3409-B195

SEARCHING FOR THE HIGH-CONTRAST PATTERNS WE SEE BEST

Daniel Kersten and H. B. Barlow. Physiological Laboratory, Cambridge University, Cambridge CB2 3EG

One way to investigate high contrast vision is to measure contrast detection performance in visual noise. High levels of visual noise raise contrast thresholds and present computable limits to ideal performance.

We have measured the absolute efficiency for the detection of Gaussian-enveloped sinusoidal gratings as a function of spatial and temporal frequency, width, duration and length, in the presence and absence of two-dimensional dynamic visual noise. For a given noise level, these measurements describe an efficiency hyper-surface. As the noise level increases, the efficiency hyper-surface rises in height by 2 log units or more. However, the shape of the hyper-surface changes as the noise level increases. As a consequence, what is seen best in high noise levels is not what is seen best in the absence of noise. Further, along some dimensions, the surface becomes less flat as noise level increases: efficiency falls off more steeply along the dimensions of width and temporal frequency. The highest efficiencies found are for stationary high contrast patterns a cycle or less in width, and .5 to 4 cycles long. Low efficiencies are found for patterns which are frequency components with random phases.

Invest. Ophthal. & Vis. Sci (Suppl) Vol. 25, No. 3, p 313(2), 1984