Mnemonology

Mnemonics for the 21st Century

JAMES B. WORTHEN AND R. REED HUNT

Essays in Cognitive Psychology

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To my son B for all the fun and laughter he brings me each day.

—JBW

To Rebekah.

—RRH

CONTENTS

PREFACE

It is not uncommon for professors and teachers of psychology to approach the topic of mnemonics with uneasiness. Coverage of mnemonics in introductory psychology courses and some courses in cognitive psychology is often considered a somewhat outdated tradition. Moreover, even those who accept the merit of tradition tend to be skeptical about the overall utility of mnemonics and mnemonic instruction. Over the course of time, the definition of mnemonics has become narrow, and a lack of enthusiasm in the topic seems to have relegated this ancient art to the rank of a historical curiosity. As a result, mnemonics has been placed on the back burner of empirical psychology in the past two decades. It is our hope that this book revives interest in mnemonics by showing that the topic remains fertile for psychological researchers, educators, and students of psychology.

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CHAPTER 1

Is There a Place for Mnemonics in Modern Psychology?

Mnemonics is a peculiar invention. No other artifact has been created for the sole purpose of supporting a natural psychological process that already is functioning perfectly in its natural form. The psychological process of course is memory.

The very existence of mnemonics is a testament to the central importance of memory for myriad human endeavors, but, in a subtle contradiction, the creation of mnemonics exposes a belief that the naturally evolved, bio/psychological process of memory is inadequate to accomplish many of these activities. To compensate for the perceived deficiency in the natural process, we invented an artifact: mnemonic techniques.

The development and use of mnemonic devices have a very long history. Over this time frame, many specific techniques have been devised, and in some subset of those, their effectiveness has been documented, more or less convincingly, as bona fide memory prostheses. Given that most people seem to believe that their memory is not as good as they would like for it to be, one might expect widespread education about and enthusiasm for mnemonics. Although there have been periods in history when such was the case, today is not one of them. Why not? This is a question that we shall pursue in this chapter as we briefly trace highlights of the history of mnemonics.

As we shall see, enthusiasm for mnemonics has been cyclical for centuries now. The formally devised systems can be elaborate and complex and have always been viewed as artificial. Sentiment concerning the use of mnemonics varies with the perceived relationship between the artificial techniques and natural memory. Although never clearly defined, natural memory was historically taken to be the natural processes of memory, sometimes described as God given, that operate without artifactual

intervention (Yates, 1966). The positive view of mnemonics is of an art that created an assistant to the natural memory processes. The negative view is of a set of tricks that at best produces gimmickry and at worse interference with the natural processes. At the end of the historical account in this chapter, we shall directly confront this tension and propose a modern reconciliation that will bring the art of memory into the mainstream of memory science.

First Records of Mnemonic Use

As long as humans have inhabited the earth, it is likely that there has been reliance on and attempts to improve memory. Early hunter-gatherer societies would have used memory to know where game and other forage could be located at different times of year, and, in fact, archaeological evidence suggests that external mnemonics were first used 28,000 years ago (D'Errico, 2001). External mnemonics are cues placed in the environment in order to improve memory. Modern examples of external mnemonics include writing a reminder on paper or circling a date on a calendar. Evidence suggests that during the Upper Paleolithic period, primitive humans marked wood and bones with notches to keep cumulative records of cyclical events (Wynn & Coolidge, 2003). Although the specific events being recorded are not known, it is not difficult to accept the possibility that these primitive mnemonics were used much like a modern hunter might refer to a calendar or solunar tables to determine where and when to locate wild game. For example, primitive hunters may have charted cycles of animal migration and used the records as reminders of where to locate seasonal food sources. In any event, it is interesting to note that these primitive external mnemonics are believed to have served the same functions that modern-day external mnemonics serve: to reduce working-memory load and to minimize dependence on long-term storage and retrieval (Wynn & Coolidge, 2003). Modern use of external mnemonics will be discussed in Chapter 2.

Internal Mnemonics and Oral Culture

An internal mnemonic is a cognitive strategy designed to enhance the encoding (initial processing) of information. If a mnemonic successfully enhances encoding, then, in theory, it should also facilitate the storage and retrieval of the information. As such, one might view an internal mnemonic as a strategy that serves to prepare to-be-remembered information

such that it can be properly filed away in memory and thus easily accessed when needed.

The evolution of psychosocial processes, especially language and communication, required memory for detail that biological evolution had not (de Chardin, 1959). The demands that early oral traditions placed on reproductive memory are well documented (e.g., Rubin, 1995; Yates, 1966), and because natural memory had not evolved for such purposes, artificial support for the natural processes was required to develop and maintain oral genres. In the absence of widespread literacy, external mnemonics would have been unavailable for the new demands on memory. Development of cognitive strategies to support such memory constitutes an important psychological adaptation to meet the new sociocultural demands.

As documented below, the use of internal mnemonics indeed was ubiquitous in ancient cultures with strong oral traditions. In fact, at least one major theory of orality (Ong, 2002) includes the use of mnemonics as one of the defining characteristics of oral culture. Among the internal mnemonics used by ancient orators, visual mental imagery was a dominant theme.

An example of the early use of an imagery-based mnemonic is found in Marcus Tullius Cicero's *De Oratore*, which was written in 55 BC (Yates, 1966). In *De Oratore*, Cicero conveys the story of Simonides of Ceos (556 BC–448 BC) who was hired to deliver a lyric poem as part of a celebration honoring the host's victory in chariot race. Over the course of Simonides' performance, the host became offended by what he perceived to be excessive praise of the mythological figures Castor and Pollux. As a result, the host paid Simonides only half of the amount agreed upon and suggested that Simonides have Castor and Pollux pay the remainder of the fee. Soon after the confrontation with the host, Simonides was called out of the banquet hall by a pair of visitors. After Simonides left the banquet hall, the roof collapsed inside, killing the host and all of his guests. It was then revealed that the visitors wishing to speak with Simonides were Castor and Pollux, who had arrived to save his life. Later, while recovering the bodies from the disaster site, people determined that the bodies were too disfigured to be identified. However, Simonides was able to recall the location at which each guest was sitting in the banquet hall and thus was able to identify each corpse. On the basis of this experience, Simonides developed a mnemonic system that first involves forming a mental image of a familiar place (Yarmey, 1984). Then, using an ordered arrangement, one mentally places to-be-remembered items in various locations of the imagined familiar place. At the time of recall, one simply revisits the imagined familiar place and retrieves the to-be-remembered items. As will be shown in Chapter 4, this mnemonic technique is now known as the method of loci and is still used today.

Ancient Greek and Roman orators also advocated the use of bizarre mental imagery to enhance memory. The oldest surviving Latin text

on rhetoric (*Rhetorica Ad Herennium*) provides a good deal of discourse devoted to instruction on the memorization of speeches. A centerpiece of that instruction is the argument that construction of humorous or ridiculous images in association with to-be-remembered information will maximize the likelihood of retrieving that information from memory (Yates, 1966). It is interesting to note that the use of bizarre imagery is a component of several mnemonic techniques advocated in modern texts on memory and cognitive psychology. Modern research on the mnemonic effectiveness of bizarre imagery will be discussed in Chapter 3.

The Middle Ages

The heavy use of mnemonic strategies continued through the Middle Ages. During this time, good memory was highly revered, and mnemonic training was an integral part of the educational system (Carruthers, 1990). Moreover, it is believed that lawyers of this time committed entire sets of laws and codes to memory using a variety of mnemonic techniques (Fentress & Wickham, 1992). Particularly interesting is a translation of the mnemonic techniques advocated by Hugh of St. Victor provided by Carruthers (2002). Like his predecessors, Hugh of St. Victor strongly advocated the use of mental imagery to enhance memory. However, the most striking characteristic of Hugh of St. Victor's instruction is the emphasis that was placed on the organization of to-be-remembered information. Specifically, he used the analogy of the meticulous organization of a money changer who could quickly and without hesitation retrieve the appropriate coins from a pouch that contained numerous coins of different types. It was suggested that information to be remembered should be organized similarly. With rigorous mental organization, the to-be-remembered information would be stored in "distinct locations" in memory and would thus be immune from interference and easily retrieved. Although the method of loci used by ancient orators provided an ordered placement of information within a mental image, Hugh of St. Victor's system appears to be more strongly related to modern organizational mnemonic techniques such as categorical and schematic organization. Modern organizational techniques will be discussed in Chapter 5.

The emphasis on organizational mnemonics as opposed to the more circumscribed method of loci appears to have been a trend in the Middle Ages. According to Carruthers (1990), the method of loci fell out of favor between the first and 12th centuries as it was considered somewhat of a gimmick during that time. In its place, mnemonic techniques such as the use of rhymes began to emerge. Of particular interest is Carruthers's description of a rhyme-based mnemonic technique advocated by John of

Garland. John of Garland suggested that one should make use of similarities between the sounds of unfamiliar and familiar terms in order to enhance memory for the meaning of the unfamiliar terms. This technique is very similar to the modern keyword method that is used to enhance second-language acquisition. The keyword method will be discussed in Chapter 4.

The advocacy of bizarre imagery as a mnemonic remained strong throughout the Middle Ages. Carruthers (1990) illustrated this point in her description of the system offered by Thomas Bradwardine (c. 1290–1349) to memorize the signs of the zodiac. Bradwardine suggested that each symbol of the zodiac should be connected to an adjacent symbol via interactive imagery. For example, Leo, Virgo, Libra, and Scorpio were associated by an image consisting of a bloodied lion (Leo) attacking a beautiful maiden (Virgo) whose arm is extremely swollen from the sting of a scorpion (Scorpio) that the maiden is balancing on her scales (Libra). Carruthers noted that all of Bradwardine's suggested imagery was extreme and that this extremity was "in conformity with a basic principle for memory images, namely, that what is unusual is more memorable than what is routine" (Carruthers, 1990, p. 134). This clearly suggests that bizarreness was the norm for mnemonic imagery in the Middle Ages. It should also be noted that Bradwardine's system bares a striking resemblance to the modern linking-by-story method, which will be discussed in Chapter 5.

The Renaissance

It is widely believed that the method of loci reemerged as a fundamentally important mnemonic during the Renaissance (Carruthers, 1990; Engel, 1991). Given that reference to ancient texts is generally considered a hallmark of the Renaissance, it is not particularly surprising that some of the earliest mnemonics reappeared during this period. However, what is striking is that some thinkers who were not even aware that the method of loci had been covered extensively in ancient texts arrived at the basic principles of the method independently (Engel, 1991). This may have been due in part to an intellectual climate that allowed for a more general acceptance of all mnemonic techniques than had existed previously. Moreover, the humanistic emphasis on mental capabilities may have also spurred additional intellectual thought on the topic of mnemonics (Carruthers, 1990).

Although the use of mnemonics was generally accepted during the Renaissance, English Puritans took issue with imagery-based mnemonics (Couliano, 1987). The Puritans believed that imagery-based mnemonics were idolatrous and that the bizarre imagery often elicited by such

techniques was obscene. At the center of this controversy were Alexander Dicson and William Perkins. Dicson was a student of Giordano Bruno's mnemonic system, which was a variation of the method of loci. Bruno's system involved heavy use of mental imagery and was associated with Hermetic occultism (Yates, 1966). Perkins was a theologian and Puritan leader who advocated Petrus Ramus's organizational mnemonic techniques. Thus, the dispute between Dicson and Perkins was just as much about religion as it was about mnemonic techniques. Specifically, as led by Perkins, the Puritans associated imagery-based mnemonics with the occult as well as with the Catholic Church (Couliano, 1987). Making an argument similar to that which they directed at the Catholic Church for the veneration of saints, the Puritans maintained that the use of mental imagery amounted to heresy as it reflected a form of idol worship. Moreover, the Puritans were especially opposed to the use of zodiac symbols in Bruno's mnemonic system (Yates, 1966).

The Introduction of the Scientific Method

In the latter stages of the Renaissance, scholars were less influenced by authoritative sources and began to embrace systematic observation and experimentation as preferred methods for the acquisition of knowledge. Francis Bacon, a major contributor to the development and popularity of these empirical methods, was also a proponent of mnemonic techniques. As noted by Yates (1966), Bacon fully embraced the use of mental imagery to enhance memory. However, Bacon believed that the use of mnemonics by rhetoricians and orators was gimmicky showmanship and that the main value of mnemonics was tied to their potential applications to scientific investigation. For example, Bacon suggested that variations of the method of loci could be used to facilitate invention by making knowledge readily available for creative use (Engel, 1997). In this way, one might consider Bacon's view of mnemonics as a precursor to the use of mnemonics as a tool for educators. The modern use of mnemonics in education will be discussed in Chapter 7.

It should also be noted that Bacon was not an advocate of the use of bizarre imagery (Yates, 1966; Yeo, 2004). Thus, it appears that Bacon's position on mnemonics was a bit of a compromise between classic mnemonic techniques and the imageless organizational mnemonics espoused by the Puritans. Bacon accepted the use of image-based mnemonics such as the method of loci and its variants but suggested that imagery should be sensible and used mainly to structure to-be-remembered information in an orderly fashion.

Despite the qualified acceptance of mnemonics by Francis Bacon, succeeding influential thinkers flatly rejected the use of internal mnemonics

and instead advocated the use of external mnemonics. A common thread among those who rejected the use of internal mnemonics was the belief that the memory system was extremely fragile. As a result of this fragility, internal associations among ideas could be easily distorted such that they no longer reflected their natural connections with the world and could possibly even approximate madness (Yeo, 2004). In keeping with this sentiment, John Locke, whose *An Essay Concerning Human Understanding* (1690) marked the beginning of British empiricism (Schultz & Schultz, 1992), advocated the use of an external mnemonic known as a "commonplace book" (Yeo, 2004). A commonplace book was a method of study in which to-be-remembered information was summarized in the form of notes written under organized headers. Typically, these notes would include relevant themes and quotations that would serve as cues for the retrieval of learned information. Locke believed that this method allowed one to avoid the supposed pitfalls associated with internal associations and to develop habits that "disciplined" the mind.

By the time of Locke's death, the commonplace method had fallen out of favor, and by the 18th century, it had become a target of intellectual loathing (Yeo, 2004). The main argument against the commonplace method was that it was viewed as the method preferred by those seeking a shortcut to learning. Specifically, it was believed that the method encouraged gist learning rather than deeper understanding. Thus, much like the modern educator who bemoans the use of CliffsNotes by his or her students, scholars of that time believed that the commonplace method facilitated intellectual pretense. Of course, using the commonplace method as a shortcut rather than a way to cue retrieval is clearly inconsistent with Locke's use of the method. Nonetheless, the reputation of the commonplace method deteriorated to the point that by the 19th century, the term *commonplace* was being used to refer to trivial facts, much like the use of the term today (Yeo, 2004).

Notwithstanding the fall from grace of his method, Locke's emphasis on organization, storage, and retrieval was a precursor to some of the fundamental topics studied by modern memory researchers. Moreover, the essential components of the commonplace method are very similar to the modern method of advance organizers that has been used to facilitate memory. The use of advance organizers will be discussed again in Chapter 5.

Despite the movement away from internal mnemonics at the end of the Renaissance, there was at least one influential internal mnemonic devised during this time. Using the pseudonym Stanislaus Mink von Wennsshein, Johann Just Winkelmann developed a phonemic system for remembering numbers that involved substituting letters for numbers (Lorayne, 1957). For example, the number 1 was represented by letters T and D because these letters were written with one down stroke. The number 2 was