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VISUAL INPUT STATISTICSDURING FREE-VIEWING OF NATURAL TIME-VARYING IMAGES: A COMPARISON ACROSS VIEWERS AND SCENES

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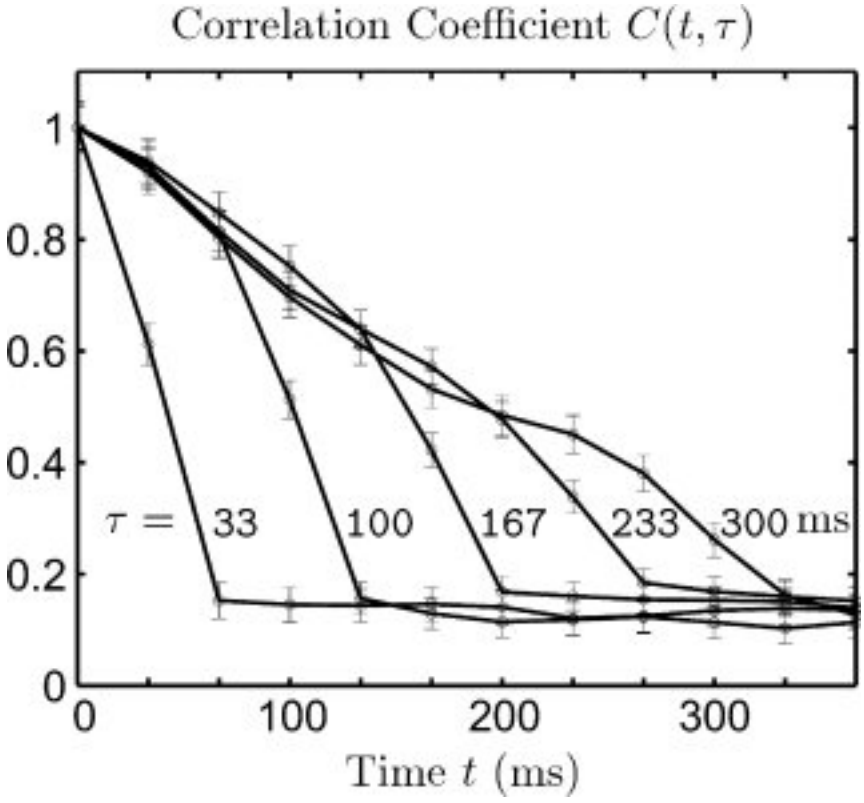
Purpose: We measure the effects of eye movements on visual processing and investigate whether such effects depend on viewers and scenes.

Methods: We record gaze positions during free-viewing video segments of natural activities. We use the recorded eye positions to derive the gaze-centered time-varying images from the original video. We analyze the statistical properties of the resulting images, particularly, the temporal correlations for different viewers and scenes.

Results: The measured temporal correlation C(t, τ) is a function of the time separation t between two signals and the relative timing τ to the most recent saccade. C(t, τ) depends on saccade amplitude, while the average saccade amplitude depends on viewers and scenes. However, independent of viewers and scenes, there are significant temporal correlations during fixations and smooth pursuits, but the macro saccades effectively remove the temporal correlation between two signals before and after a saccade. The figure shows C(t, τ) averaged over viewers, scenes, and saccade amplitudes (> 1 degree).

Conclusions: Independent of viewers and scenes, the eye movements during natural image viewing help to improve the efficiency of visual information coding through temporal decorrelation of the input signal.



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