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Reflective materials, such as metals, plastics and paints have diverse surface properties that give them their distinctive appearances. In everyday language, we use various terms to describe their qualities (e.g., sheen, lustre, shininess). In the material perception literature by far the most prominent of these terms is 'gloss'. Researchers investigate gloss estimation, gloss constancy and illusions of gloss. Yet, what exactly does the term 'gloss' mean? What aspects of appearance does it refer to?

Gloss is typically associated with the magnitude of specular reflectance, and experiments rarely vary more than one or two additional reflectance parameters. Yet to fully characterise reflectance requires the bidirectional reflectance distribution function (BRDF)—a high-dimensional representation of how light reflects in every direction for every incoming direction. Many aspects of the BRDF other than the overall specular reflectance could contribute to or influence our sense of 'gloss'.

Here we conducted the most comprehensive study on the impact of reflectance parameters on perceived gloss to date. Eighteen participants viewed 150 rendered movies of a rotating irregular shape with varying reflectance properties, and rated how 'glossy' each one appeared. On each trial, random values were assigned to 10 parameters of the 'Principled BSDF' shader in Blender. This allowed us to measure the relative contribution of each parameter to gloss perception.

Surprisingly, we find that the gloss ratings were dominated not by the magnitude of specular reflectance—as commonly assumed—but by the microscopic surface roughness. Over 75% of the variance in participants' responses were due to this single parameter. Rough surfaces lead to blurrier reflections, which were seen as significantly less glossy than smooth surfaces with sharp reflections. In other words, for naïve observers, 'gloss' is first and foremost related to 'distinctness-of-image gloss' rather than 'contrast gloss'.

Glare from LED illuminants of different colour temperature under simulated driving conditions at night

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LED technology is becoming increasingly prevalent in our daily lives, including on the roads at night, in the form of street lights and car headlights. Previous studies have shown that LEDs with a high correlated colour temperature can cause more discomfort glare than LEDs with a low correlated colour temperature. However, it is not yet known how this parameter affects disability glare in drivers under mesopic conditions. The main objective of this study is to analyse the influence of the spectral emission of lamps on glare during a representative night-driving task, specifically the reaction time.

Twenty young subjects participated in the study. A two-channel Maxwellian optical vision system was used to measure foveal reaction time without and with a glare presented at a temporal retinal eccentricity of 10°. A 2° stimulus with a Weber contrast of 0.1 was used, presented over a background field with two different luminances, 0.1 and 1 cd/m2, provided by a LED lamp with a correlated colour temperature of 4000 K. Glare source was produced by two LED with correlated colour temperature of 2800 and 6500 K, providing an illuminance of 50 lux.

In the glare condition, reaction time is significantly lower for the background luminance of 1 cd/m2 respect to 0.1 cd/m2, for both 2800 K ($p < 0.05$) and 6500 K ($p < 0.05$) lamps. No effect of correlated colour temperature is found on reaction time measurement for 1 cd/m2 ($p = 0.23$)..

In conclusión, our study found that young drivers experience similar glare impairment measured in terms of visual reaction time regardless of the colour temperature of the LED light source.

Identifying the principles of causal perception through visual adaptation transfer

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Recent work has found that there is a genuinely perceptual representation of 'causality' for at least some specific causal events. The prototypical example is the Michottean 'Launching' event, in which an object A moves until it is adjacent to an object B, at which point A stops and B immediately starts moving. Past work has shown that this event is subject to retinotopically-specific visual adaptation effects, and recent work has used adaptation transfer to demonstrate that adaptation to other elastic-collision-like events affects the perception of launching (e.g., 'Triggering'), but not causal events that resemble inelastic interactions (e.g., 'Entraining'). Using this adaptation transfer paradigm, here we seek to develop a principled account of what events do and do not share this underlying perceptual