

Driving Hazard Detection on the Road Does Not Reveal the Prevalence Effect

[Christopher I. Hernandez](#); [Dr. Katherine Rahill](#); [Minh Pham](#); [Lucho Manriquez](#); [Priscilla Louis](#); [Alexandra Figueroa](#); [Bryan Medina](#); [Dr. Benjamin Wolfe](#); [Dr. Ben D. Sawyer](#)

+ Author Affiliations

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Abstract

Previous work has shown that with an increase in the number of signals, accuracy in identifying them improves a phenomenon termed the prevalence effect. However, in complex tasks, particularly those in visually rich environments, prevalence effects may fail to appear. Detecting hazards on-road, a rich, real-world task, has been suggested to be affected by hazard prevalence. To assess whether prevalence effects do, in fact, occur in hazard detection, we performed a laboratory study using short video clips of road scenes with and without hazards. Fifteen observers were divided into three prevalence groups and performed 20 practice trials, followed by 300 experimental trials each. In each trial, participants were asked to either press the brake pedal if they perceived a hazard or press the accelerator pedal if no hazard was perceived. Hazard probabilities across three conditions were held at approximately 1%, 5%, and 20%. Accuracy in these conditions was, respectively, 60%, 64%, and 61%, revealing no effect of hazard prevalence on performance. This result suggests that avoiding hazards on the road may join other real-world contexts where prevalence effects do not occur. This is both of interest in terms of both understanding prevalence effects in real-world contexts, and in the application of prevalence effects in transportation. On the road, human vigilance in monitoring the roadway for hazards is a key

component of new semiautonomous driving systems, and this finding points to the driver's ability to intervene when needed. We suggest that the lack of a prevalence effect in this study may be due to the rich environment in these video clips, or a task-specific effect related to driving or hazard detection.

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