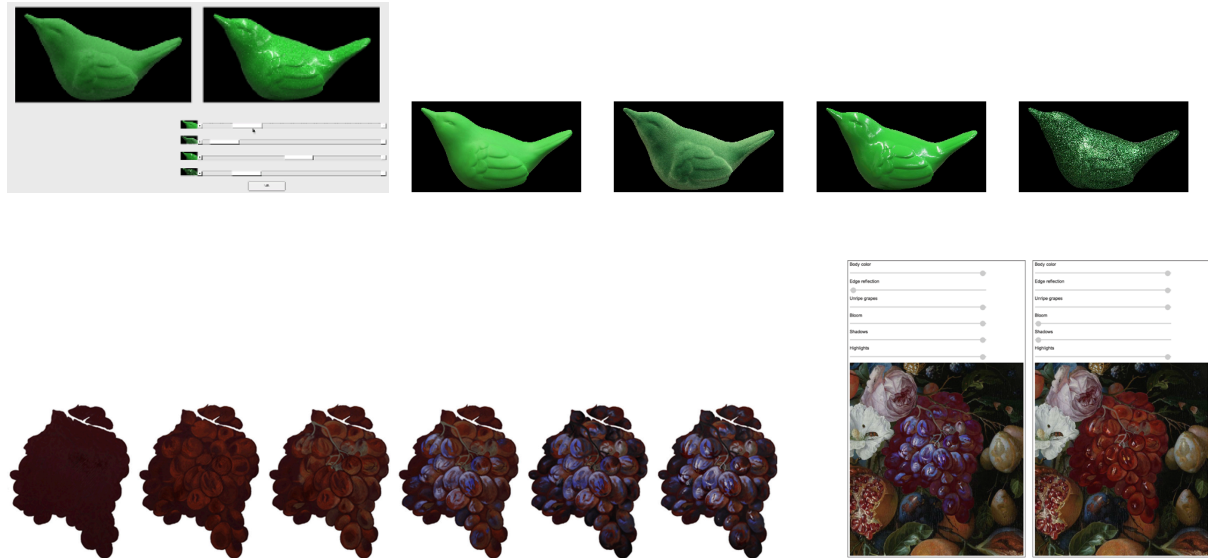# Light, science and art

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Materials need light to make them visible. Also, light needs materials to show. Together with the shape of objects and spaces they determine the "appearance" of spaces and objects, which forms the proximal stimulus for the human visual system. Appearance is a non-unique structure that confounds light, material and shape. Therefore light, material and shape perception interact. Understanding these interactions allows doing scientifically informed design. However, the range of possible light fields, materials, and shapes is endless. To get a grip on this endless variety we formulated canonical modes frameworks for light and materials. Combining these we investigated light-material interactions and whether those depended on shape and space. We found that an ambient-focus-brilliance light model can well predict material appearance variations for our canonical materials (specular, matte, velvety, glittery). Moreover, a principal component analysis (PCA) on rating data for these (only) 3 canonical lightings x 4 canonical materials matched quite well with the PCA space found for photographs of a wide variety of materials (Fleming et al., JOV 13(8), 2013) and of the PCA space found for materials depicted in paintings (van Zuijlen et al., under review), which suggests generic underlying mechanisms that are quite independent of medium and image-forming techniques. Combining art historical sources (Beurs, 1692, The big world painted small, translation in progress) with perception experiments and painting material research we aim to identify key features in the appearance or image structure that trigger such mechanisms, and how they can be combined in a "painterly approach".

References:

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Di Cicco F, Wiersma L, Wijntjes MWA, Dik J, Stumpel J, Pont SC, "A Digital Tool to Understand the Pictorial Procedures of 17th Century Realism," Proceedings ECCV-VISART 2018.

Biography:

Sylvia Pont graduated in Experimental Physics (1993, Amsterdam University). She received her PhD (1997, Utrecht University) for a thesis on haptic perception. 1997-1999 she studied computer aids at Visio, and 1999 returned to Utrecht University to investigate real-world optics and visual perception. In 2008 she moved to TUDelft to work on applied perception for design and design for perception, developing design tools, practice oriented research methods, fundamental knowledge and design frameworks for lighting design and material and form communication. Sylvia Pont was appointed Antoni van Leeuwenhoek professor of Perceptual Intelligence in 2016. Her main interests are lighting design, visual communication of light, material, form and space, the measurement and tuning of appearance, and art.

Homepages:

https://www.tudelft.nl/en/ide/about-ide/people/pont-sc/

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