Using Eye Movements to Study Cognitive Processes

Keith Rayner
University of Massachusetts
Amherst, MA 01003
rayner@psych.umass.edu

For the past twenty-five years, many researchers have been using eye movement data to investigate various issues related to cognitive processing. Recording of eye movements provides a relatively unobtrusive moment-to-moment indicator of processing in a number of tasks of interest to cognitive scientists. For example, a great deal of research on reading, scene perception, and visual search has used eye movement data. More recently, eye movement data have been used in a number of other information processing tasks (see Rayner, 1998).

In this presentation, an overview will be provided of the many different types of eye-tracking systems that are available on the market. These systems typically vary along a number of dimensions including cost and how easy they are to use. Some systems can be mastered in a short time period whereas others require a considerable amount of practice before the operator feels comfortable with the system. More critically, there are important trade-offs between temporal and spatial resolution that are inherent in the differing systems. These tradeoffs will be discussed. An important point is that the specific research application typically dictates how important each factor is. It is also important to note that the temporal and spatial resolution of the system is also related to cost and ease of use issues.

Eye movement recording typically results in a vast amount of data and it is essential that researches have well-formulated plans regarding how to analyze the data. The issue of how to best analyze eye movement data will be discussed and some representative examples of eye-tracking applications will be provided. Finally, some specific examples of how eye movement data can be used to answer certain research questions will be given.