VIEWPOINT

Best practices

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22 OCTOBER 2013

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With the increasing ease of use and availability of **electroencephalography** (EEG) in the study of autism, having guidelines on what is technologically possible, what is most methodologically robust, and how the technology interacts with the participants is crucial.

In publishing **guidelines for the use of EEG in autism** in the 22 August issue of the *Journal of Autism and Developmental Disorders*, we wanted to translate what had been informal conversations among our colleagues into a wider scientific discussion.

To begin with, what is EEG? It is a noninvasive way of measuring brain activity. When neurons are active in the brain, they use electrical signals to communicate. Those signals 'leak' outside neurons and change the current in the extracellular space. The current propagates to the scalp and can be recorded using sensitive sensors.

New technologies allow a large number of sensors to be quickly and easily applied to the scalp using a cap that has the sensors embedded in its structure. And new software allows for the simple recording and analysis of terabytes of collected data.

However, accurate collection and interpretation of EEG data entails more than knowing what cap to use or which software package you choose to record and analyze the data. Although there certainly are best practices, there are often multiple acceptable approaches to data collection and analysis, as well as many gray areas in which it is unclear how one choice might affect the final

data outcome.

Of course, replication in scientific findings is a key to moving our field forward: The better we describe the choices that contributed to how we developed our study, what happened during data collection, and how we made analysis choices, the stronger scientific impact we can have.

Sequential steps:

To write the guidelines, we started by forming the **EEG/MEG in Autism Special Interest Group** and met multiple times between 2010 and 2012 to discuss our field, where we came from and where we wanted to go. From these conversations, we moved to creating a written summary of the methodological issues that we have solved, and the ones that need more work.

Publishing these guidelines is just one step toward a more open forum for discussing EEG data. We think it will ensure that we have a common set of standards and will speed up discovery.

How can standardized application of EEG change the way we understand autism?

First, EEG can be used across the lifespan and functioning level — allowing us to work with young infants who are at risk for the disorder, toddlers showing first signs, children developing new skills and mature adults, as well as individuals with or without intellectual disability. The technology works the same regardless of age and functioning level.

However, individuals are very different if they are age 5 versus 15, or verbal versus nonverbal — just because the method can be used the same way, doesn't necessarily mean it will be or should be. The guidelines provide structure for addressing these choices.

EEG can also provide a critical window into brain functioning in autism because of the temporal resolution of milliseconds. It allows us to examine neural responses to faces or speech sounds, preparations to make a response, the response itself and feedback to that response. Standardized guidelines outlined through consensus discussion by experts in the field can help us to make use of these incoming data and advance our understanding of typical and atypical brain development.

EEG is a highly effective tool for advancing the science of autism. We think the application of standardized guidelines will improve our ability to use this approach, interpret our findings and collectively work together to increase our knowledge base of brain functioning and autism.

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