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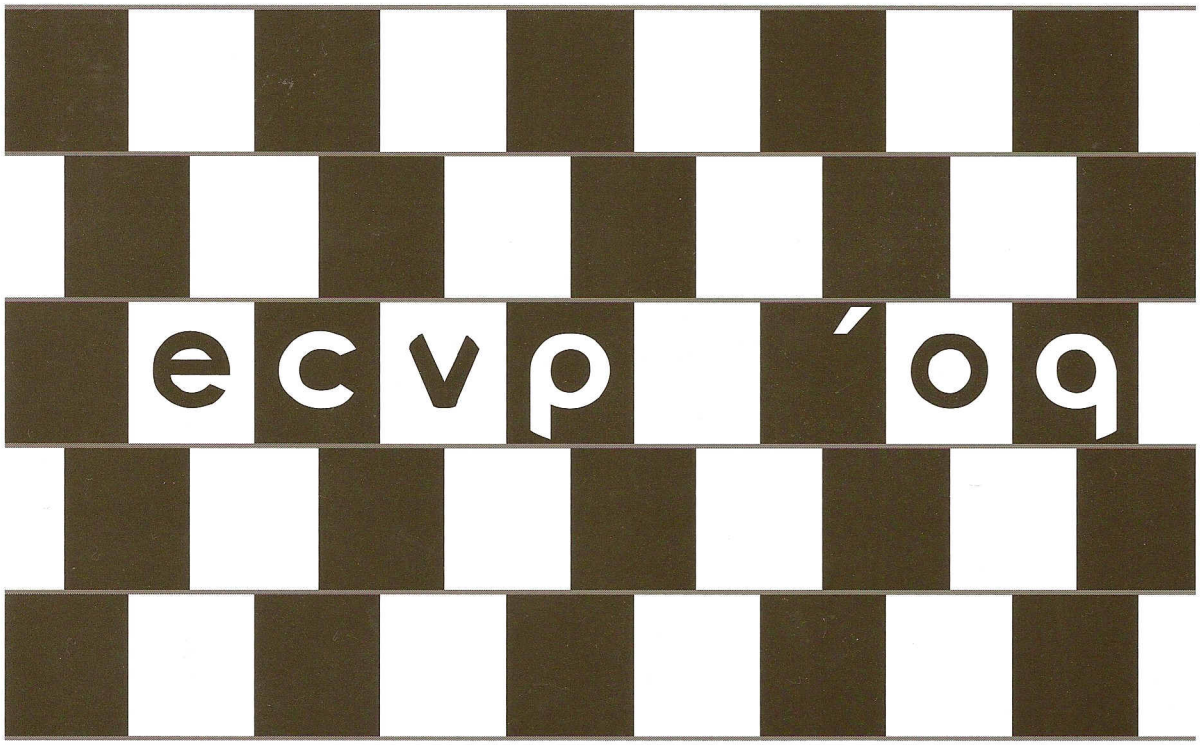


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# Abstracts

of 24.2) and 10 old (mean age of 71.4) participants were shown with a short version of the psychophysical paradigm proposed by Pokorny and Smith (1997 *Journal of the Optical Society of America*), to bias processing toward MC or PC. Observers had to discriminate the location of the higher luminance square within a four square stimulus array presented for 33 ms. In the steady pedestal condition (MC-bias), the array was preceded and followed by a four-identical-squares pedestal whereas, in the pulse pedestal condition (PC-bias), the array was presented alone. Two target luminance discrimination thresholds were collected for each experimental condition (3 pedestal-contrasts $\times$ 2 conditions) using an adaptive staircase procedure. The results showed a higher increase of threshold with pedestal contrast in the pulse relative to the steady condition. Moreover, a double interaction between group, pedestal contrast, and condition was observed: the rise in discrimination threshold found for old relative to young participants was higher in the pulse than in the steady pedestal conditions, especially for high pedestal contrasts. These results replicate the dissociation between the two low-level visual systems and demonstrate both a slight MC and a large PC impairment with normal ageing.

◆ **The time course of similarity effects in visual search**

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It is well established that visual search becomes harder when the similarity between the target and distracting items is increased. However, in models of visual search similarity is typically treated as a static, time invariant property of the relation between objects. This contrasts with data from other perceptual tasks (eg perceptual categorisation) demonstrating that similarity is dynamic and changes over time as perceptual information is gradually accumulated (Lamberts, 1998 *Journal of Experimental Psychology: Learning, Memory, and Cognition* **24** 695 – 711). In this experiment we examine the time course of target-distractor similarity effects. Consistent with the notion that similarity is dynamic, target-distractor similarity effects increase as display duration is lengthened. A model incorporating the notion of dynamic similarity was developed to fit this time course data. The model provided a good account of the time course of similarity effects as well as accounting for display size effects. The implications for models of search will be discussed.

◆ **Visual search for targets on natural textured backgrounds**

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Little is known about visual search for targets on natural, textured backgrounds, or about the capacity of biological camouflage patterns to provide protection across a range of backgrounds. The experiments described address both these problems. Observers searched under diffuse daylight for a camouflaged target on a flat, natural surface, subtending approximately $35 \times 20°$, while wearing a lightweight portable eye tracker. The targets were life-size images of four different moth species, varying in luminance contrast and size of pattern elements. They were printed on paper and cut out. Two backgrounds were approximately uniform in colour (paving slabs, stucco wall), while two consisted of distinct objects varying in colour (stone chips, dead leaves). The identity, position, and orientation of the target varied randomly between trials. The background had a significant effect on search time, which was longest for the stucco wall, and shortest for the paved surface. The rank ordering of difficulty of search on the four backgrounds could not be explained by differences in first-order properties (mean luminance, contrast) between their images and those of the moths, nor by the strength of luminance gradients at the outlines of the moths. The results suggest that search follows segregation of a scene into distinct solid elements.

◆ **Object segregation and local gist vision using low-level geometry**

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Multi-scale representations of lines, edges and keypoints on the basis of simple, complex, and end-stopped cells can be used for object categorisation and recognition (Rodrigues and du Buf, 2009 *BioSystems* **95** 206 – 226). These representations are complemented by saliency maps of colour, texture, disparity and motion information, which also serve to model extremely fast gist vision in parallel with object segregation. We present a low-level geometry model based on a single type of self-adjusting grouping cell, with a circular array of dendrites connected to edge cells located at several angles. Different angles between active edge cells allow the grouping cell to detect geometric primitives like corners, bars and blobs. Such primitives forming different configurations can then be grouped to identify more complex geometry, like object shapes, without much additional effort. The speed of the model permits it to be used for fast gist vision, assuming that edge cells respond to transients in colour, texture, disparity and motion. The big

advantage of combining this information at a low level is that local (object) gist can be extracted first, ie, which types of objects are about where in a scene, after which global (scene) gist can be processed at a semantic level.
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◆ **Top–down modulations of visually guided pointing movements**
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In detection tasks, search performance is improved, if the target defining dimension either repeats or is semantically cued before the trial. According to the dimension weighting account (DWA) these effects are due to modulation of feature contrast signals by dimensional weights before they are integrated into a master saliency map. On that account, dimensions with higher weights have a greater impact on saliency map and subsequent selection processes are faster. However, alternative accounts argue that there are two different processing routes according to the task requirements (spatial vs nonspatial). These accounts attribute dimension weighting only to the nonspatial route of singleton detection, whereas the salience map is supposed to be processed in an unweighted fashion impenetrable by top–down control. In the current study, the observers' task was to point at a feature singleton, the dimension of which was semantically cued. We found faster reaction times for valid dimensional cues over neutral or invalid cues. A greater benefit of the cueing was observed in the lift-off time, while there was almost no benefit of cueing in the movement time. These results are in line with the dimension weighting account and contradict dual-route models which propose no top–down or weighting modulation of the salience map.

◆ **Contextual memory and association across successive contextual layouts**
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Contextual cueing refers to improved visual search performance as a result of the repetition of the same displays. Previous researches have usually employed 12 repeated displays in a single session of training. It has been reported that when a search display presented on one trial is predictive of the target's location on the next trial, reaction time (RT) for the next trial is improved. Here, we studied the effect of association across consecutive visual search trials on number of contexts which one can learn in a single session of training. We trained subjects to learn 12, 18, or 24 repeated displays in a single session, in which the spatial context on trial N – 1 was reliably followed by a specific target location on trial N. Results showed subjects' RT became significantly faster in all groups as the experiment. There was a significant difference between mean RTs of the experiments in which context N – 1 was predictive of target location on trial N and the control groups in which there was no association between trials, during training phase. We conclude that spatial contextual memory may benefit from the association across consecutive spatial contexts to improve context learning.

◆ **Two mechanisms for detecting spatial contours defined by motion**
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We measured the discriminability of the linear motion trajectory of a line embedded in a random-line kinematogram. The signal line orientation was either parallel (iso-) or orthogonal (ortho-) to its motion direction and it was identical in all respects to the noise (orientation, length, baseline step size, frame rate) except for motion direction, rendering the signal line indistinguishable from the noise lines on a frame-to-frame basis. Our results show better discrimination of ortho-trajectories in most conditions, which (i) improved with duration up to 150–450 ms, (ii) was relatively independent of the speed, and (iii) whether the trajectory was straight or jittered each frame. However, discrimination of ortho-trajectory dropped when step size was high and lines were longer than 30 min of arc. Discrimination of iso-trajectory improved with increasing signal line speed and length, but was not affected by duration and was severely impaired by jitter. These results strongly suggest that discrimination of the signal line's trajectory is modulated by its orientation, and that iso- and ortho-trajectory discrimination relies upon at least two distinct mechanisms: an orientation-selective static detector that responds to iso-trajectories and a network of primary motion units that integrate local motion signals orthogonal to line orientation.