

Telling the time of day by color

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Research by scientists at The University of Manchester has revealed that the colour of light has a major impact on how the brain clock measures time of day and on how the animals' physiology and behavior adjust accordingly. The study, for the first time, provides a neuronal mechanism for how our internal clock can measure changes in light colour that accompany dawn and dusk.

In research publishing on April 17th in the Open Access journal *PLOS Biology*, the researchers looked at the change in light around dawn and dusk to analyze whether colour could be used to determine time of day. Besides the well-known changes in light intensity that occur as the sun rises and sets, the scientists found that during twilight <u>light</u> is reliably bluer than during the day.

The researchers next recorded electrical activity from the brain clock while mice were shown different visual stimuli. They found that many of the neurons were more sensitive to changes in colour between blue and yellow than to changes in brightness.

The scientists then simulated an artificial sky that recreated the daily changes in colour and brightness, as they were measured at the top of the University's Pariser Building for more than a month. As expected for nocturnal animals, when mice were placed under this artificial sky for several days, the highest body temperatures occurred just after dusk, when the sky turned a darker blue, indicating that their body clock was working optimally. If only the brightness of the sky was changed, with no change in colour, the mice became more active before dusk,



demonstrating that their body clock wasn't properly aligned to the daynight cycle.

Dr Timothy Brown from the Faculty of Life Sciences led the research: "This is the first time that we've been able to test the theory that colour affects our <u>body clock</u> in any mammal. It has always been very hard to separate the change in colour to the change in brightness but using new experimental tools and a psychophysics approach we were successful."

He continues: "What's exciting about our research is that the same findings can be applied to humans. So, in theory, <u>colour</u> could be used to manipulate our clock, which could be useful for shift workers or travellers wanting to minimise jet lag."

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