

## Mechanisms Underlying Comprehension of Visualized Personal Health Information: An Eye Tracking Study

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**Abstract :** While the use of electronic personal health portals has gained increasing popularity in the healthcare industry, users usually experience difficulty in comprehending and correctly responding to personal health information, partly due to inappropriate or poor presentation of the information. The way personal health information is visualized may affect how users perceive and assess their personal health information. This study was conducted to examine the effects of information visualization format and visualization mode on the comprehension and perceptions of personal health information among personal health information users with eye tracking techniques. A two-factor within-subjects experimental design was employed, where participants were instructed to complete a series of personal health information comprehension tasks under varied types of visualization mode (i.e., whether the information visualization is static or dynamic) and three visualization formats (i.e., bar graph, instrument-like graph, and text-only format). Data on a set of measures, including comprehension performance, perceptions, and eye movement indicators, were collected during the task completion in the experiment. Repeated measure analysis of variance analyses (RM-ANOVAs) was used for data analysis. The results showed that while the visualization format yielded no effects on comprehension performance, it significantly affected users' perceptions (such as perceived ease of use and satisfaction). The two graphic visualizations yielded significantly higher favorable scores on subjective evaluations than that of the text format. While visualization mode showed no effects on users' perception measures, it significantly affected users' comprehension performance in that dynamic visualization significantly reduced users' information search time. Both visualization format and visualization mode had significant main effects on eye movement behaviors, and their interaction effects were also significant. While the bar graph format and text format had similar time to first fixation across dynamic and static visualizations, instrument-like graph format had a larger time to first fixation for dynamic visualization than for static visualization. The two graphic visualization formats yielded shorter total fixation duration compared with the text-only format, indicating their ability to improve information comprehension efficiency. The results suggest that dynamic visualization can improve efficiency in comprehending important health information, and graphic visualization formats were favored more by users. The findings are helpful in the underlying comprehension mechanism of visualized personal health information and provide important implications for optimal design and visualization of personal health information.

**Keywords :** eye tracking, information comprehension, personal health information, visualization

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