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The expectedness of semantic scene-content as a factor influencing human gaze behaviour

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Visual information in the real world is typically continuous over time. In a pre-registered study, we investigated how this visual continuity influences eye movements, by comparing viewing behaviour when this continuity is preserved and when it is disrupted. Participants freely viewed 80 sequences of image frames from movies. Each sequence contained several 'context' frames followed by a 'critical' frame. Context frames were related and showed a consistent unfolding of events over time. The critical frame was either a natural continuation of these events (expected condition) or was completely unrelated to them (unexpected condition). We compared five characteristics of eye movements between the expected and unexpected conditions: number of fixations, saccade amplitude, mean fixation duration, probability of blinking and first-saccade latency. Results show that number of fixations and saccade amplitude increased in the unexpected condition relative to the expected condition whereas mean fixation duration and probability of blinking decreased. There was no significant effect for first-saccade latency. These findings suggest that how people look at identical scenes depends on the preceding temporal context, with participants displaying more exploratory visual behaviour and increased alertness when the current visual input is surprising (e.g. unexpected) in the context of preceding visual images.