The Importance of Information Localization in Scene Gist Recognition

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People can recognize the meaning or gist of a scene from a single glance, and a few recent studies have begun to examine the sorts of information that contribute to scene gist recognition. The authors of the

compared the scene categorization performance of two versions of

In addition, this experiment served two further functions gr1n

ages of varying durations. Consistent with evidence for the effects of phase randomization on the appearance of scenes and objects (Oppenheim & Lim, 1981; Piotrowski & Campbell, 1982; Sadr & Sinha, 2004; Tadmor & Tolhurst, 1993; Wichmann et al., 2006), viewers obtained no useful gist information from scenes' randomly localized amplitude spectra and mean luminance alone; this strongly suggests that the unlocalized amplitude spectrum of a scene is not sufficient to identify its basic level category. This finding appears to contradict evidence that unlocalized amplitude

ness. Specifically, we can rigorously test the conceptual masking hypothesis by using masks that have equal amplitude spectra but that vary in recognizability by varying the1B334.6(Spwel1B334.6(of1B334.6(phasein)-406.5an-ut)]TJT(domgnition.)Tj1m0000050.181840960.912T

frequency amplitude spectrum of scenes carries important information for scene gist, then phase-randomized scene image masks

Target duration was fixed at 12 ms, which is near the minimum necessary for above-chance gist recognition performance, as shown in Experiment 2 (Bacon-Mace et al., 2005), and the mask

duced significantly lower accuracy (stronger masking) than the white noise mask condition. In contrast, conceptual masking effects were strongest at later stages of scene gist processing (SOA 94 ms). At that later stage, all three unrecognizable masking conditions (white noise and both fully phase-randomized [RAND 1.0] conditions) produced greater accu-

Experiment 4

In this experiment we resolved the question of whether unlocalized scene information conveyed by the amplitude spectrum is sufficient for gist masking at the earliest levels of processing or whether localized information conveyed by the phase spectrum is necessary even then. Experiment 3 suggested that amplitude information may be sufficient at the earliest point in gist processing (SOA □

(Loschky & Simons, 2004; McCotter, Gosselin, Sowden, & Schyns, 2005; Oliva & Schyns, 2000; Schyns & Oliva, 1993). Experiment 3 showed that phase-randomized scene images, which have 1/f spatial frequency amplitude spectra, are more efficient at masking scene gist than are white noise images, which have relatively more high-frequency information but less low-frequency information. Our results are also consistent with Harvey et al. (1983), who found that lower frequency noise masks were more efficient than higher frequency masks at disrupting scene recognition, but inconsistent with the recent results of Bacon-Mace et al. (2005), who found that higher frequency noise masks were more effective at masking animal detection in scenes. One explanation for the latter discrepancy is that animal detection, a subset of object recognition at the superordinate level, depends more on higher frequency information, whereas scene gist recognition depends more on lower frequency information (though see Oliva & Schyns, 1997).

Conceptual Masking of Immediate Scene Gist Recognition

The current study provides a rigorous test of the existence of conceptual masking as distinct from noise and structural masking,

Field, D. J. (1987). Relations between the statistics of natural images and the response properties of cortical cells. *Journal of the Optical Society of*

operator to all the resultant zero mean and unit contrast images, such that the resultant images of this second step occupy the entire