PURSUIT LATENCY FOR CHROMATIC TARGETS

((J. B. Mulligan)) NASA Ames Research Center, Moffett Field, CA.

Purpose:
The temporal dynamics of eye movement response to a change in direction of stimulus motion has been used to compare the processing speeds of different types of stimuli (Mulligan, ARVO '97). In this study, the pursuit response to colored targets was measured to test the hypothesis that the slow response of the chromatic system (as measured using traditional temporal sensitivity measures such as contrast sensitivity) results in increased eye movement latencies.

Methods:
Subjects viewed a small (0.4 deg) Gaussian spot which moved downward at a speed of 6.6 deg/sec. At a variable time during the trajectory, the dot's direction of motion changed by 30 degrees, either to the right or left.
Subjects were instructed to pursue the spot.
Eye movements were measured using a video ophthalmoscope with an angular resolution of approximately 1 arc min and a temporal sampling rate of 60 Hz.
Stimuli were modulated in chrominance for a variety of hue directions, combined with a range of small luminance increments and decrements, to insure that some of the stimuli fell in the subjects' equiluminance planes.
The smooth portions of the resulting eye movement traces were fit by convolving the stimulus velocity with an exponential having variable onset latency, time constant and amplitude.

Results:
Smooth eye movements with few saccades were observed for all stimuli.
Pursuit responses to stimuli having a significant luminance component are well-fit by exponentials having latencies and time constants on the order of 100 msec.
Increases in pursuit response latency on the order of 100-200 msec are observed in response to certain stimuli, which occur in pairs of complementary hues, corresponding to the intersection of the stimulus section with the subjects' equiluminant plane.

Conclusions:
Smooth eye movements can be made in response to purely chromatic stimuli, but are slower than responses to stimuli with a luminance component.

Supported by NASA RTOP's 505-64-53 and 548-60-12.