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Comment

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How words shape what we see; and what makes a monkey see red

SCIENCE NOTEBOOK BY ANJANA AHUJA

IT IS, to my mind, one of the most beautiful of colours. That curiously alluring hue, neither green nor blue but somehow both, makes me think of bottomless oceans and precious stones.

I know exactly the colour I mean. But is this because we have specific words — turquoise, aquamarine, aqua — to describe the colour that straddles the blue-green border? Would I be able to imagine the concept of turquoise as readily without these linguistic cues? Did you struggle to picture the colour until I gave the words for it?

The idea that language shapes, or coerces, perception is credited primarily to Benjamin Lee Whorf, a fire inspector born in Massachusetts who worked for an insurance company in the 1920s. After a first degree in chemical engineering, Whorf studied linguistics at Yale University under the anthropologist and linguist Edward Sapir. Their efforts led to the Sapir-Whorf hypothesis, which suggested that language indeed influences thought and perception.

Whorf described his theory thus: “We cut nature up, organise it into concepts, and ascribe significances as we do, largely because we are parties to an agreement to organise it in this way — an agreement that holds throughout our speech community and is codified in the patterns of our language . . .”

This implies that people who speak different languages perceive the world differently — as has been found with speakers of Tarahumara, a Native American language spoken by about 50,000 people in northern Mexico. Unlike English, Tarahumara has just one word to describe shades of green and blue; interestingly, its speakers perceive less difference between green and blue than do English speakers.

This result recently prompted a further intriguing exploration of the relationship between language and perception. Aubrey Gilbert, at the University of California, Berkeley, reasoned the following: language is processed in the left hemisphere of the brain, which also handles vision in the right half of our visual field. So, if language is shaping perception, it should have more of an effect on whatever we see in the right half of our visual field.

As reported this month in the *Proceedings of the National Academy of Sciences*, Gilbert, together with colleagues at Berkeley and the University of Chicago, found exactly this. Volunteers were shown a ring of coloured spots; all the spots except one were the same colour. Sometimes, the odd spot would differ just in shade, in other instances it would be from a different “lexical category” (for example, one green spot among a ring of blue ones).

It turned out that the volunteers were fastest at detecting the odd spot when it lay in the right half of the ring *and* when it was in a different lexical category. But when it appeared in the left side of the ring, reaction times were unaffected by whether the spot was a different colour category or merely a different shade.

Whorf, it seems, was half-correct: words affect what we perceive, but only what we perceive on our right side (because the language faculty interferes more strongly with this input). Gilbert concludes that “. . . representation of the visual world may be, at one and the same time, filtered and not filtered through the categories of language”.

- NOT ALL mammals see the world in glorious colour. Human beings, apes and Old World monkeys can make out greens, blues and reds, which gives us full colour vision. But most New World monkeys (such as tamarins and marmosets) can see only greens and blues.

Zoologists suspect that a sensitivity to red wavelengths evolved in primates for a reason; enhancing, for example, the ability to spot edible fruits and leaves. Now Dr Mark Changizi and colleagues at Caltech, in Pasadena, suggest in *Biology Letters* that primate colour vision evolved to detect . . . blushing. We know that temporary fluctuations in skin colour can telegraph emotional states such as sexual arousal or aggression; animals that developed this ability would have enjoyed a social and reproductive advantage.

Changizi notes that primates that can see red have either bare faces (humans) or bare rumps (Old World monkeys), and that this superior vision is exceptionally attuned to blood changes under naked skin. But, ladies, as you blush coyly around the object of your affections tomorrow, do remember that one in 12 men is colour-blind.

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