There are not separate scotopic and photopic forms of light. Humans have scotopic vision and photopic vision and some wavelengths are more favorable to scotopic vision and some wavelengths are more favorable to photopic vision.

Photopic vision is vision using the cone cells in the retina of the eye. Photopic vision is color vision and has high resolution (optics of the eye and any corrective eyewear permitting). The cone cells are most concentrated in the central portion of the retina. Photopic vision requires a higher illumination level than scotopic vision does.

Photopic vision is most sensitive to green through orangish red wavelengths and peaks in the yellow-green at a wavelength of 555 nanometers. The blue sensors are part of photopic vision and peak around 447 nm in the deep blue but contribute very little to the sensation of brightness.

Scotopic vision is vision using the rod cells in the retina. Scotopic vision is black-and-white and is low resolution. Since the central degree or two of the retina lacks rod cells and the general central area of the retina is low on rod cells, scotopic vision is lacking in central vision.

Scotopic vision is apparant when illumination levels are too dim for photopic vision to work at all. Then you see in black and white with low resolution, once you dark-adapt.

Scotopic vision is most sensitive to the bluish green wavelength 508 nanometers and is generally most sensitive from mid-blue to yellowish green.

Then there is mesopic vision - where both scotopic vision and photopic vision are significant. With mesopic vision, people are usually more aware of photopic vision working than of scotopic vision working. Mesopic vision is common outdoors at night on roadways or in urban areas.

When mesopic vision is effect, scotopic vision mostly results in a sense of "overall brightness". Two scenes equally illuminated in terms of photopic units will look unequally illuminated if one has light more favorable to scotopic vision than the other does. For this reason most metal halide lamps have more apparant "nighttime illuminating power" than high pressure sodium lamps of equal lumen output (The lumen is defined in terms of "official standard" photopic spectral response of the "standard" human eye). The usual metal halide lamps have strong clusters of spectral lines at 507-508 (bluish green) and around 473-474 nanometers (greenish blue) - both of which are favorable to scotopic vision. Mercury and sodium lamps, especially sodium lamps, are relatively lacking scotopic-favorable wavelengths.

One effect of scotopic-vs-photopic vision may be what types of headlamps are best for cars. The HID (xenon metal halide) lamps are more favorable to scotopic vision than the more conventional incandescents and halogens are. The scotopic favorability of xenon-metal-halide gives a sensation of greater illumination. But there is a downside - seeing color uses photopic vision and seeing detail mainly uses photopic vision. If you are trying to see something through fog, it is mainly photopic vision seeing objects through the fog and scotopic vision tends to see the fog.

Now for fluorescent lights: There is a study by Berman that indicates scotopic vision has some effect at lighting levels frequently found indoors. Scotopic vision adds a sensation of "bright illumination" which makes the eye's pupils constrict and this makes things be in focus or stay in focus more easily. At least in cases where your eyes are tired or imperfect or if you have imperfect corrective eyewear or you are trying to see objects at different distances from you at the same time. By and large, "cooler" color lights have more of the scotopic-favorable wavelengths than warmer color lights. But at illumination levels short of "classroom bright" or "office bright" cooler colors (4000 Kelvin or higher color temperature) can have a "dreary gray" effect.

Just to make things more confusing, there are different definitions of "scotopic lumen". There is only one definition of photopic lumen or just plain lumen. (Actually two - the 1931 and the 1988 definitions which are slightly different in defining spectral response of the official standard human eye.) A lumen is 681 times the watts of optical output at a specific wavelength (or a narrow band of wavelengths) times the photopic function of that wavelength. If the light source has more than one wavelength, add up the lumens for each wavelength. If the light in question has a continuous spectrum, chop it into narrow bands and add up the lumens for each band.

I have the 1988 photopic function at:

http://www.misty.com/~don/photopic.html

But the scotopic function has at least two or three versions that differ in magnitude but have the same shape of the curve. One has the peak equal to 1 which the official photopic function extremely nearly has. Another is scaled upwards to equal 1 at 555 nm where the photopic function peaks. There may be a third scaled to have the area under the curve equal that of the photopic function. So using different sources' figures of "scotopic lumens" may not be comparing apples to apples.

I do think that the Berman study has a grain of truth but is overrated, especially by companies selling fluorescent lamps on the basis of "scotopic lumens".

Hope this helps!

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