# 1 Methods for acquiring and analyzing infant event-related potentials

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A primary goal of developmental cognitive neuroscience is to elucidate the relation between brain development and cognitive development (see Nelson & Luciana, 2001). The study of this relation in children older than 5–6 years lends itself to many of the same tools used in the adult, such as functional magnetic resonance imaging (fMRI). However, in children younger than this, limitations in motor and linguistic abilities, coupled with abbreviated attention spans, make the use of such tools impractical. In contrast, electroencephalography (EEG) and event-related potentials (ERPs) provide some of the only noninvasive methodological techniques in the armamentarium of cognitive neuroscientists that allow researchers to examine the relation between brain and behavior beginning at birth. Both EEG and ERPs measure electrical activity of the brain recorded from scalp electrodes and can be utilized across the entire lifespan, thereby permitting one to use the same methodological tool and dependent measure across a broad range of ages (although comparisons across large age spans may be challenging due to qualitative differences in the EEG and ERP response). In addition, EEG and ERPs do not require an overt behavioral or verbal response and therefore permit the study of phenomena that cannot be studied with behavioral methods (e.g., responses to the simultaneous presentation of multiple stimuli or stimuli presented so briefly as to preclude a behavioral response). However, when a behavioral response is obtainable, EEG and ERPs can also provide an invaluable complement and an additional level of analysis to that behavioral measure by permitting one to glimpse (albeit imperfectly) the neural circuits underlying the behavior.

EEG and ERPs both reflect the electrical activity of the brain, and both are collected in a similar manner; however, they represent slightly different aspects of brain function. Whereas EEG is a measure of the brain's ongoing electrical activity, ERPs reflect changes in electrical activity in response to a discrete stimulus or event. ERPs are collected from several trials and then