

Eye movements and sight distance reveal how drivers negotiate winding roads

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This illustrates the look-ahead distance in a left-hand curve. Credit: Journal of Vision

It is well-documented that when negotiating winding roads, drivers tend to look at a specific, well-defined point on the lane marking — referred to as the tangent point. New research finds that the further drivers can look ahead, generally in left-hand curves, wide curves and when leaving a curve, the less they have to look at the tangent point.

Alternatively, when drivers enter or maneuver through a right-bound [curve](#), where they see less [roadway](#) ahead, they will spend more time looking at the tangent point. These findings are reported in a recently published article, "[Car drivers](#) attend to different gaze targets when negotiating closed vs. open bends," in the *Journal of Vision*.

"The ultimate goal of the project is to build a device into cars that warns the driver if he is in danger of unintentionally departing from the lane," says author Farid I. Kandil of the Department of Psychology, University of Münster, Germany.

In the study, six drivers test-drove a car repeatedly through a series of 12 right- and left-hand bends, or curves, on real roads while their [eye movements](#) were recorded. The results confirmed that when moving into a curve, drivers rely heavily on using the tangent point before turning the [steering wheel](#). The findings further revealed that a driver will look at the tangent point 80 percent of the time when there is a shorter sight distance, such as with sharp, right-hand curves. In open bends such as left-hand curves, and when leaving curves, drivers

spent a third of their time looking at the end of the curve and the straight road that comes after.



This illustrates the look-ahead distance in a right-hand curve. Credit: Journal of Vision

The experiments were conducted in right-hand traffic as in continental Europe and the United States. According to the researchers, there are many hints suggesting that the results can also be used to predict how [drivers](#) negotiate curves in left-hand traffic.

"The system we envision will look out for upcoming curves and retrieve information about the eye movements the driver normally performs," explains Kandil. "If the driver does not show his typical pattern of eye movements upon approaching a bend, then the system will assume that he has not seen it and will warn him in time."

The research team plans to conduct additional experiments, using a prototype to determine whether the warning system provides enough time for the driver to react properly.

Provided by Association for Research in Vision and Ophthalmology

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