

SPECIAL ISSUE: HDR AND PERCEPTION

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Submit to: <https://jpi.msubmit.net>

Focus Areas:

- High Dynamic Range (HDR) displays
- HDR Luminance modeling
- HDR in VR/MR/AR environments
- HDR Spatial/temporal/color interactions
- Perceptual algorithms for computational photography of HDR imaging
- Image and video quality modeling for HDR

This special issue of the *Journal of Perceptual Imaging* focuses on perceptual considerations of High Dynamic Range (HDR), along the full imaging pathway from capture or creation through encoding and transmission to display and finally perception. HDR is a term that commonly refers to imagery that can effectively represent dynamic ranges exceeding three orders of magnitude, has bit depths of 10-bits/color or greater, and typically exhibit maximum luminance levels greater than 1000 cd/m². Perceptual models and testing at all stages of the pathway are crucial for HDR to be both efficient and effective.

Much of vision research in the 20th century was aimed at understanding the perception of reflective surfaces and discounting of illumination, using low contrast electronic displays (CRTs) or complex mechanical set-ups with lamps and color filters. Modern HDR displays and electronics allow greater control of the stimuli, allowing new questions to be asked. These include direct control over specular highlights and emissives, luminance ranges from absolute black to several thousand cd/m² at high temporal resolution, and color gamuts reaching the spectral locus.

Candidate topics:

HDR PSYCHOPHYSICS AND PERCEPTION

- The contribution of specular highlights to material perception, e.g., depth, orientation, texture, and state
- Emotional impact of HDR imagery
- Common color phenomena that can play an increased role in HDR display (e.g., the Hunt, Helmholtz-Kohlrausch, Bezold-Brucke effects); observer and device metamerism for HDR
- Comfort and discomfort
- Neurophysiological effects of HDR imaging (e.g., EEG, galvanic responses, etc.)
- HDR's role in increased realism and immersion

HDR PERCEPTION-RELATED DESIGN

- Perceivable luminance range brackets as a function of field of view and time
- Tolerances for specular highlight accuracy (e.g., in amplitude, and shape and color)
- HDR interactions with ambient lighting changes
- Intraframe, Intrascene, and Interscene dynamic range variability
- Perceptual engineering criteria for HDR (e.g., quantization scheme and bit-depth, effects on CSF, perceived resolution)
- Perceptual studies of HDR ecosystem and formats
- Simulation of HDR effects through gradients or the use of nanomaterials and paints

HDR APPLICATIONS

- Professional video and film production
- Still image and video quality metrics and Quality of Experience
- VR, medical life-sciences, remote sensing, and geospatial applications
- Information visualization and communication
- User interface design and experience (UX)
- Art (including primitive, classic, modern, and postmodern)