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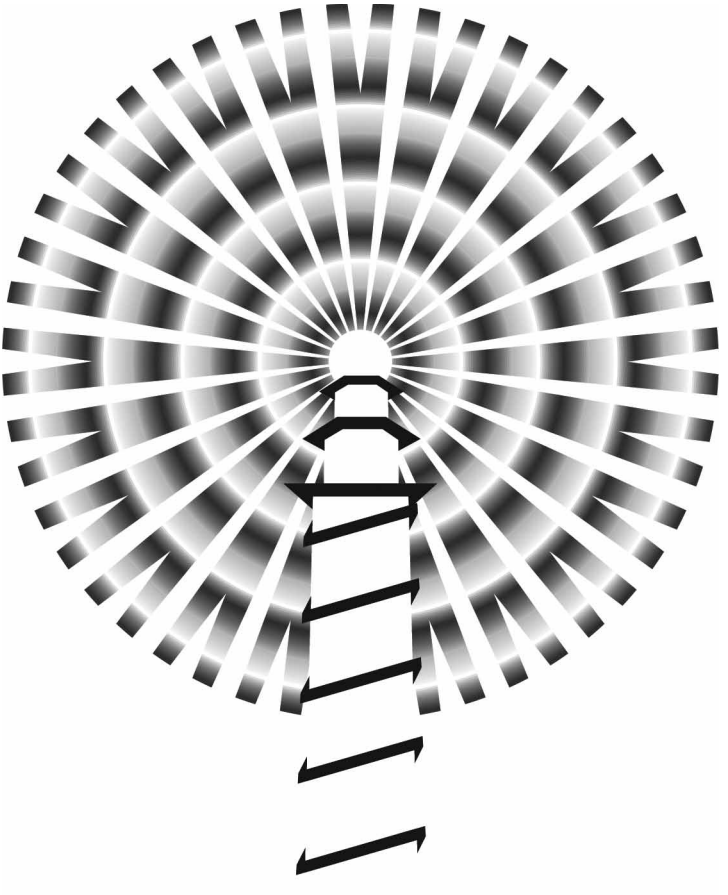

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Abstracts

the AntiV dominates the perceived offset (condition V – AntiV). Dominance changes when the V is subdivided into two equal parts, one of which is presented before and the other after the AntiV (condition $\frac{1}{2}$V – AntiV – $\frac{1}{2}$V). In general, any level of performance can be achieved by arranging sequences of Vs and AntiVs appropriately—even when the total physical energy of V and AntiV is identical. We conclude that for a given physical energy of V and AntiV the temporal order of presentation determines the integration of features. We found that later elements within the sequence contribute more to the percept than earlier ones. Computer simulations suggest that neuronal decay is sufficient for explaining our experimental findings. Models of feature processing that are mainly energy-based while ignoring temporal aspects cannot account for our findings.

◆ **Sequence selectivity of form transformation in visual object recognition**

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Object motion, eg depth-rotation, provides visual information that might be useful for the reconstruction of an object's 3-D structure, hence increasing the recognition likelihood of any given moving object. Our aim is to demonstrate that object motion can, in itself, serve as an independent cue to object identity without particular recourse to form-retrieval processes. In this study, we used novel amoeboid objects that transformed nonrigidly over time. Two experiments are reported on the learnt recognition of such stimuli. During an initial study phase, participants learnt to identify these objects. At test, participants were either presented with an old/new recognition task (experiment 1) or with a two-alternative forced-choice task (experiment 2). Here, learnt stimuli were presented in either the studied sequence of shape transformations, or the reverse order. Although the shapes shown were the same in both instances, the overall findings indicate that participants performed significantly better in recognising the learnt objects when the same shapes were presented in the learnt sequence, than when they were presented in reverse sequence. If object motion facilitates recognition of the stimulus solely by contributing to the recovery of its form, the sequence of non-rigid transformation would not be relevant to its representation. Nonetheless, these findings suggest that human observers do not merely remember a visual object as a collection of different shapes. Instead, observers are also sensitive to how these shapes transform over time.

◆ **Contextual working memory for trans-saccadic object recognition using reinforcement learning and informative local descriptors**

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Previous research on behavioural modelling of saccade-driven image interpretation (Henderson, 1982 *Psychological Science* **8** 51 – 55) has emphasised the sampling of informative parts under visual attention to guide visual perception. We propose two major innovations to trans-saccadic object recognition: first, we model contextual tuning at the early visual processing stage. Salience in pre-processing is determined from descriptors in terms of local gradient histogram patterns—SIFT features (Lowe, 2004 *International Journal of Computer Vision* **60** 91 – 110). SIFT features are scale-, rotation-, and to a high degree illumination-tolerant, in a substantial extension to previously used edge features (Rybak et al, 1998 *Vision Research* **38** 2387 – 2400) or appearance patterns (Paletta et al, 2004 *Perception* **33** Supplement, 126). Descriptors that are informative with respect to an information theoretic framework (Fritz et al, 2004, in *Proceedings of the International Conference on Pattern Recognition* volume 2, pp 15 – 18) are selected and weighted according to contextual salience. Second, we develop a behavioural strategy for saccade-driven information access, operating on contextually selected features and attention shifts, being performed in terms of a partially observable Markovian decision process and represented by a short-term working memory generating discriminative perception – action sequences. It is developed under exploration and reinforcement feedback using Q-learning, a machine-learning methodology representing operant conditioning. Saccadic targets are selected for attention only in a local neighbourhood of a currently focused descriptor. The learned strategy proposes next actions that support expected maximisation of reward, eg minimisation of entropy in posterior object discrimination. We demonstrate the performance of using the sensory – motor context of trans-saccadic outdoor object recognition, efficiently identifying building facades from different viewpoints, distances, and varying illumination conditions.