

### 3 Basic Principles of ERP Recording

- Strategy 1.* Focus on a specific component.
- Strategy 2.* Use well-studied experimental manipulations.
- Strategy 3.* Focus on large components.
- Strategy 4.* Isolate components with difference waves.
- Strategy 5.* Focus on components that are easily isolated.
- Strategy 6.* Use component-independent experimental designs.
- Strategy 7.* Hijack useful components from other domains.

This chapter describes how to record clean, artifact-free data. As the ERP technique has matured, there has been a decrease in the amount of discussion in the literature of basic issues such as recording clean data. This is only natural, because a number of laboratories have developed excellent techniques over the years, and these techniques have become a part of the laboratory culture and are passed along as new researchers are trained. However, as time passes, the reasons behind the techniques are often lost, and many new laboratories are using the ERP technique, making it important to revisit the basic technical issues from time to time.

#### The Importance of Clean Data

Before I begin discussing these issues, I want to discuss why it is important for you to spend considerable time and effort making sure that you are recording the cleanest possible data. The bottom line is that you want to obtain experimental effects that are replicable and statistically significant, and you are unlikely to obtain statistically significant results unless you have low levels of noise in your ERP waveforms. As discussed in chapter 1, the background EEG obscures the ERPs on individual trials, but the ERPs can be isolated from the EEG noise by signal averaging. As you average together more and more trials, the amount of residual EEG noise in the averages will become progressively smaller, so it is crucial to include a sufficient number of trials in your ERP averages. However, increasing the number of trials only works well up to a point, because the effect of averaging on noise is not a direct, linear function of the number of trials; instead, the noise decreases as a