

Dual-target Hazard Perception: Could Identifying One Hazard Hinder a Driver's Capacity to Find a Second?

ABSTRACT

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Publisher: Accident Analysis and Prevention, October, 2019

Abstract

Low-level cognitive processes like visual search are crucial for hazard detection. In dual-target searches, *subsequent search misses* (SSMs) are known to occur when the identification of one target impedes detection of another that is concurrently presented. Despite the high likelihood of concurrent hazards in busy driving environments, SSMs have not been empirically investigated in driving. In three studies, participants were asked to identify safety-related target(s) in simulated traffic scenes that contained zero, one, or two target(s) of low or high perceptual saliency. These targets were defined as objects or events that would have prevented safe travel in the direction indicated by an arrow preceding the traffic scene. Findings from the pilot study (n = 20) and Experiment 1 (n = 29) demonstrated that detecting one target hindered drivers' abilities to find a second from the same scene. In Experiment 2 (n = 30), explicit instructions regarding the level of risk were manipulated. It was found that search times were affected by the instructions, though SSMs persisted. Implications of SSMs in understanding the causes of some crashes are discussed, as well as future directions to improve ecological and criterion validity and to explore the roles of expertise and cognitive capabilities in multi-hazard detection.

Key points:

- Visual search of multiple hazards is critical for driving but error-prone.
- Finding one hazard impaired detection of another in the same scene.
- Warnings led to modest improvements in hazard detection performance.
- Visual search errors were still present following high-risk warnings.
- The novelty of this cognitive flaw for drivers warrants further investigation.