideration compared to other aspects of the game like graphics, audio, and gameplay, when in reality a good interface can be just as important as any of the other aspects. This paper documented the design of a new UI (user interface) for a RPG (role playing game) video game meant to be played on a computer. The focus of the design was on the inventory system, but new designs for settings and map screens, as well as an interface for the gameplay screen, were designed as well. These desicisions were made because many games have poor UI elements and

the worst offender is usually the inventory management system, which is often complex due to the nature of RPG games (players pick up many items and the game must present and organize them in a way that is easy to understand). The design was not worked to include a fully functioning game, it was just designed to have the ability to switch between the necessary menus and screens.

The invenvtory systems of many RPG games is either difficult to navigate with a mouse and keyboard (the primary input for computer games) or so cluttered that it makes it difficult to find particular items. On the other hand, games that do use a system that is easy to use with a mouse and keyboard like a grid based inventory often suffer from a lack of ability to organize items well. To solve this problem the inventory was designed to be a combination of these two options; a grid based inventory with the ability to easily filter and categorize items using check boxes [1]. An effort was also made to improve the conceptual models of indicators like health and magic levels, and inventory on the HUD (heads up display) of the main game screen [1]. Accordingly, the focus of the design was on the principles of discoverability, signifiers, and conceptual models.

RELATED WORK

Software surveys were conducted on four different RPGs to give a more in depth look at how other games implemented their interfaces and to locate flaws in them so we could identify areas to focus on fixing in our design. Each section focused on an individual game and identified two major usability flaws that were identified as something to be avoided in our design.

Fallout 4

The first major usability flaw identified in Fallout 4 was a poor world map interface. The game world is large and the only way to efficiently travel around the game world is to use the fast travel mechanic, which teleports the player to their selected destination. The issue with this was that the display size of the map was small and all the locations cluttered up the small screen to such an extent that it was difficult for the player to find a particular location they were looking for. Additionally there was no way to filter what was displayed on the map. This reflects a poor use of signifiers according to Norman's

Figure 1. The display area is small and the screen is cluttered which makes particular objects difficult to locate.

Figure 2. Sometimes it is difficult to determine what landscape items can be jumped over. There is no clear indicator that this surface can jumped on.

Figure 3. The main menu for Final Fantasy 7

Figure 4. Diablo 3's grid based inventory system.

design principles, and also harms the discoverability of the player's options when it comes to fast travel [1]. This is shown in figure 1.

The scond flaw was identified to be the game's settlement building interface. Crafting items in the game can be frustrating because the same buttons perform different actions depending on what the player has selected in the world, and this information is displayed incosistently or not at all [1]. In addition, most of the possible actions are never explained to the player. These issues relate to Norman's first design principle; discoverability. Since there are few tutorials and actions are often not labeled, it is difficult for the player to realize what actions are possible within the interface. Adding this to the fact that the same buttons do different things and it becomes apparentthatthere is a mapping issue since the temporal continuity is practically non existant [1].

Final Fantasy VII
As is typical in many older games, it suffers from a lack of signifiers [1]. This causes players to waste a lot of time trying to figure out what actions are possible and what in the game world they can interact with. For example, in one instance the player was required to interact with a broken railing so they could jump over it and continue with the level. However the railing just appeared as part of the background and there was no indication it could be clicked in or interacted with in any way. An example is shown below in figure 2.

This is a clear violation of Norman's signifier desing principle, which encourages the use of indicators to ensure actions are discoverable [1].

Another issue with the game is that the menus are text heavy and include few signifiers or instructions that help the player determine how to perform actions in the inventory. This is particularly annoying when attempting to modify a magic spell the player has, as shown below in figure 3.

One would think that the Magic submenu would be used to make this change. However, this is not the case and instead the Materia submenu is used to change the magic spells that can be used by a character. Aside from being counter-intuitive, there is a lack of signifiers that indicate how to equip magic spells for later use. As a result of this the interface is deficient, in which users will waste time in-game in an attempt to discover the devices that allow modifications of equipment.

Diablo 3
The first usability issue of this game has to do with its grid based inventory system. Item picked up are automatically placed in the player's inventory, but they are usually not placed in an optimal location. This means that in order to use inventory space efficiently the player has to drop everything out of their inventory and then pick it all up again to re-order the locations. This is shown in figure 4.

The second issue discussed for Diablo 3 relates directly to the inventory issue descriped above. Since most items take up more than one inventory square and cannot be rotated, players

Figure 5. Clean up bags popup, open bags highlighted at bottom of screen.

are forced to make frequent trips to vendors in order to make room for new items in their inventory.

World of Warcraft

The first usability flaw for this game is an issue of a lack of confirmation. The player can sort their inventory in game by pressing a sort button from the inventory screen. The problem with this is that there is no way to set how the items will be sorted, and in addition the sort funtion populates the player's inventory in the opposite order than it fills up in. Picking up items fills the right hand of the inventory first, and then the left, while the sort function inverts this. Combining this with the fact that there is no confirmation when the player clicks the button means that an accidental click could reorder the player's bags in a confusing, unexpected, and unwanted way. An example is shown in figure 5.

The second issue that was discussed is related to the game's spell book. The spell book lists all the spells known to the player, and is a multi-page interface that contains the names of the spells and their icons beside them. The issue with the book is that it has no sort or search function, which makes it difficult and time consuming to locate a particular spell.

USABILITY TEST

Each participant took the same usability test and were evaluated with the following criteria, detailed below. There are 5 sections on the usability test.

Inventory Management Test

Users will be asked to perform the following tasks in order:

- Open the inventory
- Deselect all
- Select weapons and equip the axe in the left hand slot
- Deselect weapons, select armor, and equip light armor
- Select all, equip freeze spell in right hand

The user will be timed as they complete these tasks and will answer the following questions upon completion.

1. On a scale of 1 to 10, how intuitive did you find the tasks presented?
2. On a scale of 1 to 10, how frustrating did you find the tasks presented?
3. If the worst inventory system you have ever used is a 1, and the best a 10, where would you place this system?

Fast Travel Test

Users will be asked to open the map and fast travel to the port, which is represented by the anchor symbol. Users will not be informed that the port is the anchor symbol and will instead need to figure out which symbol is the port without tester advice. Following completion, the user will be asked the following questions:

1. Was fast travel an intuitive process to learn? Why or why not?
2. Was it difficult to discern which location was the port? Why or why not?
3. On a scale of 1 to 10, how easy was it to both open and traverse the map?

Inventory Movement Test

Users will be asked to perform the following tasks:

- Bring each of the inventory items to the bottom of the inventory in the same location. That is to say that the inventory item in the upper far left must be placed in the lower far left, the item one to the right of that placement will be one to the right of that item's placement on the bottom, and so on
- Swap the locations of the weapons with one another
- Swap the locations of the shields with one another
- Swap the locations of the armour with one another
- Swap the locations of the spells with one another

The user will be timed as they perform these tasks. Upon completion they will be asked to answer the following questions:

1. On a scale of 1 to 10, how intuitive did you find the tasks presented?
2. On a scale of 1 to 10, how frustrating did you find the tasks presented?
3. On a scale of 1 to 10, how simple to perform did you find the tasks?

Settings Test
User will be asked to perform the following tasks in order:

- Open up the settings menu

- Go to visual settings

- Change the display mode to fullscreen, the resolution to 1920x1080, and the graphical quality to high

- Close and reopen the menu

- Go to audio settings

- Set master volume to zero, music to maximum, character voice to maximum, and sound effects to zero

The user will be timed as they perform the aforementioned tasks. Following completion, users will be asked the following questions:

1. On a scale of 1 to 10, how intuitive did you find the tasks presented?

2. On a scale of 1 to 10, how frustrating did you find the tasks presented?

3. On a scale of 1 to 10, how easy was it to find the settings menu? Once found, was it easy to utilize?

General Post Test Questions
1. Did you find the interface intuitive as a whole? Why or why not?

2. Can you explain what you believe to measure health and mana on the screen? Why do you think they do this?

3. Did you have any difficulty in finding the map, inventory, or settings? What could have made this experience easier?

4. Is it easy to identify the player's location? Is it easy to identify the location of enemies relative to the player's location?

5. If you could add or remove anything from the interface, what would it be and why?

RESULTS
The results will be discussed by the sections they were presented in in the usability test section. All scores and numbers mentioned in this section can be found in the usability test responses filled out by the study participants in the appendix section.

Inventory Management Test
The average time taken to perform this section was 32.5 seconds. For how intuitive the tasks were all participants selected 9, and the frustration level they experienced performing the tasks was never rated higher than a 3. For the last question comparing this inventory system to others, 3 out of 4 of the participants gave the system a 7. From these metrics we can determine that all participants found the tasks intuative and were able to complete them in a relatively short amount of time. It is also apparent that the tasks were not very frustrating and that this system was liked better than the average RPG inventory system.

Fast Travel Test
The average time taken to perform this section was 8.8 seconds. 2 of the 4 users had no trouble identifying how to open the map and fast travel, the other 2 figured it out but raised concerns about a lack of discoverability and signifiers [1]. For ease of opening and traversing the map, 3 out of 4 participants ranked it a 9 or higher, and 1 gave it a 7. From these results we can see that while the map was easy to navigate due to prior experience with similar systems, it could be improved.

Inventory Movement Test
The average time taken to perform this section was 28.7 seconds. All of the participants said that the level of intuitiveness of the tasks they were asked to perform was a 9 or higher, and that the level of frustration they caused was a 2 or lower. All participants also rated the level of simplicity of performing the tasks with the system as a 9 or higher. From these results we can see that the inventory management and organization portion of the system was a resounding success.

Settings Test
The average time taken to complete this section was 24.9 seconds. Apart from one participant who was very satisfied with this part of the system, the level of intuitiveness was lower and the level of frustration was higher in this section than in others. There was a much lower spread here compared to the other parts of the usability test.

Post Test Questions
The general feel of these answers were positive, however they are less easily quantified than the other sections and will be discussed in greater detail in the discussion section.

DISCUSSION
The results were indicative of an overall positive reaction to the design of the interface. Users were able to perform the actions without additional advice on button location or functionality separate from the test description itself. An overarching issue that was presented by more than one subject's answers was the lack of labels upon both the minimap and the main map. While the map was not the focus of the development, it was still important to the overall function. User difficult mainly came from the lack of labels and ease-of-identification of the player's location and that of enemies where applicable. The map itself, however, was an extremely divisive aspect of the overall interface. Half of the users were completely unable to understand what the shapes on the minimap actually indicated, but the other half had no issue whatsoever. One hypothesis for this eventuality could be that the users who understood did so intuitively based upon other interfaces that they had previously used, indicating that the conceptual model used may be either weak or simply not as widespread as previously believed. Users also requested a close button for the map and in one case also requested keyboard hotkeys with intuitive bindings to allow easier menu function. Another oft-requested feature was a confirmation of success message upon both successful fast travel and successful changing of settings.

While most of the tests were both intuitive and not very frustrating, the settings management test had a higher level of

frustration and a lower level of intuitiveness than the others. One frustration that was made known was that the actual settings button was at the end of the abilities hotbar, which made it difficult to find for some users, several of whom originally believed the gear symbol to be aother ability linked to the hotbar. However, users did not have much difficulty traversing the menu itself. A possible solution to this issue would be to move the actual button for the settings away from the hotbar and perhaps into a corner of the screen. The settings menuâĂŹs functionality itself was however accepted without complaint. This indicates that the frustration is not with the mechanics of the menu but rather with the ease-of-access of the menu itself. This is supported by the lack of complaint with actual menu function, except the aforementioned requests for success confirmation within the settings menu.

Users overwhelmingly indicated familiarity with the core concepts presented in the interface. They mostly indicated that they felt this familiarity with role playing game (RPG) menu systems that they had previously interacted with. This colours their success in some way, but it also indicates that the majority of the conceptual models utilized to model the interface on a general level are well defined for the average user. 100% of users were able to correctly identify the health and mana meters, one even indicating that the colours alone would indicate health and mana even without the actual shaping of the bars into the appropriate shapes. The overall responses were extremely positive, with some users refraining to indicate anything they would change about the interface itself. However, the small, repeated issues indicate that the interface should be edited to be easier to understand for the uninitiated game player, and several quality of life improvements would positively affect the reception of the interface as a whole.

CONCLUSION

This paper examined several RPGs and analyzed the strengths and weaknesses of their respective user interfaces. We then used the information gathered through that proccess to propose and design the user interface for our own RPG. This interface focused on the inventory system, but included a game screen, settings menu, and map with fast travel system as well. Personas were designed to determine the target audience for this system, and using this information in combination with the information gathered from the software surveys, several iterations of designs for the system were produced. Once the final design was selected, the system was built. A usability test was then designed to assess the performance of various aspects of the system, and 4 participants were selected to perform the tasks outlined in the usability test. After performing the test, the participants were asked a series of questions to gauge their satisfaction with the system, and to note anything that they felt we could add or remove to improve the system. All of the participants felt that the inventory system was well designed, and they were all able to navigate the settings menu and map, however they requested that more signifiers and feedback be incorporated into them to make it easier. Overall the designed system was a success, held back only by a few minor flaws.

REFERENCES

1. Don Norman. 2013. *The Design of Everyday Things* (2nd ed.). Basic Books, 250 West 75th Street New York, New York, Chapter The Psychology of Everyday Actions, 72–73.