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**Familiarity breeds contempt?**

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Brain scans have revealed that predictability can catch you unawares, warns Sara Abdulla.  
7 March 2000

**SARA ABDULLA**

Certain areas of the human brain respond to familiarity -- whether or not we are even aware of experiencing something familiar. So say Gregory Berns of Emory University School of Medicine, Atlanta, Georgia, and colleagues. While scanning adults' brains to see exactly what it is that familiarity breeds, they have stumbled across something that could shed new light on how we learn and process language.

As they explain in *The Journal of Neuroscience*<sup>1</sup>, Berns' group studied how the brain processes predictable events. But they deliberately focused their investigations on non-linguistic predictability. Language has highly predictable syntactic constraints that have been closely studied already. Instead of using words, Berns and colleagues tested subjects with sequences of colours.

The researchers gave 36 people four squares to look at on a computer screen. These squares changed between blue, red and yellow, apparently randomly. But unbeknownst to the participants, the colour changes actually contained sequences of varying levels of predictability. Throughout the experiment, the team monitored their subjects' brain activity using 'functional magnetic resonance imaging'.

Activity in two specific brain regions, the group found, decreases when a person is presented with a predictable series of events, but is ignorant of this predictability. These regions, embedded in the part of the brain beneath the crown of the head, are 'Wernicke's area' in the left hemisphere, and the corresponding part of the right hemisphere.

If, on the other hand, individuals are made aware of the underlying sequential predictability in the colours that they see, Berns' team says that activity decreases across a wide network of regions throughout the outermost layer of the brain. An increase in 'entropy', the opposite of predictability, sets the brain abuzz with activity.

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wernicke's area is thought to be central to language comprehension. If it is damaged people cannot understand what they hear, and are unable to produce meaningful sentences: their speech has grammatical structure but no meaning. It is also known to show abnormal activity in dyslexics.

But on the basis of this latest evidence, Bern and colleagues suggest that Wernicke's area may have a more general role than language processing. "It may also be responsive to probabilistic features in time...processing predictive events," they say. This hints, they add, "at an expanded interpretation of the neurological basis of language."

### References

1. Bischoff-Grethe, A., Proper, S. M., Mao, H., Daniels, K. A. & Berns, G. S. Conscious and Unconscious Processing of Nonverbal Predictability in Wernicke's Area. ***J. Neurosci.*** **20**, 1975 - 1981 (2000).

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