NTSB National Transportation Safety Board

Office of Railroad, Pipeline and Hazardous Materials Safety

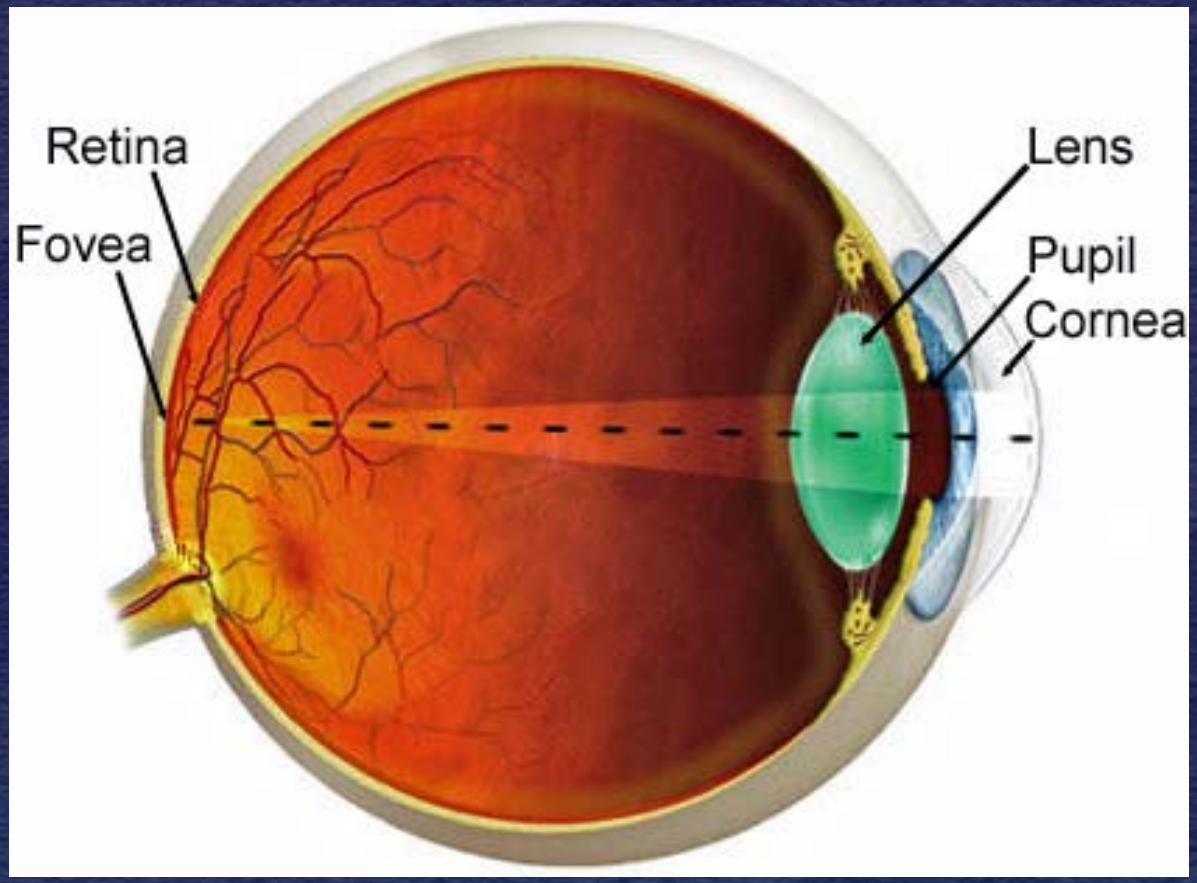
Collision of Metrolink Train 111 with Union Pacific Train LOF65-12 Chatsworth, California September 12, 2008

Visual Perception Study

Visual Identification of Signal

- Physical and recorded evidence consistent with red signal
- Eyewitness reports of green signal
- Visual identification of signal color depends on many factors
- The most significant in this case is distance to the signal

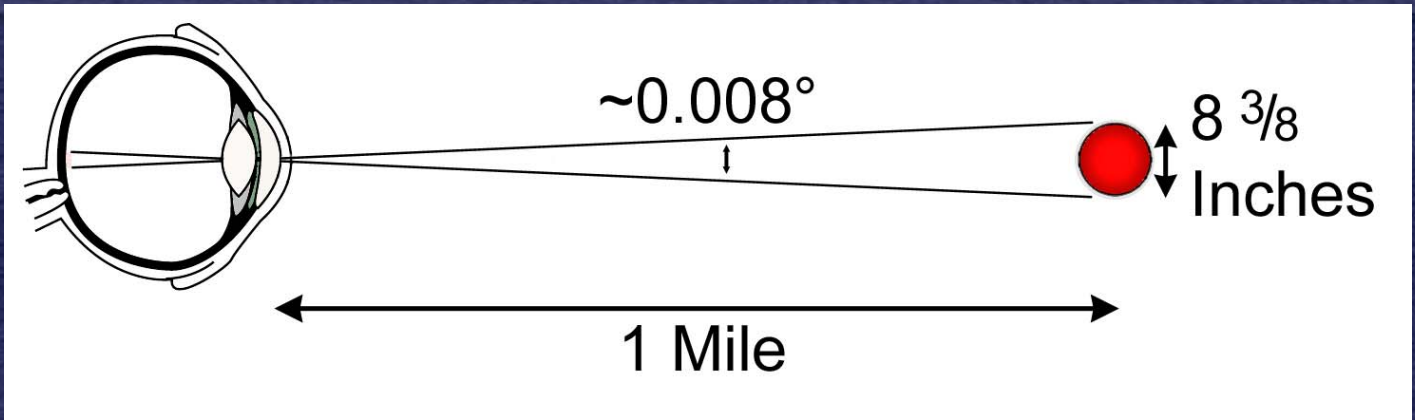
Color Perception



Human Eye

- Sensitivity is greatest to yellow-green
- Color perception is poor for small stimuli

Visual Angle



- At 1 mile, a signal light subtends a visual angle of approximately 0.008 degrees
- This is near the threshold of normal vision during daylight conditions
- Near threshold, a light can be visible without a perception of color

Perception of Red Signal

- Post-accident testing and witness statement confirm difficulty of perceiving a red signal from Chatsworth Station during the day
- Failure to accurately identify signal color with insufficient visual stimulus

Conclusion

The draft report concludes eyewitness reports of seeing a green aspect from the Chatsworth station are contrary to the other evidence; postaccident testing and research show that witnesses could not have reliably seen the red aspect that the Control Point Topanga signal was displaying as train 111 departed the station because of a combination of extreme distance to the signal (more than one mile), lighting conditions at the time, and limitations of the human visual system.

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