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Distracted minds still see blurred lines

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From animated ads on Main Street to downtown intersections packed with pedestrians, the eyes of urban drivers have much to see. But while city streets have become increasingly crowded with distractions, our ability to process visual information has remained unchanged for millions of years. Can modern eyes keep up?

Encouragingly, a new study suggests that even as we're processing a million things at once, we are still sensitive to certain kinds of changes in our visual environment—even while performing a difficult task.

In a paper published in *Visual Cognition*, researchers from Concordia University, Kansas State University, the University of Findlay, the University of Central Florida and the University of Illinois prove that we can automatically detect changes in blur across our field of view.

To investigate, the research team focused on the common problem of blurred sight, which can be caused by factors like changes in distance between objects, as well as vision disorders like near-sightedness, far-sightedness and astigmatism.

"Blur is normally compensated for by adjusting the lens of the eye to bring the image back into focus," says study co-author Aaron Johnson, a professor in the Department of Psychology at Concordia. "We wanted to know if the detection of this blur by the brain happens automatically, because previous research had resulted in two conflicting views."

Those views suggest:

1. Blur-detection requires mental effort: By focusing your attention on a blurry object in your peripheral vision, you can bring the object into focus—as though you were focusing a camera manually.

2. Blur-detection is automatic: When the brain encounters blurred vision, it automatically compensates—as though you were using a camera with a permanent autofocus function.

"If blur is detected automatically and doesn't require attention, then performing another cognitive task—driving, say—at the same time shouldn't change our ability to detect the blur," Johnson says.

To determine which of these two theories was correct, he and his colleagues used a new technique that presented different amounts of blur to various regions of the eye.

The researchers showed study participants (individuals with normal, or corrected-to-normal, vision) 1,296 distinct images—pictures of things ranging from forests to building interiors—and used a window that moved based on the their eye movements to give the pictures two levels of resolution.

As they changed the resolution from blurry to sharp, the researchers gave participants mental tasks of varying degree of difficulty. Regardless of the difficulty levels, though, the subjects' ability to detect blur in these pictures was unchanged.

"Our study proves that, much like other simple visual features such as colour and size, blur in an image doesn't seem to require mental effort to detect," Johnson says.

"The process may be what we call 'pre-attentive'—that is, little or no attention is required to detect it. As such, this research provides insight

into a key task, compensating for blur, that the visual system must perform on a daily basis. In the future, I hope to study how blur detection changes with age."

More information: "Blur detection is unaffected by cognitive load," *Visual Cognition*, www.tandfonline.com/doi/abs/10 … 13506285.2014.884203

Provided by Concordia University