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Additivity of Color Masking A. J. Ahumada & W. K. Krebs, NASA Ames Research Center & FAA

Color masking experiments with targets and maskers in different directions in color space have sometimes shown masking only in the target color direction as though there are no privileged directions and other times shown masking along fixed cardinal directions. We are developing models to be used to predict the masking of color images, so we want to use noise rather than pedestals as the masker. The models are image discrimination models that difference the model representation of the image with and without the signal, so we needed to use fixed-pattern noise. We hypothesized that if a particular direction was chosen to detect a target, the masking pattern would be additive and reveal that direction.

Detection thresholds for 24 observers were measured on a uniform gray background and on seven fixed pattern noise backgrounds (noise in the white/black direction (W), isoluminant red-cyan noise (R), isoluminant yellow-blue noise (Y), and their sums (W+R, W+Y, R+Y, W+R+Y). There were three target directions (W, R, Y). For 16 observers, the targets were approximately square, subtending 0.26 deg on each side. For 8 observers, the targets were patches of the same size with one cycle of a horizontal square wave grating in cosine phase. Thresholds were estimated using a two interval forced choice QUEST procedure. Masking was measured as 20 times the log based 10 of the ratio of the masked contrast threshold to the unmasked contrast threshold. Masking additivity was measured in the contrast energy domain.