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A MULTIMODAL APPROACH TO ENHANCING MEMORY IN REFERENCE SERVICE

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Introduction

In recent years, reference services have been characterized by an ever-expanding array of paper and electronic reference sources, including online databases, internet resources, CD-ROM products, and OPACS. Along with this influx of new resources has come an increasingly complex set of policies and procedures that define who should have access to these resources and how they should be used. This glut of information resources has made it difficult for reference librarians to keep up with all the new resources and their ever-changing formats, much less remember them all. This is especially true when one considers that many librarians may be spending fewer hours on the desk as a result of competing responsibilities such as user instruction, collection development, and liaison work, which may compete with reference responsibilities.

In this kind of reference environment, it is more important than ever for librarians to have a good memory. Perhaps more than any other mental ability, memory is essential to the performance of reference work. This may seem obvious, yet despite the growing importance of memory to the reference function, surprisingly little has been written about it in the library literature. There are several reasons why this may be the case. First, memory is an extremely complicated and nebulous phenomenon that does not easily lend itself to scientific study. Second, much of the psychological research on memory consists of laboratory studies that are difficult to apply to practical settings. Third, the findings of these studies are sometimes inconclusive or even contradictory, making them seemingly less valuable to someone seeking help for everyday problems encountered at the reference desk. Nonetheless, several authors have written about memory in relation to libraries, and these studies are worth a brief review.

Library-Related Literature

One interesting article, written by Suzanne E. Najarian, is entitled, “Organizational Factors in Human Memory: Implications for Library Organization and Access Systems.”¹ In this article, the author examines a number of psychological studies on the structure and function of memory, to see what their implications might be for library systems of organization and access. The psychological research indicated that there is a definite limit on the typical span of memory, which averages five to seven items. In order to overcome this limitation, there is a natural tendency on the part of subjects to organize material into categories that are arranged in a hierarchy that leads from the most general concepts to the most specific. This form of organization seems to facilitate recall. The author states that libraries should adopt organizational schemes that are arranged from the general to the specific as search aids. Since individuals generally search their memories in a general to specific sequence, and many library classification schemes employ a similar hierarchical arrangement, it would be helpful to users to display visual aids explaining how library systems are organized. Additionally, the author concludes that, since individuals can only process small amounts of information at a time, library organizational schemes such as online system displays should be kept simple.

Another important study of memory that addresses memory in relation to the reference process is entitled, “The Reference Process and Certain Types of Memory: Schematic, Episodic, and Semantic.”² The author, Professor S.D. Neill of the University of Western Ontario, uses excerpts from transcripts of taped reference interviews to illustrate how librarians use three important types of memory organization. Semantic

memory, which organizes data into categories and lists, is often used by librarians when they sort reference questions into various classes or groups. For example, the patron who asks for collections of poetry, is likely to be asked by the librarian, “What kind of poetry?” “English poetry?” “American poetry?” The librarian is using semantic memory to recall the categories into which the question may be subdivided in order to subsequently refer the patron to the most relevant sources. Episodic memory, which is used by librarians to recall specific instances or episodes, is called into use when a patron asks a question and the librarian responds “Someone just asked that question recently.” A third type of memory, called schematic memory, is a set of expectations for how things should appear or the order in which they should occur. The librarian who picks up a reference work in response to a patron’s question, thumbs through it quickly, and exclaims, “Oh, I see how it works, it’s alphabetical by subject,” is using schematic memory of how similar works are arranged. The author points out that librarians have schema (expectations) not only for various types of reference works, but also for reference procedures, reference questions, and patrons themselves.

A third article by David Fraser called, “Memory Skills: Whose Concern?” makes the argument that librarians need to be as concerned with memory skills as psychologists and educators.³ That is because memory is a form of information processing, which is a logical extension of the library profession’s longstanding concern with information storage and retrieval. The author believes that patrons these days obtain much of their information from non-print media such as television and radio. Consequently, we need to develop memory skills that will enable us to recall information from these media as well as from more traditional sources like books. In order to do this, it is important to

discover if certain memory strategies are more effective with particular media than others. This can be accomplished by studying how people commit information to memory from various media. The research results might lead to discovery of the most effective processing strategies, which could eventually result in creation of new styles of studying. The article is important because it calls attention to the importance of memory to librarianship and to the idea that memory is capable of being improved.

Traditional Methods

Outside the library literature, there is a vast literature on memory improvement from fields such as psychology and education. Many of these articles have a practical, “how to” emphasis, and stress that memory can be improved by using one or more of the traditional methods of memory improvement. These include such techniques as the method of loci, which requires a person to imagine the material to be memorized as being placed in various locations in a scene, such as the rooms of a house. Other traditional techniques are the “peg” method, which involves mentally associating material to be remembered with images to objects contained in a list that has been memorized previously, and the link method, which requires one to form joint images of the material to be committed to memory.

While these methods have been found to improve memory immediately after utilizing them, psychologists have recently begun to evaluate their overall effectiveness. Originally researchers simply assumed that these techniques would be effective over a wide range of situations and applications, both immediately and for some time after the

techniques have been learned. Recent research suggests, however, that this is not necessarily the case.

For example, one researcher found that rather than being broadly applicable to a wide variety of situations, each given method tends to be more effective for certain kinds of tasks than for others. The method of loci appears to be most effective in remembering ordered lists, while the interactive imagery used by the peg system works best with pairs of items. The story method (which involves making up a story that incorporates the material to be memorized) has been shown to be superior for unordered lists. It was also found that these traditional methods of memory improvement are not useable at all for certain kinds of memory tasks, such as recalling a melody, a person's face, or a specific procedure for how to do something.⁴

Another interesting study raised questions about the sustainability of traditional techniques of memory improvement after they have been learned. Three groups of students at different educational levels were asked to complete a questionnaire about how they used memory techniques in their everyday routines. The results indicated that the two most frequently used memory aids were "mental rehearsing" and short term repetition. Both of these are considered normal functions that do not require special training. The study also found that the least used strategies were the more formal and complex forms of encoding and elaboration, such as the method of loci, because they are difficult to use and require high cognitive effort. This proved true even for students with training in formal mnemonics. The researchers also cited another possible reason for low usage: the lack of situations in everyday life that would require the use of formal memory aids.⁵

What about memory experts, the memory researchers themselves? Perhaps the most telling piece of research regarding the limited value of traditional memory improvement techniques comes from a study done of the memory practices of memory researchers themselves. The authors of the study reasoned, if anyone should take advantage of traditional memory enhancement techniques, it is the people that teach them and research them. The results indicated that memory psychologists relied more heavily on two particular memory improvement strategies than did the other two groups of respondents. The strategies they utilized more were organization and physical reminders, two commonly used strategies of naïve users. All three groups rated formal mnemonic techniques such as the loci, peg, and story methods as among their least used methods. The reasons that the respondents gave for preferring these strategies was that their own personal experience suggested that they worked and also that the strategies were easy to use.

In general, the study concluded that only in rare instances are the memory strategies of memory experts different from those of other academics. Memory experts do not use formal mnemonic systems more than other academics. The memory strategies that experts use are the same general and commonly used ones that non-experts use, such as organization, rehearsal, and notes and lists. The reason that memory psychologists use formal devices infrequently is because they realize that such devices are only viable in limited situations and require extensive cognitive effort to be used optimally. They are more willing to rely on popular methods than invest all the extra effort required by the formal memory techniques.⁶ From these studies, it seems clear that the traditional methods of memory improvement cannot be recommended for most people

Noting that traditional memory improvement techniques have limitations, some researchers have suggested trying a multimodal approach to memory improvement. The multimodal approach incorporates newer techniques that alter memory processing by manipulating the processing of other psychological modes such as the emotions, attitudes and social cognitions. By altering modes of processing that affect memory indirectly, memory can be enhanced in a gradual, subtle way over time. These newer techniques are thus not suitable for anyone hoping to discover memory tricks, gimmicks, or a “quick fix,” which are the kind of promises often utilized by commercial memory improvement courses or “how to” books.

Unlike traditional memory improvement techniques this new approach recognizes that memory is contained within an entire psychological system. These psychological modes influence memory performance and memory is thus dependent on them. The focus of the new approach is to influence a person’s overall psychological readiness to perform a task, rather than merely to manipulate the content of memory like traditional memory improvement techniques did. The advantage of this new multimodal approach to memory improvement is that it is not as mentally taxing to use as the old techniques, so that it does not result in fatigue or distraction from the task itself.⁷ A basic assumption of these new approaches is that memory processes do not occur in a vacuum, but rather in a social and environmental context. The following section is an exploration of how some of these psychosocial modes may affect memory performance in the reference setting.

Memory in Social Context

Psychologists have recently begun to place more emphasis on how social factors affect memory. Many memory tasks take place in a social context, including reference work, and the social environment can affect memory in various ways. In addition, the social aspect of memory manifests itself in attitudes or stereotypes about memory performance.

In the typical reference encounter, the librarian does not conduct a search alone, but is watched by the patron. The librarian is generally aware that he or she is under scrutiny. This social presence may affect the librarian's ability to recall, particularly if the librarian is predisposed to be self-conscious, or if the patron is demanding, impatient or difficult in some way. This can create a distraction that diverts the librarian's concentration away from the process of remembering and toward the patron or the situation.

The memory of librarians may also be subject to other social influences. A recent experiment has some interesting implications. Subjects were asked to read a story and then complete a test that asked them to recall the facts from the story. After completing the test, subjects were shown bogus tallies of other subject's responses to the same questions which disagreed with theirs. When the subject's memories were tested again, they changed their responses from those they gave in the initial test to conform to those given in the bogus tallies. The more agreement there were among the bogus tallies, the more likely the subjects were to change their original responses.⁸

With the increasing sophistication of patrons, an analogous situation may sometimes arise at the reference desk. One or more patrons may approach the desk,

swearing that they have checked a certain source or sources, only to turn up nothing in their search. If said with enough conviction, they may cause a librarian who might otherwise have recommended the very same sources to momentarily question their own memory and perhaps try a different strategy.

Memory may also be vulnerable to the social demands that are made on it. This was demonstrated by a study which indicated that the more cognitive demands that are placed on a person's memory, the more likely they are to think stereotypically.⁹ Thus in cognitively busy situations in which traffic at the reference desk is high, the librarian's memory may be more prone to produce stereotypic responses. Demanding information processing contexts may create a need for a form of mental simplification that will not tax already depleted resources normally needed to produce less stereotypical responses. Stereotypical answers that may be superficial but that nonetheless minimally satisfy the patron's need allow the librarian to cope with a demanding environment and serve as another illustration of how memory may be affected by the social situation it must function in.

The gender roles that people are socialized into represent another potential social influence on memory,¹⁰ which may manifest itself in the reference process. Male librarians may be predisposed to recall stereotypically masculine subject materials such as science, engineering, or business. Women may be more proficient at remembering literature, art, or music. In addition, the academic background of many librarians may influence how memory functions. Given the large number of individuals with humanities degrees who enter the profession of librarianship, it would not be surprising if humanities resources were remembered better than the physical or social sciences. The important

point here is that one's social and cultural background may influence memory in the reference process and cause a librarian to develop certain predispositions toward acquiring and retaining various kinds of information that may be viewed as more or less salient because of one's socialization.

Memory and Emotional States

Researchers have conducted numerous studies on the relationship between memory and emotional states. In many of these, a link has been established between feelings and memory.¹¹ Some of the results of these studies have interesting implications for the reference process.

A person who uses his or her memory in a worried or anxious state, for example, will likely experience poor memory. This is because worrying tends to use up the individual's working memory capacity. It is working memory where information is stored to be used in helping with various cognitive tasks. This was demonstrated by a study that required subjects to try to perform a simple task (repeating the word "one" at timed intervals) while worrying about a topic to current concern to them. The study found that the subjects had difficulty worrying and performing the task simultaneously.¹² If a relatively simple task cannot be completed while worrying, think of how difficult it may be for a librarian to conduct reference transactions, or think in terms of research strategies, in a worried or anxious state.

One particular anxiety-related state that may affect the memory of librarians involved in reference work is performance anxiety. It is not unusual for reference librarians, like other occupational groups who must perform or "be on" for the public, to

experience moments when they feel less confident of their reference skills. There is evidence to suggest that this sort of anxiousness can interfere with memory.¹³

Attention and Memory

Attention plays a critical role in memory performance because what one remembers depends on what one pays attention to. The content of memory is not only determined by attention, but how well one is able to retrieve a particular memory also depends on attention.¹⁴ Any distraction during retrieval can weaken memory as much as distraction during encoding, when memories are being formed. The librarian who gets a call at the reference desk from a patron while still distracted by the telephone question, may have difficulty retrieving the answer from memory because of an inability to fully focus attention on the subsequent patron's question. This example suggests how closely attention and memory are linked.

There is additional evidence that suggests that the strength of a memory depends on how much attention is paid to what is being attended to.¹⁵ This helps explain why librarians are able to remember sources that they use frequently, and why sources that are seldom used are harder to remember. It also sheds light on why the sources that the librarian relies on most heavily are generally the first ones to come to mind in answering a patron's question. It may also help account for why a particular source is found only after expending a great deal of time and effort in exhausting other sources may tend to stick in one's memory longer.

The process of attention not only plays an important role in forming memories, it also plays a key role in preventing their formation through the mechanism of suppression.

The suppression of attention is critical to what is remembered because it prevents the processing of irrelevant objects or thoughts that might otherwise serve as distractions from a person's goals. The ability to suppress attention thus becomes a critical consideration for librarians trying to improve recall. It is particularly important given the rate of technological change now taking place in libraries. Rapidly changing protocols and interfaces make it important to have the ability to suppress outdated information in order to absorb and retrieve new information more efficiently.

The interaction between attention and memory may also play a critical role in distinguishing a novice from an expert librarian. The development of expertise depends on a processing called automaticity, which refers to mental processing that is rapid and effortless. Novice performance is slower and more tentative, because the novice's complete attention is consumed by the details and procedures involved in performing the task. As the novice becomes more skilled, performance becomes more automatic, and attention shifts from performing the task to retrieving past solutions from memory. Attention thus remains of critical importance to both novice and expert, the difference being that it is directed to a different aspect of mental processing. Expertise depends on automaticity, which itself depends on memory.¹⁶

In studying the relationship between attention and memory, psychologists have identified another important factor, the time of day. The efficiency of one's attention and memory are both affected by the time of day a person is using them. Evidence suggests that certain kinds of task are performed better by certain kinds of people at different times of day. In general, attention appears to be more focused in the morning, which would be better for performing new and unfamiliar tasks that rely less on memory and more on

attention. The afternoon is better for automatic tasks that rely more heavily on memory.¹⁷ It appears that many librarians might be better at learning new sources or search techniques in the morning, and working with more familiar material later in the day.

How effectively librarians are able to focus attention and utilize memory may also depend on whether they are “morning type” or “evening types.” That is, individuals whose circadian rhythms operate at their peak of arousal in the morning will exhibit performance decrements as the day wears on. Conversely, the performance of evening types on memory tasks tends to improve throughout the course of the workday. Recent research has suggested that most younger adults tend to be evening types, while the majority of older subjects are morning types.¹⁸

The Role of Metamemory

Metamemory is a term used by psychologists to refer to a person’s awareness of, beliefs about, and control of memory. Deficient memory is often a result of deficient metamemory. Indeed, beliefs about memory may be more important in determining memory performance than one’s actual ability to remember.¹⁹ Some individuals, such as older adults, are more prone to believe that memory situations are threatening. This creates anxiety which then serves to consume short-term memory resources, thus producing a self-fulfilling prophecy in which remembering becomes more difficult. Many people also believe that memory ability is innate, and hence incapable to being altered or improved. The result is that when these individuals are compared on a variety of memory tasks with subjects who believe that memory is heavily dependent on strategic

processing, they do not perform as well. This suggests that librarians who believe that memory is not innate and can be improved by effort will be more effective in retrieving information from memory than librarians who believe that memory is fixed and unalterable. This is because memory beliefs may affect motivation which in turn may influence retrieval capability. Librarians who believe that memory can be improved by effort are more likely to search their memory deeply and thoroughly and find the answer. Metamemory beliefs thus have the ability to improve or hinder memory performance.

Another example of how metamemory can affect actual memory performance has to do with the beliefs about the degree to which memory is vulnerable or suggestible. People who believe that memory can be subject to distortion or can be influenced by the suggestions of others are likely to be more vigilant than those who believe that their memories are invulnerable. Increased vigilance is, in turn, likely to increase the probability of detecting misinformation and suggestion. Vigilant individuals would be more likely to use various criteria, such as vividness and degree of detail, as indicators of the veracity of memory.²⁰ In the reference situation, if librarians suspect they are likely to be misled, they may pay particular attention to the source of the information and compare it carefully with the content of their memory. This would make them less vulnerable to false leads supplied by patrons who are convinced they are correct.

Psychologists have found that other factors have an effect on metamemory. One such factor is how important a given event is to a person, as well as how familiar it is. People tend to be more aware of their memory for highly salient events and events of great familiarity than they do for mundane or unfamiliar tasks.²¹ In general, the longer subjects perform a task, the more confident they will be in their ability to recall it.²²

Similarly, the reference librarian will be more readily aware of and recall more quickly those encounters or situations in which he or she was able to assist an important patron, answer a particularly difficult or pressing question, or conversely (and perhaps with embarrassment) fail to provide the answer. More obviously, the librarians who tend to get repeat questions that require the use of some sources repeatedly will be more conscious of them and have a better memory for them than sources that are infrequently consulted.

Implications for Memory Enhancement

The social context in which reference work is conducted is one in which librarians are called on to utilize their memory in the presence of patrons and or colleagues. To the extent that they are required to do this, their work constitutes a kind of performance not unlike that of the performing artist or athlete. Given that the librarian is under some degree of social scrutiny, and does not have unlimited knowledge of all subjects, there will undoubtedly be times when the librarian's memory may be taxed or strained.

The first step in improving memory in the reference situation is to acknowledge that it is a kind of performance in which one is required to "think on one's feet." By approaching reference work as a performance, it becomes possible to draw on the rich and varied literature on the psychology of performance that has developed in recent years. In many ways, librarians face the same kinds of psychological challenges that concert musicians or professional athletes encounter in their performance work. All wish to convey an image of competence and skill in the face of a situation that invites social evaluation.²³ Even if the audience is only one patron, "making a good impression" by

recalling information quickly and efficiently is important to a librarian's self esteem and sense of professional self-worth, not to mention the patron's satisfaction. Optimal memory performance contributes to a better overall reference performance and enables librarians to appear competent and "save face."

Like librarians, performing artists and athletes are called on to recall and execute often complex sequences of steps in order to successfully complete a performance. Although accurate memory is an essential element of the performer's overall set of skills, performers do not generally rely on special memory tricks or schemes to recall their material. Rather, they rely on the same basic memorization techniques that are commonly used by non-performers. These include making sure that material is well organized, thoroughly committing it to memory using repetition, and once memorized, making sure that it well rehearsed.²⁴

Even though performers do not typically use specialized mnemonic schemes for committing material to memory, they often rely on a repertoire of memory enhancing techniques. These techniques, though not always specific to memory, have been designed to improve a performer's overall psychological functioning in performance situations, including memory. Extensive research, some of which is cited below, has demonstrated the effectiveness of these techniques. Many have been designed to be used together rather than individually for maximum benefit.

Mental Rehearsal

One such technique that has been shown to be effective is called mental practice or mental rehearsal. Mental practice is the cognitive rehearsal of a task without any

corresponding overt action or execution. Many studies that have been conducted to test the effectiveness of this technique have found it to have positive and significant effect on a wide variety of performances in both athletics and the arts.²⁵

Reference librarians can utilize the techniques of mental rehearsal by mentally practicing answers to the kinds of questions they typically encounter in the reference situation or in using a complex source or database. This may be a more effective means of priming one's memory than such commonly used methods as "walking the reference shelves." The reason is that answers are more likely to be recalled easily when a high degree of encoding specificity is used in committing them to memory. That is, to the degree that the mental rehearsal condition matches the actual conditions at the reference desk, the material committed to memory will be more easily recalled. By mentally posing and answering specific reference questions, like those actually asked by patrons at the desk, the librarian is priming his or her memory to be particularly responsive to a particular stimulus, the question posed. Mental practice can be a particularly valuable technique for librarians who have other responsibilities that do not allow them enough hours on the desk and are concerned about their reference skills "getting rusty."

Imagery Training

Closely related to mental rehearsal is a technique called imagery training. Unlike mental rehearsal, imagery training is a mental process that involves using all the senses to internally store in memory, recall, and perform a task in the absence of any external stimuli. Imagery training goes beyond visualization to cognitively and emotionally stimulate in great detail how the person imagining the performance will actually perform

in the real situation. Elite athletes and performing artists commonly use imagery to enhance their performances, and are highly skilled at both the ability to form vivid images and the ability to control those images. This ability is a critical factor in distinguishing between successful performers and less successful ones. When used correctly, imagery training has been shown to enhance performance and to serve as an effective adjunct to actual practice.²⁶

One reason imagery may be so effective in strengthening cognitive processes related to memory is that it serves to focus the attention of the performer to such a degree that it helps to screen out irrelevant contextual information. This prevents such information from being encoded, which allows for much readier and stronger recall. Librarians who are able to vividly imagine themselves giving a great memory performance will be able to recall that image easily and use it to help screen out both external distractions (e.g. difficult patron) or internal ones (e.g. self-consciousness). Studies have shown that subjects who are able to imagine themselves as successful outperformed those who imagine themselves as unsuccessful.²⁷

Self-Talk

Given the ever-increasing number of paper and electronic resources that librarians are responsible for remembering, many librarians may harbor doubts about their ability to remember it all. Memory problems that librarians experience due to self-consciousness or self-doubt about their memory ability may be alleviated by bolstering the self-efficacy beliefs that librarians possess about themselves. These self-efficacy beliefs affect

cognitive processes which in turn serve to help or hinder memory performances at the reference desk.

One of the best ways reference librarians can improve their memory performance is to bolster their self-efficacy beliefs. An excellent way to accomplish this is by using a technique known as self-talk. This involves self-statements that a performer makes to him or herself in order to control their cognitive processes in pressure situations. Self-talk is a means by which beliefs are made conscious, energy is aroused, positive expectations are reinforced, and attention is focused on the memory task itself, rather than on distractions like worry or patron scrutiny. Several studies have found that successful athletes effectively use self-talk to eliminate distractions and self-doubts.²⁸ The research suggests that negative self-talk was associated with losing and that players who believe in the effectiveness of self-talk scored more points than those who did not.

Librarians can utilize self-talk in a variety of ways. It can be used to focus or refocus attention when the librarian realizes he or she is distracted, by the use of cue words like “focus,” or “here and now.” It can be used to boost self-efficacy by statements like “you can do it,” or “I’ve answered tougher questions.” Self-talk can also be effectively used to cue relaxation “easy does it,” or to psych oneself up “go for it,” or “let’s nail this.” The most effective cue words are ones that have a high degree of emotional content for the performer and can readily be combined with appropriate images of mastery. Such words energize individuals to perform optimally and sharpen their attentional focus

Modeling

In addition to self-talk, modeling can be an effective way for librarians to enhance their memory performance. Librarians who want to improve their memory should select another librarian they work with who has an excellent memory and observe them as much as possible. Paying careful attention to that person's style of thinking, their way of responding to questions, including visual and auditory cues, may enable the observing librarian to better encode and retain the modeled actions. Modeling allows the observer to encode a symbolic representation of the modeled action so that it can be rehearsed mentally. A model that is retained and encoded in memory can be more easily reproduced because the association between the model and the appropriate response has been strengthened through observation and mental rehearsal. In one recent study of a group of college level music majors, both guitarists and vocalists were able to give longer performances of music from memory when a model was introduced into their practice sessions.²⁹

By observing a model, the memory process takes on personal associations that make it more salient, because the observer can see it being utilized. The transfer of learning is enhanced by a process of empathetic introspection, in which the observer becomes capable of psychologically placing him or herself in the role of the model when called on to utilize their own memory. Modeling also has a positive effect on the learner's sense of self-efficacy in using their memory in actual situations. The greater one's sense of self-efficacy, the more likely the person is to persist in their efforts at remembering. Observing a model not only gives the observer a chance to monitor another's memory process, it also gives one the opportunity to note the conditions under

which it may be applied. This allows for better organization of the material in memory, and material that is well organized is easier to remember.³⁰

Adversity Training

Earlier in this article evidence was presented that suggests that librarians working at the reference desk in high traffic situations may tend to give simplified or superficial answers due to cognitive overload. One way of preparing for reference desk situations that make excessive demands on memory is through adversity training. This is a technique in which librarians may be able to cognitively “inoculate” themselves against the environmental stress of a busy reference desk by simulating adverse conditions during practice. Successful athletic performers have used this technique with much success to enhance their concentration and improve their performance.³¹

The use of adversity training involves immersing oneself in a situation that features as much external distraction and time pressure as possible in an attempt to replicate the actual conditions of a busy reference desk. By deliberately working in conditions that are as noisy and hectic and distracting as possible, the librarian may gradually learn to block competing stimuli out and concentrate on the act of remembering. The goal is to minimize any differences between practice and “being on the desk.” Creating this type of simulated psychological pressure has the effect of making librarians less sensitive to noxious conditions so that they are less likely to “cognitively choke” in the actual situation and forget a strategy or source. Football coaches frequently use this technique. They recreate the actual playing conditions of an

important game by simulating opposing team's fans and stadium noises during practice, so that the players will have become accustomed to performing amidst them.³²

Compensation

Librarians need to be sensitive to the role of their social and cultural background and the effect that this may have on memory. Male librarians who find themselves gravitating toward stereotypically masculine subjects, need to offset these tendencies. The same holds true for female librarians who find themselves preferring literature or the arts. Many librarians may hold an unconscious preference for the humanities in general as a result of their academic backgrounds, since a large number of them come from fields in the humanities. In each case, corrective action can be taken, so that these subtle biases do not exert undue influence on memory.

A useful technique for maintaining more of a balance might be to engage in compensation. Essentially this means that librarians with a cognitive predisposition for certain subjects or subject areas may be able to achieve more balance by intentionally redirecting their attention to areas that are less interesting and familiar to them. By spending additional time and effort focusing on these areas, the librarian can compensate for whatever biases may influence memory and help to offset them. Periodic review of primary and secondary reference works in areas deliberately chosen for their unfamiliarity or lack of appeal in comparison to one's most comfortable subject preferences may help make them easier to recall.

Intentional Forgetting

In the section on attention and memory, the importance of being able to suppress attention was noted. Librarians are constantly inundated with new information in new formats that often supercedes old information or sources. Optimal memory performance necessitates not only learning new information, but also removing older task-irrelevant information from memory. The active suppression of this information is referred to as retrieval inhibition or intentional forgetting. In general, the more efficient a person's inhibitory processes are, the better their memory.³³

How does a librarian come to forget older irrelevant information? Much of it happens naturally, through decay of associations over time, but there are also techniques that librarians can use to actively inhibit unneeded information. One way that retrieval paths to the outdated information can be blocked is by mentally trying to segregate it and dissociate it from new information. By relegating it to a mental "bin" of information to be forgotten, it becomes easier to suppress. Another way to aid the process of forgetting is to have a competing alternative. Psychologists have found that the most successful intentional forgetting occurs when subjects have salient alternative information to replace the previous information with. There is one plausible reason why this may be the case. Having new information provides an alternative to retrieve at time of recall so that older information is less likely to be called up. Librarians can also facilitate the process of forgetting by mentally reviewing the valid evidence for forgetting the material, which helps induce intentional forgetting.

Conclusion

This study suggests that traditional memory improvement techniques are of limited value to reference librarians. They tend to be psychologically demanding and complex to use, and are of limited generalizability across a broad variety of memory situations. As a result of these shortcomings, psychologists working in the field of memory improvement have pointed out the importance of emotional and contextual factors in designing memory improvement strategies. As an alternative to traditional memory improvement techniques, this article has proposed that librarians utilize a new multimodal approach that takes into account the overall social and psychological context in which memory functions. This approach to memory enhancement offers a simple yet effective alternative to traditional mnemonics.

Earlier in the article, evidence was cited that suggested a strong connection between stress and forgetting. Overall, the psychological literature suggests that the greater one's level of environmental or internal stress, the more difficult it will be to recall material. Considered as whole, multimodal techniques offer great promise because they constitute an effective program of stress management. Utilizing a combination of these techniques over time can reduce the levels of perceived external and internal stress that might otherwise decrease recall and compromise memory.

Further research is needed on both the applicability and durability of this new multimodal approach to enhancing memory. If the degree of specificity of a memory technique is an indicator, the practices that constitute this new approach should be applicable to a wider variety of memory situations than traditional techniques. The multimodal approach utilizes a more general approach that is intended to enhance a

person's overall psychological readiness to deliver an optimal memory performance, rather than narrowly focus on specific manipulation of memory content. Similarly, the durability of the practices that make up this new approach, as represented by how long people are willing to use them after learning them, will likely be greater than traditional techniques, because they are easier and simpler to understand and to use. It would appear that the multimodal approach to memory enhancement represents a viable solution to some of the problems created by the rapid growth of new information resources and formats in reference services and the inadequacy of traditional memory techniques to aid in remembering them.

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