

Exploring the Relationship between Layout Design and Aesthetic Emotion through Eye Tracking Method

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Summary

Different media produce different effects that subsequently influence the user's acceptance and understanding of a message. The visual presentation of these media is greatly influenced by the use of layout systems; the present study takes this as a starting point for research. Research shows that layout styles represent the ideas and preference of society and people of the time. Also worthy of discussion and comparison is the fact that the varying dimensions of the different types of media platform result in different effects in conveying messages, and that the effect of digital media must also take into account the factor of layout design.

Human minds are not necessarily rational. A well-designed incentive may influence behavior towards the desired direction. Psychology and behavioral economic theories proved that, insignificant elements are often the source of significant influences. Kahneman (2011), Thaler and Sunstein (2009) introduced the notion of "Nudge" to illustrate the importance of subtle designs. One of the most renowned examples is the etching of images of houseflies into the urinals. This subtle design improved the aim and reduced 80% urine spillage. When defining factors affecting website usability, scholars tended to advocate the importance of aesthetics. Hassenzahl (2008), however, proposed that layout design is the critical influence on both aesthetics and usability. These are examples that visual or interface designs of details could exert remarkable impacts on people's behavior or decision making. Layout design is ubiquitous in daily life, an indispensable element behind successful visual guidance and aesthetic experience of 2-dimensional media or 3-dimensional space alike. Therefore, how different layouts and content lead to different user

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eye movement and emotional reactions becomes a vital subject for clinical designs and aesthetic education, while relevant empirical studies of aesthetics are few in number.

The present research started off by discussing basic layout system. Then an 8×2 factorial design experiment was employed based on two factors, “layout design” and “content meaningfulness/meaninglessness.” It used eye tracking technique and Pleasure-Arousal-Dominance (PAD) emotion measurement scale to analyze browsing movements and aesthetic emotions of 40 participants. Treating scanpaths of the eye movement on “content meaningfulness/meaninglessness” as the variant, the 8 layouts were sorted into 3 categories: similar, somewhat similar, and not similar. S3 Radial, S4 Dilatational, S6 Modular and S7 Random layouts resulted in similar eye movements. S2 Bilateral and S8 Transitional layouts resulted in somewhat similar eye movements. S1 Axial and S5 Grid layouts resulted in eye movements that were not similar to each other. The impact of layouts on fixation allocation was shown on the heat map. In “content meaningfulness” scenarios, participants tended to focus on specific points or areas under the influence of layout design.

Based on the PAD aesthetic emotion research, different layouts yielded to different results when observed from different emotional indicators. The result of a two-way ANOVA in SPSS Statistics shows that there is a statistically significant interaction ($F = 3.324$, $\text{Sig.} = 0.006$) between “layout design” and “content meaningfulness/meaninglessness” on the Pleasure emotion. The main effects can be summarized as follows. First, among the 8 layouts of content meaningfulness in the Pleasure emotion evaluation, S3 Radial layout scored highest while S8 Transitional, S5 Grid, and S7 Random layouts scored least. Secondly, among the 8 layouts of content meaningfulness on the Pleasure emotion evaluation, S3 Radial, S4 Dilatational, and S2 Bilateral layouts scored highest while S7 Random layout score least.

“Layout design” has a significant effect on the Arousal emotion indicator, with Radiant layout triggering the highest Arousal emotion. “Content meaningfulness/meaninglessness” has a significant effect on the Dominance emotion with “content meaningfulness” getting a higher Dominance emotion score.

The present research used eye movement experiments to reinforce theoretic achievements of prior studies. It also attempted to formulate the relationships between layout and eye movement. The PAD emotion measurement identified aesthetic emotions produced by various layouts, also shedding lights on the relevance between eye movement and emotional responses. The research aims to provide references for design or art education to this relatively under-researched topic. It also expected to make tangible proposals for ideal layout designs for multimedia platforms at the present day.