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► **COVER:** 'Decoding: strength in numbers' by Kirsten Lee. Adapted from Getty and BRAND X images, inspired by the review on p173.



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As the technology required for analysing the brain's structure and activity continues to improve, and as these endeavours grow in popularity, it becomes increasingly important to develop appropriate mathematical techniques for understanding the information generated by these powerful methodologies. Two papers in this month's issue reflect this need.

Multielectrode arrays that can record the electrical activity of tens to hundreds of neurons simultaneously can give us insight into complex brain processes, yet interpreting the information from these recordings is a challenging task. On page 173 Quian Quiroga and Panzeri review two different methods — decoding algorithms and information theory — for extracting the information encoded by large neuronal populations and highlight the advantages of population analysis.

Advanced imaging techniques such as diffusion tensor imaging and functional MRI (fMRI) have allowed neuroscientists to map the brain's structural and functional networks at a greater resolution than ever before. On page 186 Bullmore and Sporns describe how graph theoretical approaches can be used to describe the characteristics of these networks and discuss what these have revealed about the brain's organization.

Although techniques such as fMRI have played a large part in recent advances in our knowledge of how the brain operates, on occasion we are reminded that our understanding of the technology itself is in its infancy. On page 166 of our highlights section, we describe recent work indicating that increased fMRI signals may not always reflect increased neural activity, a finding that may have important implications for the interpretation of fMRI studies.

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