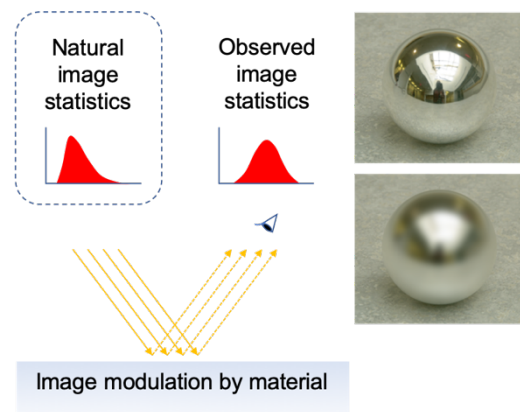# Image features for human Shitsukan perception

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Image modulation by material

For visual estimation of material properties, or Shistukan, accurate inverse optics is too difficult. Instead, human material perception seems to rely on image features that are correlated with the material property under natural viewing environments. The critical features often take the form of image statistics, because many material properties can be characterized by how they optically modulate the natural image statistics. For instance, a critical image statistic for surface wetness perception is enhanced color saturations, while that for subresolution fineness perception is reduced luminance contrasts. There are optical reasons these image features vary in correlation with physical material properties, as well as psychophysical evidence that human material perception does respond to the features. We also propose that material and shape perceptions may be based on independent image features — material (surface reflectance) perception relies on the magnitude of luminance gradient, while shape perception relies on the order of luminance gradient. This is why the skewness of the luminance histogram strongly affects gloss perception, while not surface shape perception. I will also discuss the relationship of image statistics features with mid-level perceptual features, and deep neural network features.

Reference:

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Biography:

Shin'ya Nishida received B.A., M.A. and Ph.D from Kyoto University (Psychology). After working at ATR Auditory and Visual Perception Labs, he joined NTT Labs in 1992. Since 2019, he is Professor at Dept Informatics, Kyoto University, and Research Professor at NTT Communication Science Labs. He is an expert of psychophysical study on human vision, such as motion perception, time perception and material perception. He is also interested in haptics, multisensory integration, time perception and visual media technologies. He is an editorial board member of Journal of Vision, Member of Science Council of Japan, and Project Leader of Innovative SHITSUKAN Science and Technologies.

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