Headway
the brain injury association

Memory problems after brain injury

This publication has been written primarily for the families and carers of people who have memory problems following a brain injury. It explains what memory is and how it can be impaired,along with some general strategies that may help.

This publication is also available as a printed booklet, which can be purchased from our online shop.

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Introduction

Memory is easily affected by brain injury because there are several structures within the brain that are involved in memory, and injury to any of these parts can impair memory performance. As remembering involves the stages of taking in information, storing it adequately and retrieving it when needed, injury to those parts of the brain responsible for these stages can lead to poor memory.

It is sometimes said that the reason people with memory impairment do not remember is because they are protecting themselves from some emotional shock or trauma, and that their memory problem can be cured by hypnosis or psychotherapy, or even by another shock of some kind. While it is true that some people become amnesic for ‘psychological’ reasons (and most films, plays and fictional books about memory loss seem to suggest such reasons), the fact is that in real life such people are rare. The majority of people with memory problems have these problems for a physical reason rather than a purely psychological reason: it is not that they will not remember, but that they cannot remember.

This publication begins with a description of different types of memory systems and how these can be affected by brain injury.

The rest of the publication offers tips and coping strategies to help someone with memory problems after brain injury.

The information in this publication does not replace clinical guidance from medical professionals. You should always get advice from your GP or other suitably qualified professional for help with managing the effects of brain injury.

What is memory?

People often think of memory as a single skill. However, it is not one skill on its own but can instead be thought of as a number of skills working together. We can therefore classify memory in several ways, namely:

- the length of time information is stored
- the type of information to be remembered
- the stages involved in remembering
- the kind of remembering required
- whether the memories date from before or after the injury.

Each of these ways of classifying memory are discussed in turn below.

Length of storage

There are three main memory storage systems, each of which retains information for different lengths of time: sensory memory, immediate/working memory and long-term memory.

Sensory memory.
This stores information for less than a quarter of a second. We

use this memory system to make sense of moving pictures (visual sensory memory) and spoken language (auditory sensory memory). Most people with damage to this system would not think of themselves as having memory difficulties, and would present with perceptual or language problems.

Immediate/working memory
This second system holds information for a few seconds. We use this memory system when we need to 'hold on' to information for a short period of time, such as when we are looking up a new telephone number and need to remember the number for the time it takes to dial it. If the line is engaged or someone interrupts us, the information is lost from memory and we have to look it up again. Most people with brain injury do not have particular problems with this system.

Long-term memory.
This system covers any length of time longer than a few seconds, ranging from about 10 seconds to decades. Although there are differences in memory for things that happened a few minutes ago and things that happened years ago, the difference is less clear cut than it is between sensory memory and immediate memory. Long-term memory can therefore mean different things to different people. We recommend using the following terms to distinguish between types of long-term memory: 'delayed memory' when referring to the store of knowledge of events/ information that was presented in the last few minutes; 'recent memory' when referring to the store of knowledge accumulated in the last few days or weeks; 'remote memory' when referring to the store of knowledge accumulated over several years.

Types of information to be remembered

Another way in which we can structure memory is in terms of the types of information that we are required to remember in everyday life. For instance, there are differences in the way that we remember general knowledge, the meaning of words, or social customs, and the way that we remember what we ate for dinner last night, or when we last paid our electricity bill. And both of these memory systems behave differently from the system we use when we are learning a skill such as riding a bicycle or playing the piano.

Remembering general knowledge, the meaning of words, social customs, and so forth, is referred to as *semantic memory*. One of the characteristics of semantic memory is that we do not, as a rule, remember exactly how or where we acquired the information, e.g. that elephants have trunks, and that breakfast is the first meal of the day. Rather, we gradually accumulate this information over time and can subsequently retrieve it when necessary. Sometimes people with brain injuries have problems with semantic memory as they may lose the knowledge of what an elephant is or what an elephant looks like. This is not typically seen, however, in most memory impaired people.

More common is the inability to remember personal experiences, called *episodic memory.* This includes things such as remembering what happened in our personal lives a few minutes or a few hours ago, to pass on a message as requested, or recall the name of the person to whom you were recently introduced. This system is most frequently affected in people with memory problems following brain injury.

Learning a new skill, such as riding a bicycle or playing the piano involves *procedural memory*. People improve with practice, but they do not need to remember how they actually

learned the skill. They don't even need to remember ever having done the task to learn the skill before. Thus, people with memory impairments can learn new skills or procedures without any conscious recollection of having carried out the task before.

Stages involved in remembering

The ability to remember something involves three stages: *encoding, storage and retrieval.* Encoding means getting the information into memory in the first instance; storage means keeping the information in memory; and retrieval means extracting the information when you need it.

For example, suppose you wanted to learn the name of your new neighbour. You would first have to hear or see the name and register it – this is the encoding stage. You would then have to keep the name stored – this is the storage stage. You might do this by repeating the name to yourself, or thinking about it every now and again, or thinking of an association with the name, e.g. 'Daphne' might remind you of daffodils. Then, when you next meet your neighbour, you have to retrieve the name in order to greet him or her appropriately – this is the retrieval stage.

After a brain injury things can go wrong with any or all of these stages. Suggestions on how to help with improving encoding, storage and retrieval can be found later in this publication.

Types of remembering

Two of the main kinds of remembering are *recall* and *recognition*. Recall involves actively finding the information to be remembered. For example, if you have been asked to tell your mother the next time you see her, "Jean phoned and wants to come round on Saturday night". If you remember the message accurately, you will have recalled the message itself. If you wrote the message down and then remembered to give

the message to your mother, you will have recalled the need to pass on a message.

Sometimes we are not required to recall the information, but to recognise it when we see it or hear it. Most of us at some time have said something like, “I can’t remember the word/name/town but I would recognise it if I heard it”. Most people with memory impairments find recall harder than recognition, although both systems are usually affected.

Another way of classifying the kind of remembering is to compare *retrospective* and *prospective memory*. Retrospective memory means remembering things you have seen, heard or done in the past, while prospective memory means remembering to do things such as taking your medication, feeding the dog or paying the electricity bill. The majority of people with memory impairments have problems with both retrospective and prospective memory.

Explicit and *implicit memory* are other terms for the kinds of remembering required. Explicit memory means that you can consciously recollect the information you want. For example, if I asked you to tell me where you went for your summer holiday last year and you were able to tell me, you would be using explicit memory. If, on the other hand, I asked you to explain how to ride a bicycle, or when and where you learned, you would probably find it difficult to explain or remember when and where you learned. You could, however, demonstrate how to ride a bicycle without much trouble, so you do have implicit memory of how to ride a bicycle.

Do the memories date from before or after the injury?
One of the questions frequently asked by relatives of people with memory impairments is, “why can she/he remember what happened 10 years ago but not what happened this morning?”,

or a variation of this. The short answer is that old memories are stored differently in the brain from new memories.

Information from before the brain injury may be forgotten. For most people with brain injuries this gap in memory from before the injury will range from a few minutes to a few months. This type of memory loss from before the injury is known as *retrograde amnesia*. Memories laid down well before the period of retrograde amnesia are likely to be retained well.

Problems with memory for information learned after the injury are known as *anterograde amnesia*, and for most people these problems are likely to be a bigger nuisance and handicap than the memory loss that predates the injury.

Amnesia

Amnesia means literally ‘a lack of or an absence of memory’. In practice, however, nobody forgets absolutely everything, so amnesia refers to a failure of some part of the memory system(s). Sometimes the term ‘amnesia’ is used to mean any kind of memory disorder, and sometimes it is used to mean a very pure memory problem – i.e. when memory impairment is the only problem faced by an individual.

In the strictest sense, a person suffering from amnesia would show the following symptoms:

- a great difficulty in learning and remembering information of nearly all kinds;
- difficulty in remembering some information acquired before amnesia started;
- a normal immediate memory span (i.e. the person could repeat back a telephone number or short list of words if

there was no delay or distraction);

- all other intellectual abilities (such as attention, language, perception, reasoning, judgement, etc) would be normal, or nearly normal.

In reality, of course, people suffering entirely and solely from a memory problem are relatively rare. It is much more common to find people who have a memory problem along with other problems, such as impaired reasoning or attention.

Whether the problem is 'pure' or not, people who suffer from amnesia are likely to:

- show normal or near-normal immediate memory (i.e. they can repeat back a telephone number immediately);
- have difficulty remembering things after a delay or distraction;
- have problems in learning new things;
- remember things that happened some time before their brain injury/illness better than they remember things that happened a short time before it;
- usually remember how to do things they were previously good at or had practised a great deal (e.g. playing the piano, swimming, driving a car);
- be helped by cues, such as giving the first letter of someone's name.

How to help people with memory problems

People with brain injuries often achieve some recovery over a long period, and so memory problems may improve over time. It should be made clear, however, that no magic solutions exist to get memory back or to regain damaged memory. There is, to date, no drug or treatment or exercise which will restore or even improve memory significantly. However, we can still do things to help people cope with their loss of memory and to manage their day-to-day lives.

Taking in the information

If we are to remember efficiently, then we need to initially take in the information properly. Some people with brain injuries have problems doing this. It may be that they have language or perceptual problems that initially distorts the information they receive. Or sometimes too much information is offered all at once. Sometimes the information being given may be too complicated. To help avoid such situations, there are rules that can be followed:

- Simplify information that we expect the person with brain injury to remember. This applies particularly to the written word.

- Reduce the amount to be remembered (e.g. ask the person to remember one thing rather than three things).

- Make sure that the person with brain injury has understood the information by asking them to repeat it back or re-tell it in their own words.

- Try to get the person to link the information to something that they already know – that is, to make associations. For

example, the name of the therapist might be better remembered if it is associated with a relative or film star of the same name.

- When assisting a person with brain injury to learn or remember something new, use the rule of ‘little and often’. Generally, it is better to work for a few minutes several times a day than for an hour once a day.

- If possible, encourage the person with brain injury to organise the information that is to be remembered. We know, for example, that if people are asked to remember a shopping list they remember more when they group the items into categories such as vegetables, dairy produce, cleaning materials, etc, than if they simply list the items randomly.

Storing the information

Most people forget new information rather rapidly over the first few days and then the rate of forgetting slows down. This is also true for people with memory problems, bearing in mind of course that in their case relatively little information gets stored in the first place. However, once we have helped to get the information in, we can help to keep it there by testing or persuading the person with memory impairments to rehearse or practise at intervals.

The best way to help is to test the person immediately after seeing or hearing new information, then test again after a short delay, and again after a slightly longer delay. This process is continued, with the intervals being gradually lengthened. Such practise and rehearsal usually leads to better retention of information.

Retrieving the information

It is sometimes the case that, although you have learned something, you just cannot ‘reach’ it when you want it. This is more often the case for a person with memory problems, and if we can provide that person with a ‘hook’ in the form of a cue or prompt, she/he may then be able to access the correct memory. For example, providing the first letter of a name may well lead to the person remembering the whole name.

Perhaps all of us have experienced a situation where we recognise a face but cannot place the person. This is particularly likely to happen if the person is seen in a different place from that in which earlier meetings occurred. Retrieval is easier for most of us if the surroundings in which we are trying to remember something are the same as those in which we first learned it. People with memory impairments may find they remember better if they are in the same room with the same people who were there when something was first learned or experienced.

When trying to teach a person with memory impairments new information, we should therefore aim to teach that person to remember information in a number of different settings and social situations. Our aim should be to encourage learning in many different, everyday situations that are likely to be encountered in daily life. Learning must not be limited to a classroom or therapist’s office.

The mood or state of mind that we are in may also influence our ability to remember. We know that people who learn things when they are sober remember them better when they are sober. This may not seem surprising. However, it is also true that things learned when a person is drunk may be remembered better when that person is drunk again. Similarly, things learned when one is happy or sad are better recalled when the original emotion is experienced again. Consequently,

when helping a person with memory impairments to remember, we should aim to teach him or her in a number of different moods.

Cues and prompts help with remembering as well, so sometimes supplying the first letter, sound, or part of a word can enable a person with memory impairments to find the information they want to remember. Sometimes it is possible to help people find their own prompts or cues by systematically going through letters of the alphabet ("Does the person's name begin with A, B, C?" etc). Similarly, if a person has mislaid something, it often helps to go back to the last time they remember having the item, then ask them to go very carefully through all the actions that followed. In this way the location of the lost article may be recalled.

Which problems to tackle

It is sometimes possible to identify particular problems experienced by people with brain injuries. They and their relatives frequently report such problems as the following:

- forgetting what has been said;
- difficulty learning a new skill;
- repeating the same question over and over;
- telling the same story or joke over and over;
- finding a television programme difficult to follow;
- forgetting people's names;
- getting details mixed up;
- forgetting a change in routine;
- forgetting where things have been placed.

Problems which cause most anxiety should be identified first. This might be approached by keeping a memory diary for a

week or two. Record all the memory failures you notice and see which occur most frequently or which ones cause the greatest concerns.

If your relative with brain injury is attending therapy, you can arrange to talk to one or more of the therapists involved (these will usually include physiotherapists, occupational therapists, speech therapists and clinical psychologists). They may be able to offer valuable information that they have obtained as a result of their observations.

Deciding which particular problem(s) to tackle will depend on matters such as:

- future plans e.g. someone attending a day centre will have different needs from someone intending to return to university;

- observations made by relatives, professional staff and friends;

- the wishes of the person with memory impairments, although care must be taken here since sometimes a person with memory problems may be unrealistic about the severity of their problem(s) or the goals attainable, or may even deny the existence of a problem.

Deciding on the number of problems to tackle at once will depend on such things as the degree of intellectual difficulty, the level of awareness and motivation of the person with brain injury, and of course, the time available to relatives and helpers.

Strategies

Arranging the environment

One of the simplest ways to help people is to arrange the environment so that they rely on memory less. Examples here include labelling doors for a person who cannot remember which room is which, labelling beds in a ward or cupboards in the kitchen. Other examples include drawing lines or arrows to indicate routes around a building, or positioning things so they cannot be missed or forgotten (e.g. tying a front door key to a waist belt).

It is also possible to re-phrase questions or statements to the person in order to avoid a predictable, repetitive response.

External aids

All of us have used external aids at one time or another. These include diaries, notebooks, lists, alarm clocks, watches, wall charts, calendars and mobile phone apps.

Some people with memory problems may resist external aids, claiming that they do not wish to become dependent on them, or that they want their own memory to do the work. Such resistance should be discouraged because it is important to use anything that will aid memory. It should be pointed out that people with good memories use external aids, and that in fact there is no evidence to suggest that using external aids prevents or slows down recovery of memory. The opposite is likely to be nearer the truth.

Although external memory aids are probably the most efficient strategies for memory impaired people, it is not always easy for them to use such aids. Efficient use of external memory aids requires remembering what to do, so the people who need them most often have the greatest difficulty in learning.

Nevertheless, notes, diaries and lists are commonly used. Sometimes, with patience and ingenuity, use of new external aids can be taught to people with memory difficulties.

Modern smartphones have all sorts of programmable alarms, calendars and other reminder features. Many of these are quite intuitive and user-friendly and you could help the person to choose a device and applications that suit them.

Mnemonics

Mnemonics are verbal and visual aids to learning. They are sayings, rhymes or drawings which help us to remember things more easily. Most people have used mnemonics at some time in their lives. For example, many people use the rhyme 'Thirty days hath September…' when trying to remember how many days are in each month. Many also use a first letter mnemonic, such as 'Every Good Boy Deserves Fruit' for learning musical notes on the lines of the stave.

Mnemonics can be used by those with memory impairment to learn new information. It is unrealistic to expect most people with memory problems to remember to use mnemonics themselves. For this reason, we provide the following guidelines for relatives and helpers of people with memory impairments:

- use mnemonics to teach particular pieces of information, such as people's names or a new address;

- use two or three strategies to improve learning of one piece of information – for example, if you wanted to teach your relative with brain injury to remember the way to the local shops, you could: (a) draw a map, (b) describe the way verbally, and (c) accompany the person along the route;

- new things should be taught one step at a time e.g. teach one new name at a time, not more than one I take account of individual preferences and styles – not everybody likes the same strategy;

- be realistic about what is to be learned i.e. concentrate on relevant material that the person with memory impairments wants to learn.

Rehearsal and repetitive practice

Simply going over and over material to be learned is not helpful for most people. It is what you do with, or to, the information that helps with learning. Your relative with brain injury will be helped more if you follow the recommendations in the section on general strategies rather than relying solely on repetition.

One useful strategy to help people with memory impairments learn more efficiently is a method known as *errorless learning.* This is a teaching technique whereby errors are prevented or reduced as much as possible. Most of us can learn from our previous mistakes, so that a trial-and-error method is fine. However, if you cannot remember your mistakes you cannot learn from them. Furthermore, the very act of making an error may in fact strengthen this incorrect response. For example, if a person with memory impairments is trying to learn a new name and gets it wrong the first time, he or she may repeat the mistake the next time despite being told the correct answer. The wrong response tends to get in the way and makes new learning even harder.

To stop this from happening, it is a good idea to try to prevent mistakes from occurring in the first instance when learning a new skill or new information. This can be done by guiding the person with memory impairments through a task several times and then gradually decreasing the amount of help given, or by

providing written instructions to follow and then gradually decreasing the amount e.g. by missing out a word here and there.

Memory games and exercises

Again, there is no evidence that playing memory games and engaging in memory exercises improves memory. They will not do any harm provided they are carried out with common sense and are enjoyed, but do not expect them to bring about improvement in memory skills. They may, however, help a person with a slight memory problem to realise that she/he does have a problem.

Emotional aspects of memory impairment

Memory problems are rarely seen in isolation. Depression, anxiety, irritability and aggression may all occur as well. Social isolation is often reported by brain-injured people and their families. Many rehabilitation programmes will address these emotional issues as well as trying to help with the memory problems. Providing information to people with brain injury and their families can sometimes reduce anxiety. Relaxation therapy may also help. Participating in a memory group is beneficial for some.

Encouraging wider use of aids and strategies

Although we can provide aids and strategies for the person with memory impairments, we cannot guarantee that he or she will use them. Furthermore, the person may use a strategy in one situation and not in others, or for a particular problem and not others. For example, a notebook may be used in occupational therapy but not at home. In such a case, we should try to teach

the person to use the notebook in a variety of different settings. We can also teach other people how to help the person with memory impairments to use aids or strategies.

Conclusion

Memory problems can destroy a person's sense of identity and continuity. The inability to remember events and emotions can leave people without a sense of the passage of time or of their own narrative and progression as a person. This is on top of the everyday practical difficulties with planning and organisation.

There are no easy answers for memory difficulties and it is unrealistic to expect lost function to be regained. However, we hope you have found that there are simple, practical steps that can make a difference and that the information in this booklet has been helpful.

Not all the strategies in this booklet will work for everyone. They should be used according to individual preference and can be adapted in any way that people find suits them. Ideally, they should be enjoyable and can be a shared activity with family and friends. People are far more likely to stick with something and make it a part of their routine if they enjoy doing it. If the enjoyment and interest are there, then, with a little persistence, many practical problems can be overcome.

Glossary

Amnesia - Anterograde: problems with memories of events after the brain injury.

Amnesia - Retrograde: inability to remember events that happened for a period before a brain injury.

Delayed memory: refers to the store of knowledge of events/information that was received in the last few minutes.

Encoding: the first stage of remembering. Getting something into the memory by hearing or seeing information and registering it.

Episodic memory: memory of specific experiences and events.

Errorless learning: teaching technique designed to limit the number of mistakes made when learning new information.

Explicit information: conscious recollection of the information we require.

Immediate memory: memory storage system that retains information for a few seconds. Also referred to as working memory.

Implicit memory: remembering how to do something even if we are unable to explain it easily, or remember when and where we learned it.

Long-term memory: memory storage system that retains information for varying amounts of time, from about 10 seconds to decades.

Mnemonics: verbal and visual aids to learning, such as sayings, rhymes or drawings, which help us to remember things more easily.

Procedural memory: remembering how to carry out tasks and skills we have learned and practised, such as driving.

Prospective memory: storing information about actions which need to be taken in the future.

Recall: actively finding the information to be remembered.

Recent memory: refers to the store of knowledge accumulated in the last few days or weeks.

Recognition: recognising information when we see or hear it.

Remote memory: refers to the store of knowledge accumulated over several years.

Retrieval: extracting information stored in the memory when it is needed.

Retrospective memory: remembering things that we have seen, heard or done.

Semantic memory: remembering general knowledge, the meaning of words, social customs, etc.

Sensory memory: memory storage system that retains information for less than a quarter of a second. This is the system we use to make sense of moving pictures (visual sensory memory) and language (auditory sensory memory).

Storage: keeping information in the memory.

Working memory: see *immediate memory*.

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We hope that this has been a helpful resource. Please consider sharing your feedback with us by scanning the QR code or by visiting our publication feedback survey https://uk.surveymonkey.com/r/hwpublications.

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