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NEUROTECHNIQUES

It is an exciting time to be a neuroscientist. The experimental landscape has changed markedly over the past few years, given the technological advances in molecular genetics, optogenetics and functional imaging. The focus is now shifting towards the application of these techniques in a variety of experimental systems so that their promise can be fulfilled.

Neuroscience research was once dominated by anatomical techniques. But, with the advent of electrophysiology, and subsequently molecular biology, anatomical labelling techniques were eclipsed as the pre-eminent experimental strategy. Now, anatomical methodology is experiencing a renaissance, thanks to the ability to deliver molecules genetically in a cell-type-specific manner and as a result of advances in imaging methods. This powerful combination, together with electrophysiological techniques, now makes it feasible to study the relationships between specific neural circuits and particular behaviours in rodents, previously the domain of invertebrate model systems. However, despite the rise of new techniques, electrophysiology is unlikely to suffer the earlier fate of neuroanatomy and will remain an integral part of neuroscience experimentation.

Neuroscientists are also poised to benefit from systems-based approaches to data collection and analysis but lag behind other researchers, such as tumour biologists, in implementing these strategies. Using the results from such approaches to direct hypothesis-driven work and improve the design of these experiments could be a crucial development in psychiatric-disease genetics, focusing efforts on key candidate genes in the genetic network associated with disease. Systems biology could also aid in attempts to identify specific markers of neurodegenerative diseases.

We thank the authors and reviewers of these Reviews for their contributions to this Insight, which offers visions for tackling the next set of challenging neurobiological questions.

Noah Gray, Chief Commissioning Editor
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