Twitchy eyes solve 'Where's Waldo?'

February 25, 2009
By Devin Powell
ISNS Contributor

The children's book 'Where's Waldo' has a special place in the hearts of most of us born after the late 70s -- and the parents who raised us. We all remember challenging our friends in elementary school, racing to see who would be the first pick out Waldo's distincti¬ve specs and stripes from a sea of faces. Now a group of researchers in Arizona may have discovered the secret to solving the puzzle: spotting the lanky cartoon character makes our eyes twitch involuntarily.

These slight quivers of the eye -- called 'microsaccades' -- are different from the big eye movements we use to intentionally look at different parts of the page. They are so small, in fact, that you aren't even aware of them. Scientists once thought that these movements only happened in laboratory experiments, usually in the tired eyes of volunteers who had been staring at dots on screens for long hours. For decades few thought that microsaccades were important for our normal, everyday vision. Neurologist Susana Martinez-Conde is challenging the established view by suggesting that these seemingly insignificant twitches are actually important for our sight. At the Barrow Neurological Institute in Phoenix, she collaborates with unusual characters like magicians Penn and Teller to see how magic and visual illusions work. A few years ago, she discovered that microsaccades fill in our peripheral vision when we stare. And when we stare at a visual illusion, like the Enigma Illusion (http://www.michaelbach.de/ot/mot_enigma/index.html), the twitches don't quite get it right, producing the weird effects that make these illusions so popular.

To see if these twitches also help to search our surroundings for interesting objects, Martinez-Conde recently picked up a copy of 'Where's Waldo' from the local bookstore. She carefully recorded the eye movements of volunteers as they looked at the oversized illustrations and at other images like photographs and picture puzzles.

She quickly discovered that our eyes never stay perfectly still, even when we think we are staring at one spot. They constantly dance and jitter as they move across the page.

These microscopic jitters, the experiment showed, increase when we look at complicated scenes. A boring gray screen is viewed with calmer eyes than a photograph of dogs, for example, and an intricate picture puzzle or 'Where's Waldo' illustration makes our eyes go crazy (to see videos of how the subjects moved their eyes over different images, visit http://journalofvision.org /8/14/21/supplement/supplement.html).

But our eyes shake the most when they actually spot Waldo. One explanation offered by Martinez-Conde is that the twitches are an alert system. When larger eye movements carry our vision over an interesting area, the microsaccades may be a signal that tells the brain to pay attention.

This isn't just the case for photos and children's illustrations. "We could extrapolate the results to daily life situations" like looking for constellations in the night sky, or trying to spot the Empire State Building in the New York skyline, she says.
Psychologist Ralf Engbert, who studies vision at the University of Potsdam in Germany, says that this makes sense evolutionary. "Our visual system evolved to spot moving targets," he says. "If we want to look at a stationary scene in detail, we need to perform miniature movements to optimize vision."
The research could imply that people whose eyes twitch more are better at finding Waldo, though further experiments are needed to test this. If it turns out to be true, it would give you a convenient excuse the next time your eight-year-old son beats you at the Waldo game. He isn't smarter than you … he just has shifty eyes.
