

A Brief Analysis of the Current Status and Recommendations for Eye-Tracking Research on Mobile Reading (Postprint)

Authors: Jiang Tingting, Gao Fang

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Abstract

With the continuous emergence and development of digital reading, mobile reading has gradually become one of the primary modalities within digital reading. However, mobile reading has also revealed issues of low reading efficiency. Therefore, increasing research through eye-tracking experiments facilitates the analysis and summarization of factors influencing mobile reading efficiency, as well as methods for its improvement, thereby enhancing mobile reading efficiency.

Full Text

Preamble

Research • Media and Development: A Brief Analysis of the Current Status and Recommendations for Eye Movement Research in Mobile Reading

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Abstract: With the gradual rise and development of digital reading, mobile reading has become one of the primary methods of digital reading. However, mobile reading has also exposed problems of low reading efficiency. Therefore, increasing research through eye movement experiments helps analyze and summarize factors affecting mobile reading efficiency, as well as ways to improve it, thereby facilitating enhanced mobile reading efficiency.

Keywords: mobile reading; eye movement; research status; recommendations

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Authors: Jiang Tingting, Gao Fang

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1.1 Convenient and Practical

Mobile media fully utilizes media resources, enabling users to obtain most real-time network information simply by viewing relevant mobile web pages or APP software. The primary advantages of mobile phones lie not only in their portability but also in the concentration and conciseness of information. This portability allows mobile reading users to receive and access information anytime and anywhere, making information acquisition more convenient and practical.

1.2 Massive Amount

With the gradual rise and development of digital reading and the increasing datafication of information, more content is being integrated and disseminated through mobile device platforms. Consequently, through mobile browsers, social media, mobile APPs, and other channels, vast amounts of news and information resources flow to mobile reading users, who also learn about more fresh and real-time information through mobile reading.

1.3 Low Cost

Compared to the rising prices of paper-based reading materials—where a newspaper costs about 1 yuan, a journal no less than 5 yuan, and a book generally over 10 yuan—mobile reading media allows users to access newspapers, magazines, books, and other related information for only about 5 yuan per month. Some public information can even be queried for free, enabling people to obtain large amounts of relevant information at low cost and satisfying their reading needs.

2.1 Font Size

From the perspective of visual cognition, fonts must first be eye-catching and distinct, with sufficient contrast against the interface background and other visual elements. Taking the APP interface of the Android system as an example, Droid Sans Fallback is Google's own font, very similar to Microsoft YaHei. Font sizes must adapt to different screen dimensions, while different user groups also have varying requirements for font size. As font size changes, layout design also changes—for instance, whether page breaks or scroll bars are needed. Therefore, font size has some impact on users' reading efficiency.

2.2 Color Effects

During information reading, when the human visual sensory system receives external color stimuli, it produces intuitive impressions while also involuntarily triggering thought or mental activities, such as in color matching and color association.

2.2.1 Color Matching

Color matching is primarily manifested in color coordination. For example, red is characterized as powerful, with the longest wavelength, creating a sense of visual expansion for users and easily attracting attention and excitement.

2.2.2 Color Association

Color association occurs when external light and color stimuli simultaneously evoke corresponding color memories in the brain. It varies among user groups based on factors such as age, gender, and occupation. Therefore, when facing different age groups and cultural levels, colors have corresponding symbolic meanings.

2.3 Layout

Depending on the content, layout methods are also crucial for information combining text and images. The proportion of interface space occupied by pictures, animations, and text, as well as their arrangement, indirectly changes users' attention to information and their comprehension and absorption of key points, thereby affecting reading efficiency.

2.4 Information Volume

Since mobile reading utilizes fragmented time and emphasizes convenience, practicality, and entertainment, it disseminates more news, information, and query materials by condensing and simplifying information. Therefore, the volume of information is self-evident; while larger amounts of information are produced, they also generate certain cognitive loads, which consequently affects reading efficiency.

3.1 Eye Movement Research on Digital Reading Methods

Some foreign scholars have used Google search engines as research cases to explore users' eye movement characteristics during web searches, providing valuable insights for testing and modifying page settings, improving human-computer interaction, and determining advertising placement areas. Other foreign scholars have studied users' eye movement features when reading and sending text messages, concluding that short messages are suitable for reading on

small mobile screens and that non-standard spelling can increase reader interest. Domestic researchers have investigated eye movement characteristics of different genders when reading mobile advertising information, concluding that fixation duration on mobile ads is most influenced by their size and information display methods, with different genders showing varying responses to advertising information. Eye movement experiments have revealed that the true cause of college students' shallow online reading behavior is the formation of poor cognitive habits in a shallow reading environment, rather than online reading itself.

3.2 Eye Movement Research on Text Reading

Foreign researchers such as Taylor have conducted eye movement analyses on students of different age groups using eye trackers. Through analysis of eye movement indicators such as fixations, regressions, fixation pause times, and perceptual span, the results show that age affects reading speed, comprehension accuracy, and efficiency; perceptual span increases with age; and there is a clear correlation between font size and reading efficiency.

3.3 Eye Movement Research on Multimedia Reading

Domestic experts such as Yan Guoli have concluded through eye movement experiments that when multimedia information such as pictures and animations is placed close to text, users' reading efficiency improves by approximately 50% compared to presenting image or text information alone. Appropriately inserting pictures and animations can attract user attention, increase fixation time, and reduce cognitive load. Therefore, articles with illustrations have the optimal reading effect.

4.1 In-Depth and Continuous Exploration of Mobile Reading

Although eye movement research has gradually deepened across various fields, it remains in the initial exploratory stage domestically. Therefore, we hope for more eye movement research projects that use eye trackers to record parameters such as fixation points, fixation duration, saccade direction, saccade distance, regression frequency, and pupil diameter when the human eye processes visual information. Based on experimental needs, relevant eye movement data should be extracted and eye movement trajectory maps drawn to more comprehensively analyze human psychological activities and cognitive patterns, applying these more extensively to research fields such as attention and reading, thereby enabling substantial development in related areas.

4.2 Increased Development and Research on Various Functions of Eye Trackers

Regarding eye movement research on mobile reading, although researchers have begun to pay attention to this field in recent years and conduct theoretical literature explorations, related research remains in its infancy. Therefore, we hope more researchers will join this research field, seriously study the use of relevant eye movement instruments and equipment, expand the range of test subjects, and carefully design test experiments to obtain more objective eye movement parameters. These will inform the experience design of mobile reading, striving to analyze factors affecting mobile reading effectiveness through experimental data, enabling users to better utilize mobile reading products and promoting the virtuous cycle development of mobile reading.

4.3 In Eye Movement Experiment Design

By extensively using currently available mobile reading software on the market and combining it with relevant theoretical knowledge for analysis and summary, we can improve the experience design of eye movement experiments, such as the layout methods for interface text and images, the reasonable arrangement of information content, etc., making experimental data more specific and comprehensive.

5. Conclusion

In recent years, domestic eye movement research has made considerable progress and achieved certain results in fields such as aesthetics, psychology, sports psychology, and advertising. However, there remains significant room for expansion in using eye movement technology for analysis and research in mobile reading design. Through scientific eye movement technology to explore mobile reading interface design methods and approaches, utilizing parameter data can provide theoretical support for subsequent mobile reading interface design, offer support for improving future interface designs, and will certainly bring new hotspots to mobile reading interface design.

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Author Information

Jiang Tingting (1988-), female, Han ethnicity, from Changsha, Hunan, graduate student at the School of Packaging Design and Art, Hunan University of Technology, majoring in Art Design; Gao Fang (1988-), female, Han ethnicity, from Nanyang, Henan, graduate student at the School of Packaging Design and Art, Hunan University of Technology, majoring in Art Design; Supervisor: Wang Jianmin (1970-), male, from Dunhuang, Gansu, Associate Professor at the School of Packaging Design and Art, Hunan University of Technology, Director of the Animation Department, also serving as Director of the Art Design Experiment Center.

(Author Affiliation: School of Packaging Design and Art, Hunan University of Technology)

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