

Eye Tracker Study: Analysis of Gameplay Elements Placement

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Introduction

This report presents an analysis of eye tracking data gathered during a study aimed at understanding participants' visual attention in a game interface. By examining heat maps generated from eye tracker data, we aim to provide insights into the effectiveness of the placement of key gameplay elements.

Our main hypothesis posits that participants will initially direct their attention to areas aligned with their beliefs or habits. Additionally, we hypothesize that optimal placement of items will coincide with participants' natural search behavior.

Methodology

The study utilized an eye tracker from Pupil Labs for data collection, with subsequent analysis conducted using Pupil Cloud. Participants consisted of first-year students enrolled in the Social Informatics program at AGH University of Science and Technology. Age and gender were not factors considered during participant selection.

Participants were tasked with completing various in-game actions while their eye movements were tracked. The tasks were completed based on a looped screen recording of a part of a game. The static UI elements are on the graphic 1. The participants received the following questions:

1. Where is the end turn button located?
2. Where is the minimap?
3. Where are the hero's health points located?
4. Where is the character movement order displayed?
5. Where are the collected items located?
6. Where can the team be divided?



Graphic 1. User Interface elements.

Results and Analysis

Analysis was done in the connected interface pupil_labs.com, where first the recordings were manually segmented into events, and then automatic enrichment was run with the markers options. Based on the enrichment obtained in the environment, visualizations were done, namely heatmaps and saccade path visualisation. Heatmaps were generated from the collected data to visualize areas of high fixation density, indicating regions of interest on the game interface. The saccade paths were created in order to understand the most natural and prominent placement of the UI elements. Later based on the images and videos obtained, a post hoc analysis was made.

1. End Turn Button Location

The fixation analysis suggests that while the majority of participants were able to find the "end of the turn" button relatively quickly (approximately 1-7 sec), there were instances where participants struggled or initially missed the button. There is a slight trend for looking for such buttons on the right side of the screen, however it is not too consistent among participants. The heatmap clearly shows that at the end the main attention was paid to the correct place.



Graphic 2. End Turn button heatmap.

2. Minimap Location

While the player character in the middle of the screen attracted significant attention according to the heatmap, the minimap received less focus. There are visible heat marks towards both bottom corners of the screen, a faint one on the upper left corner and a stronger one on the upper right where the actual minimap is located. The fixation paths confirm that most participants, although found the minimap in around 1 sec, started from the center of the screen and looked at the bottom of the screen first, and only afterwards, looked to the upper part.



Graphic 3. Minimap heatmap.

3. Hero's Health Points Location

Participants primarily looked towards the bottom center of the screen, when asked to find health points. The additional focus on character portraits and group areas indicates a preference for visual representations of character information. Fixation analysis reveal that participants firstly looked at the top of the screen and later started scanning the bottom part right to left looking for the asked information, with some exceptions going even further left to the party item. Average time for this task was 9 seconds.



Graphic 4. Health Points heatmap.

4. Character Movement Order Display

The turn order display received significant attention, particularly at the upper center of the screen. Additional strong heat marks in the center of the screen indicate a natural tendency to focus on moving items on the screen. Fixation paths revealed that the average participant needed 8 sec to find the turn order display, and that their primary action was to look at the top of the screen, then bottom, and go back and forth, similarly to question 3.



Graphic 5. Character Movement Order heatmap.

5. Collected Items Location

Despite the inventory being situated towards the bottom center, participants showed confusion, possibly mistaking spell lists for items. Lack of strong fixations on the actual inventory location suggests a misunderstanding of its placement, with participants shifting attention towards equipped items and spells instead. From the fixation path there are no visible paths that can be shared among more participants. Average time for finishing this task was 4 seconds.

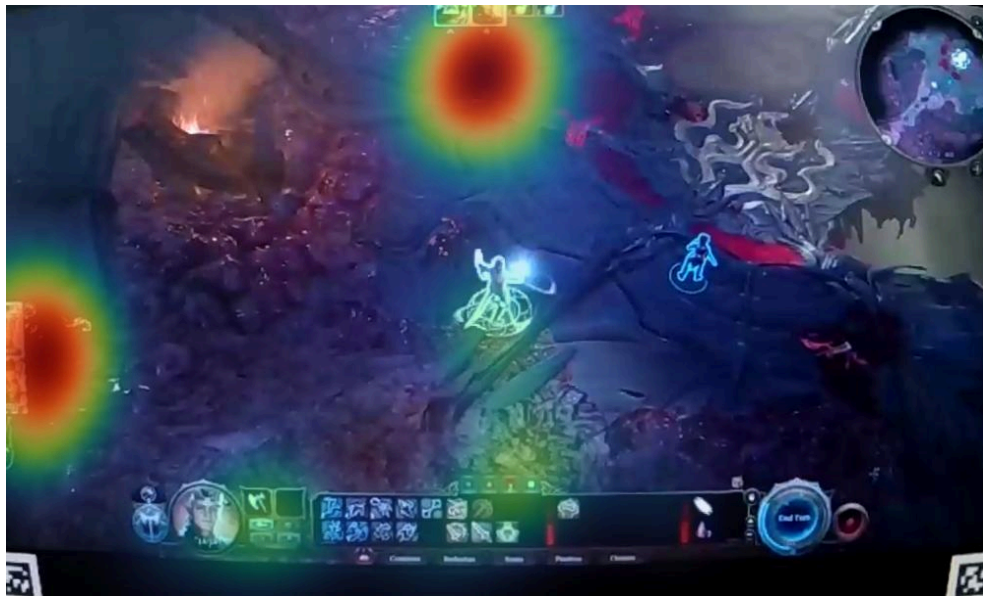


Graphic 6. Collected Items heatmap.

6. Team Division Options

Participants considered both the turn order and character group areas as potential options for splitting the party. Additionally fixation paths revealed that all participants looked at the relatively beginning of this task on the top of the screen where the turn order is, but after approximately 9

sec all of them have found the correct element on the left. Afterward, the participants on their own expressed that the last question was more of a deduction question “which element was not yet asked about” more than reaction to the task and a gut feeling.



Graphic 7. Team Division Options heatmap.

Conclusion and Recommendations

The analysis of eye tracking data offers valuable insights into the attention and interaction patterns exhibited by players within the game interface. Effective placement of gameplay elements, such as the "end of turn" button, has the potential to significantly enhance user experience. Conversely, inconsistencies in the placement of other elements, such as the minimap and inventory, may result in user confusion. These findings underscore the importance of informed interface design decisions aimed at optimizing user engagement and gameplay experience.

Moreover, the examination of eye tracking data revealed several key observations regarding player behavior during gameplay. Firstly, it was observed that precise adjustment of screen brightness is essential for accurate eye tracking analysis, ensuring reliable data collection and interpretation. Additionally, players tend to direct their attention predominantly towards their in-game character and its likeness, highlighting the significance of emphasizing important elements during interface design. Furthermore, the use of similar interface elements may lead to player confusion and the conflation of different elements, such as mistaking the spell menu for the inventory or the team menu for the turn order.

Based on these findings, several recommendations can be proposed to enhance the design and usability of the game interface. For instance, relocating the minimap to one of the bottom corners of the screen could improve its accessibility and visibility to players. Similarly, information about health points could be strategically placed within the interface, such as near the character representation, to facilitate quick and intuitive access. Furthermore, considerations should be made to redesign the appearance and layout of the inventory, potentially integrating it with existing menus or utilizing visual cues to aid user comprehension. Additionally, efforts should be made to differentiate between interface elements to mitigate user confusion, such as enhancing the distinction between the character menu and the turn order counter.

In conclusion, the integration of eye tracking data analysis into interface design processes offers invaluable insights into user behavior and preferences, ultimately contributing to the development of more intuitive and engaging game interfaces.