Study suggests repetition of rare events could reduce screening mistakes by security

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The failure to detect infrequent, but obvious security threats at airport screenings and other checkpoints may have less to do with incompetence or poor training than a human tendency to overlook rare events. But a Carnegie Mellon University researcher suggests guards could improve their detection rates the same way adults learn vocabulary words—through repetition.

In experiments that simulated multiple-camera video surveillance, study participants failed to correctly detect threats about 45 percent of the time when exposed to two threat events over the course of two hours. But the error rate dropped to 25 percent when encountering 25 events in the same time span. Most missed events were blatant, such as someone brandishing a knife.

"If people know what they're looking for and haven't seen it for some time, or their attention is focused elsewhere, they won't necessarily see what they're looking for, even when it is in full view," said Judith Gelernter, associate scientist in the School of Computer Science.

Gelernter will report her findings Nov. 13 at the IEEE International Conference on Technologies for Homeland Security in Waltham, Mass. The experimental results suggest that one way to make threat detection more effective is to have screeners routinely encounter and respond to simulated threats.

Failure to see what is before the eyes, particularly when concentrating on

something else, is a phenomenon known as "inattentional blindness." This is a problem not just for airport screeners, border guards or building security personnel, but for any occupation in which someone is looking for anomalies that occur infrequently, such as radiologists reading CT scans, or pathologists looking for cancer in biopsy slides.

Inattentional blindness is a form of selective attention. Gelernter explained that it occurs because the brain must strike a balance between accuracy, which can take time, and efficiency. When a person has seen a lot of a certain pattern, such as law-abiding behavior, the brain might continue to register that pattern, despite what is seen to the contrary, in an attempt to be efficient, she said.

Using simulated threat events to give screeners additional opportunities to see rare events would make them seem less rare and make it more likely that actual threats would be noticed, she said. This strategy could be applied not only to security screeners in airports, but to other occupations in which inattentional blindness is a concern.

In the Carnegie Mellon experiments, 108 people underwent half-hour training to learn how to detect low-level and high-level threats. During the two-hour experiment that followed, 10 interior building views alternated to cover four quadrants of a computer monitor, with each view lasting for a minute, which is similar to actual surveillance video. Participants spent most of their time counting and categorizing hats worn by people in the videos, a task that demanded concentration and memory. But they also were told to summon police with a mouse click when they detected threats.

The subjects were randomly divided into three groups of 36; the only difference between the videos seen by the groups was the number of threat events that each group saw during the experiment—two, nine or 25. Gelernter said the experiment was unusual for an inattentional

blindness study because it lasted for hours, told participants just what to look for and gave them multiple chances to see the rare events.

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