INDIVIDUAL DIFFERENCES
Editorial

To paraphrase Robert Benchley, there are two kinds of people in this world: those who believe there are two kinds of people in the world and those who think that difference is just noise. For decades, scientists who study mental processes and behavior (and the neural bases thereof) have largely been divided along these lines—those who focus on central tendencies and those who focus on the deviation from those tendencies. In his 1957 presidential address at the 65th Annual Convention of the American Psychological Association, Lee Cronbach discussed these "two historic streams of method, thought, and affiliation, which run through the last century of our science. One stream is experimental psychology; the other, correlational psychology. . . . Psychology continues to this day to be limited by the dedication of its investigators to one or the other method of inquiry rather than to scientific psychology as a whole."

Of course, both types of psychology care deeply about variation among individuals. The difference amounts to whether the variance is treated as data, or as noise. For the most part, experimental psychologists, including the vast majority of cognitive neuroscientists, have done the latter: differences between people (those that cannot be explained by an experimental manipulation) are banished to the denominator of the test statistic, in the realm of "unexplained variance." Variability in effect size is the bane of the random effects analysis. Cognitive neuroscientists construct theories about the relation between the average brain and the average behavior. Why should they be interested in explaining individual variability? For starters, the signal-to-noise ratio is diminished when potentially explainable variance is treated as noise. Scientists interested in making inferences about the population mean might find that task easier when variance attributable to individual differences is removed from the denominator of their test statistic. In addition, in some cases the estimate of the sample mean might not actually describe *anyone* very well. Finally, and perhaps most importantly, the mark of a theory's explanatory power is the degree to which it makes successful predictions not only about the central tendency of a population, but also about the individuals within that population.

Arguments for (and examples of) an individual-differences approach to studying psychological and biological processes were collected in a recent *American Psychologist* article by some of the leading champions of this approach (Kosslyn, Cacioppo, Davidson, Hugdahl, Lovallo, Spiegel, and Rose, 2002). However, of the nearly 100 citations in the article, only a small fraction described individual variation in functional neuroimaging patterns. Why might this be? There are a number of "myths" about studying individual differences in the field of cognitive neuroscience: "The cognitive process I study doesn't vary across individuals." "Estimates of fMRI responses in an individual are too noisy to subject them to an individual differences analysis." "I would need too many subjects than is feasible in order to conduct a correlational analysis." "I need to understand the average response before I could hope to make progress understanding variation around that average." Although the basis for these arguments is easy to understand, our goal with this special issue is to dispel these and other myths about the study of individual differences in cognitive, affective, and social neuroscience. We hope to demonstrate the utility and feasibility of coupling experimental and correlational approaches in the design and analysis of studies of the human brain.

As Cronbach observed, "The well known virtue of the experimental method is that it brings situational variables under tight control. . . . The correlational method, for its part, can study what man has not learned to control or can never hope to control. Nature has been experimenting since the beginning of time, with a boldness and complexity far beyond the resources of science. The correlator's mission is to observe and organize the data from Nature's experiments." The articles in this special issue of *Cognitive, Affective, & Behavioral Neuroscience* demonstrate this mission across a broad variety of questions and issues. Some of the studies have focused on individual differences in perceptual processing (Gauthier, Curby, Skudlarski, & Epstein) and distinct cognitive

domains, such as attention (Wager, Jonides, Smith, & Nichols), and working memory (Todd & Marois; Gibbs & D'Esposito). Others have focused on the nature of fundamental processes such as learning (Ganis, Thompson, & Kosslyn), conditioning (Zorawski, Cook, Kuhn, & LaBar), and speed of processing (Haier, Jung, Yeo, Head, & Alkire). Still others have examined affective and social processes such as reward evaluation (Cohen & Ranganath), and emotion regulation (Ray et al.). Further, a number of the studies add to the growing literature on neural correlates of personality dimensions (Cunningham & Rave; Eisenberger, Lieberman, & Satpute; Gray et al.; Ray et al.). Finally, some of the studies in this issue address methodological as well as substantive issues related to the study of individual differences in cognitive neuroscience (Omura, Aron, & Canli). We hope that these selections will provide representative examples of the topics for which combined experimental and correlational methods can help provide insight and understanding regarding the relationship between brain and behavior. We hope further that this special issue will inspire a continuing acceleration of research using individual-differences approaches to problems of cognitive, affective, and social neuroscience.

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