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Are You Blind?! How Attentional Blink Affects Visual Inspections

The human brain processes visual information very quickly and is particularly good at detecting changes in patterns even when things are flashed in front of our eyes at high speeds. But, there are some situations where the brain is "blind" for a short period of time and this can lead to errors, particularly in visual quality control inspections.

Attentional Blink or "Mind Blind"

The phenomenon called "Attentional Blink" was discovered in 1992 and the best way to explain this limitation is via a real-world example.

Imagine that you are an operator on a fast-moving filling line which fills around 400 bottles per minute. Your job is to watch each bottle as it travels along a conveyor and whenever you see a bottle that has a speck in the liquid or a smudge on the label or a label that is crooked, you need to press a button to reject that bottle. The human brain is very good at detecting "changes in patterns" so you will be able to detect if a bottle travelling at that speed has any of these quality faults.

But here's the problem: once you detect a fault with one of the bottles, for approximately the next 500 milliseconds (half a second), your brain is "blind".

Neural pathways need a refractory period to "reset" after detecting an error or event

When the brain detects an error, it sends a signal down the appropriate neural pathways but after the brain has sent a signal, it needs to "reset" before it can send the same signal again. During the time that the brain is resetting those neural pathways, it is effectively "blind", just as we are blind when we blink, hence the term "Attentional Blink". This Attentional Blink takes approximately 300-500 milliseconds.

The brain is incapable of detecting another fault during this Attentional Blink period. You will be totally unaware of this and will feel that you are fully alert and able to see the bottles on the line continuously, but you will not be able to detect another fault unless it occurs 500 milliseconds or more after the first fault. In our filling line example, 3 bottles pass within 500 milliseconds, so if there is more than one fault within a group of 3 bottles, you will only be able to detect one fault: the other faults will pass unnoticed!

How do we prevent errors related to Attentional Blink

Now that we understand the issue of Attentional Blink we can determine if it is relevant to our situation, and if so, put in place strategies to eliminate errors due to Attentional Blink.

In our example, each of the options below would eliminate errors due to Attentional Blink:

- Reduce the speed of the filling line to 120 bottles per minute so that only one bottle travels past the operator in 500 milliseconds. (Not a good solution if you want efficient production!)
- Have the operator stop the line for half a second after a fault is found. (Not a good solution)
- Have the operator move up the line past where the bottle was rejected so that he/she is re-inspecting 3 bottles prior to where the fault was found. The operator would then walk slowly back to their normal inspection point, inspecting all bottles along the way so that no bottles are missed.
- When a fault is found, the operator presses a lever which rejects the faulty bottle plus the 2 following it. The 2 bottles are placed back on the line for re-inspection.

Key Point: If a person is required to perform visual checks on more than one item per 500 milliseconds, Attentional Blink applies. Redesign system or steps in the process to counter the effects of Attentional Blink. For more information email brainwaves@talsico.com

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Reference Notes – Do not print

Dux, P.E. (2009) "The attentional blink: A review of data and theory", ***Attention, Perception and Psychophysics*****, 6 June 2009: http://www2.psy.uq.edu.au/~uqpdux1/DuxMarois_ABReview.pdf**

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