



D19 The Conspicuity of a Horizontal Rope Hazard in the Path of a Bicyclist: A Case Study

James B. Hyzer, PhD*, Hyzer Research, Janesville, WI 53545-4077

Learning Overview: The goal of this presentation is to discuss how camouflage and depth perception influence the ability of a bicyclist to visually perceive and recognize a horizontal rope hazard suspended in his path.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by advancing the understanding of how conspicuity, camouflage, depth perception, and expectancy influence the probability that a bicyclist will not visually perceive a rope hazard in time to avoid being “clotheslined.”

The case study involves a 71-year-old male bicyclist, riding an upright bicycle into a white rope suspended horizontally at near neck height, between two lamp posts, across his intended path through a parking lot. An issue in the case is why the bicyclist did not see the rope that he hit.

It will be shown that even though a rope hazard may be in plain sight and visible to observers who know that it is there, to a rapidly approaching bicyclist that is not expecting it, a rope hazard must be sufficiently conspicuous relative to its background to be detected. Generally, the probability that a hazard will be detected increases with increased hazard conspicuity (how conspicuous it is). At the extremes, rope hazards that are highly conspicuous have the highest probability of being detected at the greatest possible distances, and hazards that are camouflaged may not be seen or recognized at all.

In addition to conspicuity, to be noticed, a rope needs to be perceived as being close enough to be considered a hazard. To the observer moving rapidly through a scene, primary critical cues to the perception of distance to a hazard come from motion parallax and binocular vision. It will be shown that a horizontal rope at near eye height to an approaching bicyclist will exhibit a visual illusion that make it difficult or impossible for the bicyclist to perceive as becoming hazardously close.

An earlier presentation addressed the conspicuity of wires ropes and cables under substantially ideal conditions, where the hazard is viewed against a uniform background and when the observer has sufficient time for observation.¹ For the subject case, factors that were only briefly discussed in the 1997 paper become primarily relevant for understanding why a bicyclist, exercising reasonable care with respect to lookout, failed to visually perceive a rope hazard. Specifically, it will be shown through case study that a bicyclist did not see an elevated, horizontal white rope hazard that he rode into for the following reasons: (1) the rope hazard was camouflaged against its background, making it difficult to visually recognize as a hazard in his path as he approached; (2) at near head height, the rope hazard did not exhibit significant parallax movement that would have offered a cue to changes in distance as the bicyclist rode toward it; (3) the distance to horizontal wires, ropes, and cables, without hazard warning flags or markers, is generally difficult or impossible to judge with horizontal binocular vision; and (4) the rope hazard was unexpected for the bicyclist, and as he rode across the parking lot toward his intended path, his focus was reasonably on the parking lot surface beyond it.

The rope in the case study at near the time of the accident was measured to be 58.5 inches above the pavement. The bicyclist’s neck height, while on his upright bicycle, was measured to be 61 to 62 inches. The United States Department of Transportation Federal Highway Administration (FHWA) reports an average eye height for a bicyclist as 60 inches. For comparison, the height of a standing 50th percentile female and male is 64 and 69 inches, respectively.

Clearly, stretching a rope at neck or head height, at a location where people may walk, run, or ride bicycles or motorcycles, especially at night, poses a clear hazard to public safety.

Reference(s):

- Hyzer, W.G. Conspicuity of Wires, Ropes, and Cables. *Proceedings of the American Academy of Forensic Sciences*, 49th Annual Scientific Meeting, New York, NY. 1997.

Conspicuity, Camouflage, Depth Perception