Human-Computer Interaction - User Research Methods

COMP210 - Interfaces and Interaction

1703170

October 12, 2018

Introduction

This journal intends to research different usability testing techniques. This research will go on to inform a decision on what methodology would best suit the gathering of information on a bespoke game controller and game made by a computing student. The game is a simple 2D game with space invaders style enemies scrolling down the screen. The player controls a target crosshair that moves up, down, left and right attempting to bombard enemies before they reach the bottom of the screen. The controller itself is unconventional, shaped like a cannon with a rotary crank to control the players movements, and a firing mechanism akin to WW2 mortar grenades.

Surveys

Surveys are the most widely used research method, consisting of a well defined set of questions to which an individual is asked to respond [1]. The quality of the questions in a survey correlates directly to the usefulness of a survey, as ill-defined or vague questions can result in bad data [2].

Surveys can also be subject to confirmation bias; if a question written by the researcher about an interface seems loaded rather than being as neutral as possible then the user response wont be as useful, skewing the results in favour or the researchers preconceptions about the interface [3]. This is a common pitfall with interview and focus group questions as well.

A web-based survey has the ability to disseminate the test to large swathes of a population regardless of geographical location and gather user responses relatively quickly and are noted to be preferred over paper surveys [4].

Surveys are also very easy to create and use, this can however lead to companies using them when another method might be more appropriate.

Focus Groups and Interviews

While surveys are a useful tool for gathering broad simplistic answers to questions about an interface, they are somewhat limited in that they often lack depth.

Alternatively, focus groups and interviews give the researcher an opportunity to garner more meaningful information from the user by way of asking follow up questions to responses from the user [5]. The challenge arises in asking the best questions to get the most useful insights whilst knowing how to interpret user responses [6]. A user's response may also change depending on the structure of the interview or focus group. More formal interviews may elicit different responses to informal ones [7] [8]. This suggests that psychology and human interaction are facets just as vital to the researcher

as knowing the focus of the research study [9].

Analysing the results of these studies can also be a challenge and very time consuming and as such limit the number of participants. As we can see, interviews and focus groups clearly require more effort to undertake than most other research methods.

A/B Testing

This method is used to test out different features in a program by giving one set of users a version of the software while giving a second set of users an alternate version. The researcher can look at how each version performs separately to decide which direction to proceed with development. This happens a lot in web development [10] where businesses' need to optimize their user or customer experience to maximize usage and concurrently profits [11].

Think Aloud Protocols

A Think Aloud Protocol is a method in which a researcher watches a user use an application or interface whilst the user verbalises their thought processes [12].

There are several factors the researcher should adhere to in order to ensure good results:

- The researcher should make sure the user feels at ease with the environment they are in.
- The situation should focus on the task with the researcher interfering as little as possible with the users' thought process to avoid influencing its course of action.
- The researcher should instruct the user with a simple and concise task like 'I will give you a problem. Please keep talking out loud while solving the problem.'. The more the researcher says in this regard, the more ambiguous the instruction, the

more the user will come up with their own interpretations about what it is the researcher wants from them [13].

- Interference from the researcher should come only to reinforce the objectives of the protocol if the user stops talking.

- It is good practice to record the experience with an audio or video tape. The researcher can then review the protocol with the user as soon as possible after the actual think aloud session to avoid unnecessary interpretation. This then becomes a Retrospective Think Aloud Protocol [14] [15].

Motion Tracking Technologies

While surveys and focus groups are good for determining a users conscious opinions, would capturing a users subconscious actions while using an interface be more illuminating? Eye-tracking for example, can give us a highly accurate measure of where the users focus lies at any one moment while using a computer [16].

Gaining a users attention is a challenge [17] and eye-tracking could be used to influence the development of a game, for instance increasing or lowering speed of moving enemies or objects based on how much or little attention the user pays them. This could be useful in regards to testing my Alternative Controller project. In practice this may be impractical for my current needs considering equipment costs [18], but for future projects may be viable, especially considering there are alternative commercially available eye-tracking goggles that can be used in conjunction with smartphones as well as software utilizing a smartphones camera to track eye-movement [19].

Collecting data about the emotions of a video game player can also be very useful and particularly in Virtual Reality where the user should feel much more immersed than in a regular video game [20]. This suggests quantitative data can be gathered on a users emotions while playing video games. If made more readily available this could

revolutionise how games are developed and play-tested.

Conclusion

In an ideal world several different methodologies would be used to review the controller so that both quantitative and qualitative results could be analysed. This would help eliminate biases and cover the disadvantages of each method. However, considering that the scope of the controller and game is quite small in comparison to commercial interfaces, it seems more appropriate to choose one.

Motion tracking technologies such as eye-tracking, while being particularly useful in game development, the high cost of the equipment and expertise requires makes this an impractical approach [21] [22].

A Think Aloud Protocol is an alternative approach that may be considered. This method would be particularly useful in garnering insight into a users thought processes while playing a video game. This may be better suited to a more complex game however.

Interviews and focus groups do seem a possibility but seem to require a decent understanding of human interaction and psychology to interpret the results in a meaningful manner.

A/B Testing seems an interesting avenue for exploration but currently only one version of the software exists. If the development was ongoing and iterative this method would be much more useful and viable.

The most logical method to gather data on it seems to be a traditional survey with multiple users. This is a versatile method that can give either quantitative and qualitative data. With the game being relatively simple and unambiguous when provided with a few simple instructions on how to utilize the controller, a well defined set of questions wouldn't be too difficult to devise.

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