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## Colour vision evolved to spot our blushes

11:33 10 February 2006  
NewScientist.com news service  
Roxanne Khamsi

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Colour vision may have evolved in primates to help them pick up on changes in blood and oxygen concentrations beneath the skin's surface, giving access to emotional cues, a new analysis proposes.

Previously research has suggested that primates – the only mammals with the ability to see in colour – evolved this facility to spot ripe fruits or nutritional leaves.

The new analysis compared variations in skin colour change with the colour sensitivities of primate vision cells. These cells, known as cones, sit in the retina of the eye and allow primates to discriminate colour.

Charting the receptivity of these cells was no small task. "Basically, careful retinal neurophysiologists and psychophysicists spent untold numbers of hours measuring how sensitive each cone is to each wavelength of light," says Mark Changizi at Caltech in Pasadena, California, US.

Changizi, who led the new study, and his colleagues built on this previous research by analysing how different primates' cone cells might pick up on shifting blood oxygen levels, which show through the skin.

## Bare-faced cheeks

In general, skin with veins underlying it has a high concentration of blood with little oxygen – deoxygenated blood. This skin, as a result, often appears greenish blue. Blood loaded up with oxygen appears red, by contrast, and reddens the skin above it. The colour changes depend on whether the blood protein haemoglobin, which shuttles oxygen around the body, is carrying oxygen or not.

Changizi and colleagues charted how haemoglobin's colour varied with or without oxygen. They found that the difference was most evident at around the light wavelengths of 540 and 560 nanometres. The team also discovered that the cone cells most sensitive to these wavelengths belonged to primates with the most advanced colour vision, such as humans and gorillas.

"The relationship is pretty good. They're really well correlated," says colour vision expert Shozo Yokoyama of Emory University in Atlanta, Georgia, US.

The results of the analysis suggest that primate vision may have evolved to pick up on these physiological changes below the skin's surface. In other words, our eyes may have evolved partly to pick up on cues such as blushing.

Changizi also notes that the study found primates with more advanced colour vision tend to be bare faced: "Much more recently, evolutionarily speaking, some primates evolved the ability to see these spectral modulations of the skin, and there was probably a co-evolution between fur-loss on the face or rump."

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