The Eyes Have It

Where’s Waldo? Ask your microscarcades
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Microscarcades are tiny involuntary eye movements that are instrumental in vision, because they prevent the fusing of stationary objects from the visual field. Without these movements, objects could become invisible to the retina. Researchers at the Barrow Neurological Institute in Phoenix recently showed that these eye movements occur when the gaze is fixed on a specific point, like a dot in a cross-projection on a screen. But it was unknown whether or not these findings could be generalized to more complicated, natural visual tasks, like fixing a look at objects in a scene, or picking a face out of a crowd.

New research from Barrow shows that microscarcades do in fact occur during a variety of complex visual tasks, including locating Waldo in the classic search puzzle. According to Susana Martinez-Conde, one of the authors of the study, these findings add to the hypothesis that microscarcades only occur in rigid laboratory settings when subjects focus on a specific point.

Precise Measurements

In the study, Martinez-Conde and her team used high-precision cameras to record where test subjects’ gaze fell on various pictures, which included portraits of animals and people. Life Picture Puzzle books that require the viewers to determine differences between two similar images, and Waldo search puzzles. These visual stimuli are similiar to that which we experience in everyday life, like looking at various features of natural objects or scenes, and searching for a specific object in a complex, distracting scene.

The subjects were asked to free-view the portraits, and to complete the visual tasks in both types of puzzle pictures (i.e. finding differences in the Life puzzle and locate Waldo). Microscarcades and sacode movements were recorded simultaneously, which allowed the researchers to pinpoint what the subjects were looking at during high levels of eye movement (free-view, courtesy of Barrow Neurological Institute, Waldo is highlighted in a blue box and the microscarcades are indicated in red).

High Correlation

The researchers found that microscarcades are highly involved in both visual exploration and visual search tasks. The portrait pictures, they found a very high correlation between microscarcades and visual search features like faces, as compared to where less prominent objects or the background. According to Martinez-Conde, this may indicate that microscarcades play a role in locating the most salient or interesting features in a scene.

In the visual search tasks, higher levels of microscarcades were associated with successful detections. For example, microscarcades occurred at a much higher rate when the test subjects found Waldo.

It is not yet clear why the microscarcades occur more frequently when the eyes are looking at aperson’s face or locating a specific object, although the researchers suspect two possible scenarios (which are not necessarily mutually exclusive). First, it could be that when the subject is looking for Waldo, the increase in microscarcades helps make his image more visible. The other possibility is that the subject first finds Waldo, and the resulting increase in microscarcades function to verify that the image matches the form of Waldo that was already present in the subject’s mind. According to Martinez-Conde, the worldwide search for Waldo will explore these possible explanations.

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