example, if a pop quiz is given after a typical 50-minute lecture, chances are students will remember best what was discussed in the first 10 minutes of class and in the last 10 minutes before the quiz. Likewise, most journalists adhere to the maxim that important information should go at the beginning and end of their articles, because these are the paragraphs best remembered by readers. These phenomena have led some researchers to question the two-stage nature of memory and to propose instead some sort of intermediate memory or a continuum from short-term to long-term memory.

Finally, for information to reach a relatively permanent state in long-term memory, maintenance rehearsal is not enough. Learners will argue that simple repetition is an effective means for them to remember something for a long time. In the case of highly overlearned material, such as arithmetic facts, spelling words, or a memorized script, they are probably right. But repetition of more complex and meaningful information will not ensure its being fully processed into long-term memory. Elaborative rehearsal, or encoding, will.

Encoding

Encoding refers to the process of relating incoming information to concepts and ideas already in memory in such a way that the new material is more memorable. Left to their natural inclinations, humans will always try to make things meaningful, to fit some new experience into the fabric of what they already know. We have already seen the evidence of this in perception and attention. Encoding serves to make permanent what these processes have initiated.

Studies demonstrating the various ways in which encoding may take place are too numerous to review in any comprehensive fashion here. But it is useful to consider briefly the major types of encoding schemes that have been investigated. The concept of organization, to begin with, has long been of interest to psychologists and educators alike. Bousfield (1953) found that people will group related pieces of information into categories in order to learn and remember them better. Even when information is seemingly unrelated, learners will impose their own, subjective organization on the material in order to learn it (Tulving, 1962). To assist learners in organizing material meaningfully, outlines (Glynn & Divesta, 1977), hierarchies (Bower et al., 1969), and concept trees (see the examples provided in Chapter 2 and later in this chapter [Tessmer & Driscoll, 1986]) have all proven effective.

Mnemonics and mediation (Matlin, 1983) provide other effective means of encoding. Learning a list of unrelated words, for example, is facilitated by relating the words together in the form of a story (Bower and Clark, 1969). The story then serves as a mediator to make the words on the list, which are meaningless by themselves, more memorable. This can be a helpful strategy for young children to use while learning to read. By themselves, single words