



How to... Improve your memory

OUR challenge here was to come up with 10 practical suggestions for improving memory, based on well-documented psychological research. We have compiled a list of powerful and robust techniques, organised by when you would apply them. Each is accompanied by just a few of the many possible supporting references.

The first set of tips relate to *when you encounter new information that you want to remember*.

1. Activate all your relevant past knowledge

Previous knowledge helps understanding and understanding improves memory, so the more that you know about a topic the easier it is to learn new, related facts (Morris *et al.*, 1985). Making sense of what you are studying is essential to maximise learning (Bransford & Johnson, 1973).



PETER E. MORRIS and **CATHERINE O. FRITZ** with the first in our 'How to...' series of evidence-based advice.

Relating new information to familiar information helps, even when the link is otherwise unimportant. Because you've generated the links, you're likely to remember them, and they will cue the new information (Slamecka & Graf, 1978). If a new situation is similar to one that you've encountered before, think about the similarities and the differences between the situations; both can serve as useful cues (Mäntylä, 1986).

When encountering names, we normally ignore the meaning of the words, but if you use that meaning and link it to the person, it will help you remember their name. For example, if someone is introduced to you as Professor Morris, picturing them in full Morris dancer outfit can help you to remember their name. Words that sound similar to names or are parts of names can also be useful mnemonic links (Morris *et al.*, 2005).

2. Organise new information: seek a meaningful structure

Identifying the structure and relationships in what you are studying helps in many ways: actively generating an organisation

will make that organisation more memorable (Witrock & Carter, 1975). The process is also likely to link the new information to what you already know. By linking elements together, remembering part of the information will cue memory for other elements that are linked.

3. Actively elaborate

Think of the new material in many ways. Think about it in terms of your present knowledge, but also go farther and think of what it suggests or questions that it raises (Craig & Tulving, 1975). Making rhymes, tunes or even puns and jokes with the new material can help your memory by creating more cues and by establishing constraints. Generating really distinctive ideas, sounds, or images can also help to ease recall.

4. Learn the phonetic system for translating numbers into memorable words

In these chip and PIN days, it can be tempting to set all of your PINs to the same number or to carry a list, both of which are bad ideas from a security standpoint. You can remember any string of numbers more

TABLE 1 Number/word mapping

| Digit | Sound | Hint |
|-------|-------|------------------------------|
| 0 | s, z | For zero |
| 1 | t, d | One down-stroke |
| 2 | n | Two down-strokes |
| 3 | m | Three down-strokes |
| 4 | r | fouR |
| 5 | l | Roman for 50 is L |
| 6 | j | Reversed J resembles 6 |
| 7 | k | K is mirror image 7s on side |
| 8 | f, v | Script f resembles 8 |
| 9 | p | P reversed |

easily by converting them to words, following the mapping in Table 1 (Morris & Greer, 1984). Each digit maps to a consonant sound; vowels and remaining consonant sounds such as H and W are inserted as necessary to make words. So to remember a PIN such as 8492, map the digits to consonants (F or V, R, B or P, N) and then make a word or words by inserting vowels between them: perhaps 'fur bun' or 'fur bone' for example. Choose words that are memorable to you, perhaps because they create a funny image. If you have lots of PINs to remember, link the image to the function of the PIN (for example, your partner hitting you with a furry bone for your joint account card).

With all mnemonic techniques, it is important that the technique is sufficiently beneficial to make the investment in learning and applying the method worthwhile. In this case, you have to learn the consonant sounds, but there are hints in the table to help you. Also, the consonants in the phrase TeN MoRe LoGiC FiBS will assist your remembering the sounds for the numbers 1–9 and 0. If you're still not convinced and think that in this day and age programming a false number into your mobile might be easier, just remember that your mind is the one thing that is always with you and cannot be lost, forgotten or stolen.

5. Form mental images linking the things to be remembered

Mental imagery mnemonics underlie most of the powerful mnemonic techniques that have been recommended as practical memory aids for over 2000 years. Forming mental images allows you to link together things which are not otherwise connected, and exploits visual-spatial relationships (Morris & Stevens, 1974).

If you have never experienced for yourself the effectiveness of linking images try it for yourself using the list of 15 pairs of words in Table 2. Professional performers who use imagery techniques often recommend that the images should be bizarre, but most research has suggested that bizarreness is not a necessary element. Just forming images that link the items together is usually sufficient. However, creating images alone is not enough; it's important to link them together: in pairs, triplets or strings.

Imagery underlies the very effective keyword or linkword system for learning foreign language vocabulary. First, some

TABLE 2 Linking words with imagery

Go through the list forming mental images that link each pair together in one interacting image. Then cover the target column and see how many you can recall.

| Cue word | Target |
|----------|--------|
| Knife | Onion |
| Mouse | Egg |
| Witch | Car |
| Chair | Lion |
| Sheep | Hat |
| Hook | Bee |
| Boy | Owl |
| Teeth | Phone |
| Leaf | Wolf |
| Duck | Belt |
| Lake | Banana |
| Moon | Rose |
| Bottle | Kettle |
| Monkey | Shoe |
| Pen | Robin |

concrete association has to be found that captures at least part of the sound of the foreign word. Then that association is imagined together with a representation of the native language word. So, the German for *skirt* is *Rock*, so imagine a skirt spread across a rock. More examples and Linkword courses developed by psychologist Michael Gruneberg can be found at www.linkwordlanguages.com.

6. Create links to cue information through pegwords and familiar images

The use of mental images improves memory only when there is something to cue recall of the image. Successful recall requires appropriate cues that are themselves easily recallable when you need to remember the information. This need for good retrieval cues in circumstances where such cues are not naturally available has been addressed in the traditional mnemonic methods by initially memorising a set of cues that can be linked with images. The most common and successful of such cues are lists of pegwords, which are at the heart of many memory improvement courses.

Professional mnemonists learn pegwords associated with each number from 1 to 100 or more. Higbee (2001) provides a good set of alternative peg words to 100. These pegwords are typically created using the phonetic system, but

ordinary folk sometimes use a rhyme-based, smaller set of pegwords – 1 = bun, 2 = shoe, 3 = tree etc. To remember an ordered set of items, image each item together with the pegword image. When it's time to remember the list, first recall the pegword image for 1 which will bring with it the image of the associated item enabling you to recall the item.

You can avoid having to learn a set of pegwords, though, by using images of places you know (e.g. Roediger, 1980). Imagine arriving at home. You might begin by imagining your front door as the first location. The second location might be where you hang your coat. You can easily construct an ordered set of images as you walk through your home or office, or travel from home to work. Use these images in place of the pegwords, and they can help you to remember your ordered set as well. This approach is called the method of loci, and dates back to Simonides in 500BC (Morris & Gruneberg, 1996).

The next set of tips covers the time between encountering new information and needing to remember it.

7. Practise remembering after several suitable intervals

Retrieval practice is one of the most powerful and robust methods for improving memory (Morris *et al.*, 2005). Unlike many mnemonic methods, such as imagery, reminding yourself to remember does not require creativity or a great deal of expertise. Almost everyone can benefit from retrieval practice: it has been useful with preschool children and the elderly suffering memory problems as well as schoolchildren, university students and adults. Like comedy, the key is timing: practise too soon and it won't help, too late and you won't be able to remember. In principle, the best time to practise is just before you would have forgotten the information. Normally, it's a good idea to test yourself quite early (especially for names), then after a short while, then after a bit longer, and so forth.

WEBLINKS

Practical Memory Institute: www.memoryzine.com

Linkword Languages: www.linkwordlanguages.com

The Memory Key: www.memory-key.com

Mindtools: www.mindtools.com

As an example, consider applying the technique to remembering the names of people that you have just met at some work or social event. As soon as you're introduced to someone, use their name

(either aloud or in your own mind). Within a sentence or two, remind yourself of their name; later in the conversation, or when leaving it, remind yourself again. Later still, look around and review the people you have met, reminding yourself of each name. Do this several times during the course of the event. At the end, run through the people you met, imagining them and remembering their names. On the following day, think about the people you met again, bringing each name to mind. You might practise again a few days later, then a week, then a month. Try it sometime: you'll be amazed at how easy and effective the technique is.

The same approach applies for any other sort of information you need to remember. With meaningful information practice can be far less frequent. The more difficult the learning task, the more frequent the early practice should be. Nevertheless, it is important not to test yourself too early: a bit of difficulty during practice appears to pay off in terms of improved later memory.

You can effectively combine the benefits of retrieval practice with other memory techniques. For name learning, retrieval practice can be combined with noting meaningful associations to the names to gain the benefits of both strategies.

DISCUSS AND DEBATE

Should schools and universities teach students general memory improvement techniques?

Has the development of information sources such as the internet decreased or increased our dependence on memory? Has it changed the way we use our ability to remember?

Why are most people reluctant to invest time and energy in developing strategies for improving their memory, even if they complain their memory is poor?

Prospective memory (remembering to do things in the future) is part of everyday life, so why is there so little research in improving it among the normal population?

Have your say on these or other issues this article raises. E-mail 'Letters' on psychologist@bps.org.uk or contribute to our forum via www.thepsychologist.org.uk.

8. Play the name game

The name game incorporates the principles of expanding retrieval practice and is a very effective way for groups to learn each other's names (Morris & Fritz, 2000, 2002). One member of the group starts by saying their name, the second person repeats the name and adds their own, the third person recalls the last person's name and works back round the group recalling the names, and adding their own at the end. This continues back to the first person who this time names the entire group. More interest and knowledge about the group members can be added if each person includes a relevant detail about themselves that is also recalled along with their names. This technique works with groups varying in size from 5 to 20 or more (Morris, Fritz

& Buck, 2004) and its benefits remain as long as a year later.

9. Explain what you are studying to someone else or yourself

When you try to teach someone else you have to recall (or restudy) the information in an organised way and you add the benefits of self-generation and activity too. You cannot fool yourself over parts that you do not understand. However you don't always need someone else to explain to, so long as you genuinely try to explain the details to yourself (Chi *et al.*, 1994).

The final tip relates to when you need to remember.

10. When struggling, try to reconstruct the context

There are few techniques known to be helpful when struggling to recall. Recall of forgotten words can be cued by going through the alphabet (Gruneberg *et al.*, 1977). When trying to recall events, if you can suspend your struggles while first

reconstructing in imagination as much as you can of the situation in which the learning took place – remembering as much as possible of the preceding events, the way you felt and other features of the learning context – then some aspects of the cues from the recalled context can help. Recall tends to be better the closer you can bring your thinking and feeling to the state that you were in when the event occurred. This technique (based on research into context effects on memory Smith, 1994), along with trying to recall from a different person's perspective, has formed part of the very successful Cognitive Interview technique for eyewitness testimony (Fisher & Geiselman, 1992).

Conclusion

In this article we have restricted our advice to techniques that have been shown through psychological research to be successful (and for more practical guidance written by psychologists see Gruneberg & Herrmann, 1998, and Higbee, 2001). There is one simple piece of advice, though, that

we haven't covered: don't expect the impossible from your memory. If you didn't catch some information initially (such as the time that the train should arrive), then don't expect to remember it. If you deluge your mind with too many disorganised demands, don't be surprised if your memory fails.

In general, each technique that we have suggested has been found to double recall, or even better. Some of the techniques can seem artificial and relevant to a limited number of situations. However, those situations, such as learning names, numbers and foreign words, are the most difficult because they lack the benefits of meaningful past experience that make some remembering easier. The imagery mnemonic techniques, when implemented, are powerful, but most people find them too demanding to put into practice routinely. For that reason in recent years we have been studying retrieval practice. This is truly a technique for almost all situations and it requires much less investment than the older mnemonics.

The reader will have noted the absence of any advice on prospective memory (remember to do things). This is because there has been very little research on techniques for improving prospective memory among normal adults; the research has focused on individuals with serious memory problems. There are suggestions in the memory improvement literature that needs proper testing. However, we should not neglect the use of external memory aids such as diaries, alarms and written notes. Even Dominic O'Brien, several times World Memory Champion commented that: 'the easiest way to honour appointments is to write them down in a diary...' (O'Brien, 1993, p.37).

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CONTRIBUTE

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