

# Beyond your very eyes: eye movements are necessary, not sufficient

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Editor – In a response to our paper ‘Before your very eyes, the values and limitations of eye tracking for medical education’,<sup>1</sup> Smith and colleagues discuss two additional critical limitations of eye-tracking methodology<sup>2</sup>: (i) looking at something does not equal (consciously) processing it, and (ii) changes in processes do not necessarily translate into changes in performance. We argue that these are *characteristics* instead of limitations of eye tracking.

To address the first point, the unique feature of eye tracking is that we can objectively and non-intrusively measure what information *entered* the human cognitive system.<sup>3</sup> Eye tracking measures the positioning of light on the fovea, which is the only part of the eye that can process details and colour. Such entrance does not *guarantee* further cognitive processing, even though that is what happens most of the time.<sup>4</sup> That is, eye tracking does not *directly* measure what information is processed, but it

indicates what can be processed. Triangulation with other measures, such as verbal protocols, helps to support the interpretation of eye-tracking data. That said, what we can validly determine from eye tracking alone is what was *not* looked at and, as a result, has hardly a chance of being processed, falling at best onto the periphery of the eye’s retina. Spoken in the terminology of logical empiricism, looking at information is a *necessary* condition for it being processed cognitively; it is, however, not *sufficient*.

To the second point, we have experienced exactly this issue in our own research: We found that training medical students to systematically inspect radiographs made them ‘look at’ more of an image (measured via eye tracking) but not ‘detect’ (i.e. report) more abnormalities.<sup>5</sup> In this study, eye tracking provided us with invaluable information: that training in a systematic viewing strategy does change viewing behaviour but does NOT change diagnostic performance. The implication is that in this specific case, we should focus our efforts on training students in what abnormalities look like rather than focusing on better viewing strategies. Eye tracking provided unique insight into the

root cause of the problem, something that a diagnostic performance test alone could not have.

Like every research technique, eye tracking has its strengths, but also its limitations. Together with verbal data (how?), eye-tracking data (what?) can provide unique insights by helping us detect where exactly the challenges lie within a specific task.

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## REFERENCES

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