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Usability Testing on Information Design through Single-Lens Wearable Device

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Abstract : This study was conducted to investigate the effect of ocular dominance on recognition performance using a single-lens smart display designed for cycling. A total of 36 bicycle riders who have been cycling consistently were recruited and participated in the experiment. The participants were asked to perform tasks riding a bicycle on a stationary stand for safety reasons. Independent variables of interest include ocular dominance, bike usage, age group, and information layout. Recognition time (i.e., the time required to identify specific information measured with an eye-tracker), error rate (i.e. false answer or failure to identify the information in 5 seconds), and user preference scores were measured and statistical tests were conducted to identify significant results. Recognition time and error ratio showed significant difference by ocular dominance factor, while the preference score did not. Recognition time was faster when the single-lens see-through display on the dominant eye (average 1.12sec) than on the non-dominant eye (average 1.38sec). Error ratio of the information recognition task was significantly lower when the see-through display was worn on the dominant eye (average 4.86%) than on the non-dominant eye (average 14.04%). The interaction effect of ocular dominance and age group was significant with respect to recognition time and error ratio. The recognition time of the users in their 40s was significantly longer than the other age groups when the display was placed on the non-dominant eye, while no difference was observed on the dominant eye. Error ratio also showed the same pattern. Although no difference was observed for the main effect of ocular dominance and bike usage, the interaction effect between the two variables was significant with respect to preference score. Preference score of daily bike users was higher when the display was placed on the dominant eye, whereas participants who use bikes for leisure purposes showed the opposite preference patterns. It was found more effective and efficient to wear a see-through display on the dominant eye than on the non-dominant eye, although user preference was not affected by ocular dominance. It is recommended to wear a see-through display on the dominant eye since it is safer by helping the user recognize the presented information faster and more accurately, even if the user may not notice the difference.

Keywords : eye tracking, information recognition, ocular dominance, smart headware, wearable device
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