

# COGNITIVE EFFECTS OF BRAIN INJURY

---

## AND HOW TO HELP

# INTRODUCTION

Acquired Brain Injury (ABI) is the term used to describe an injury to the brain that you were not born with. ABI and recovery are experienced differently by everyone. The team at P.A.U.L For Brain Recovery want to support you during this difficult time and help you understand how an ABI may affect your life and how to manage the changes that occur. This booklet will specifically focus on changes to a person's cognitive skills.

After reading this booklet, we hope to give you a better understanding of the cognitive effects that may occur after sustaining an ABI, and how these can be best managed with the support of health professionals, P.A.U.L For Brain Recovery and the wider community. The booklet provides guidance for those experiencing cognitive difficulties, but can also be used to inform friends or family members of those affected by ABI.

**YOU**  
are not

**ALONE**

# Why and how can brain injury change my cognition?

Different parts of our brain support our different cognitive abilities (**language, attention, perception, memory** and **executive function**) so these skills can all be affected differently when injury occurs. This depends on the location of your brain injury and how your brain is organising itself around the injury. Multiple areas may be affected to different levels of severity, and some cognitive abilities may remain unaffected.

## **FRONTAL LOBE**

Located at the front of the brain, it is responsible for executive functions (this includes complex skills such as planning, organising and inhibiting inappropriate behaviour).

## **TEMPORAL LOBE**

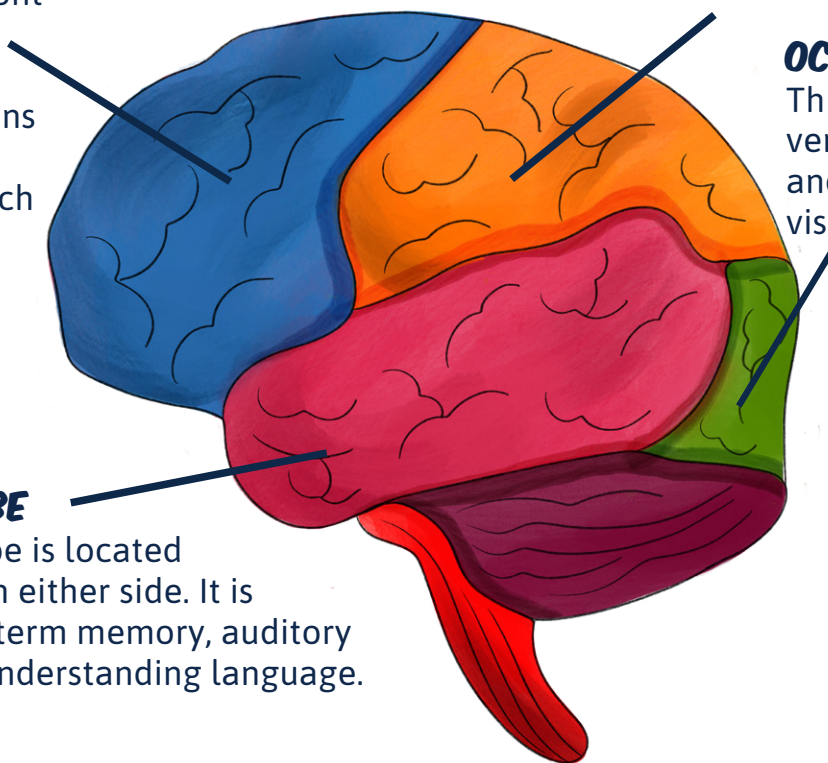
The temporal lobe is located behind the ear on either side. It is involved in long-term memory, auditory processing and understanding language.

## **PARIETAL LOBE**

This is located towards the back of the brain and above the ear on either side. It is involved in spatial processing, perception and reading and writing

## **OCCIPITAL LOBE**

This is situated at the very back of the brain and is involved in basic visual processing



You, or those close to you, may notice changes to your cognitive abilities after a brain injury.



## What is meant by cognitive effects?

Cognition refers to the mental process involved in thinking, learning, and remembering. It is common after a brain injury that these abilities can be affected. Depending on your brain injury, these cognitive abilities can be affected in different ways.

There are many types of cognitive abilities that can be affected after a brain injury. You may have noticed some changes to your:

**LANGUAGE AND COMMUNICATION** – being able to .....4-6  
pick up on body language, understand a conversation,  
speak, write and read.

**ATTENTION** – being able to focus on specific things .....7-9  
in your environment, such as a conversation, music, or  
TV.

**PERCEPTION** – being able to take in information .....10-12  
through your five senses and using this to interact with  
the world.

**MEMORY** – being able to remember either new or .....13-17  
old information in a process of encoding, storing, and  
recalling information. It also supports learning and  
helps you to remember details about the world and  
your personal history.

**EXECUTIVE FUNCTION** – being able to learn and .....18-21  
understand new information, join information together  
with old information, and organise your thoughts to  
make plans or solve problems.

# Language and communication

Different people experience different language changes, and it can depend on where your brain injury is, although language difficulties are typically associated with damage to the left side of your brain. This can be distressing for you and others around you, and requires time and compassion from everyone. You may notice some changes and difficulties with:

**UNDERSTANDING OTHERS** – This may also be referred to as ‘Receptive Aphasia’ as people struggle to understand the communication they are receiving. It can be difficult to understand what people are saying, with previously familiar words losing meaning, or conversations being difficult to follow. It is often associated with injury to an area of the brain called ‘Wernicke’s Area’. It can also be more difficult to follow a piece of written information; you may find you need to re-read information or have pictures to help give meaning to words.

**OTHERS UNDERSTANDING YOU** – This may also be referred to as ‘Expressive Aphasia’ as other people struggle to understand the communication that the brain-injured individual is expressing, and may appear to say words that make no sense. It is often associated with injury to an area of the brain called ‘Broca’s Area’.

**SAYING WORDS DIFFERENTLY** – You may find that you talk slower, or say wrong-but-similar words (naming/semantic errors) or a word that rhymes/sounds similar (phonetic errors). Some people often report the ‘tip-of-the-tongue’ phenomenon after brain injury, where you feel you know the right word but can’t seem to say it. Many of these difficulties can be supported with strategies suggested later in this booklet.



## Ways to help you manage:

Different parts of our brain support our different cognitive abilities (**language, attention, perception, memory** and **executive function**) so these skills can all be affected differently when injury occurs. This depends on the location of your brain injury and how your brain is organising itself around the injury. Multiple areas may be affected to different levels of severity, and some cognitive abilities may remain unaffected.

### ***LANGUAGE AND COMMUNICATION STRATEGIES***

- Exploring other methods of communication if words have become more challenging, such as using picture cards.
- Developing alternatives to talking, such as pairing words with gestures, writing, or drawing.
- Self-cueing by saying out-loud the sound the word starts with, or if you don't know, running through the alphabet. Or, in cases of that tip-of-the-tongue phenomenon, you can self-cue by describing the word.
- If you find you keep saying the wrong word (making naming errors), practicing words you regularly get stuck on, building associations and links with them. For example, if forgetting the word "chair": picture a person you know called Charlotte, in the chair, brushing their hair = Chair.

Support with your language abilities may also come from a Speech and Language Therapist; talk to your GP or Consultant about a referral if you think this may be helpful.

## How friends and family can help:

There are also ways your family, friends and other significant people in your life can support the cognitive changes that have occurred after a brain injury. Similar to compensatory strategies, you may find some of these strategies more helpful than others. It may help if you read this section together.

### **SUPPORTING LANGUAGE AND COMMUNICATION**

- Use kind words and have a gentle tone with your loved one. Do your best to not 'talk down' to the person, but meet them at their level.
- Use gestures and pictures to help give meaning to a conversation.
- Slow your speech down and do not overload the conversation with lots of information or unfamiliar words.
- Allow your loved one more time to respond.
- Break up a conversation by asking every so often if they understand what you saying, to give them the chance to ask questions or say if they need something repeating.
- Limit a conversation to one person speaking at a time about a shared topic.



# Attention

Difficulties with attention after a brain injury may involve challenges with directing attention, focusing on tasks, or becoming distractible. These can occur when speaking to others, watching a TV show or movie, or when reading, and tend to be worsened by busy or noisy environments. It is most often associated with damage to the right hemisphere (side) of the brain.

**SELECTIVE ATTENTION** – Challenges with directing attention to a specific task or thought, or being able to tune out distractions. After brain injury, your brain may struggle to ‘filter’ all of the sensory information it is receiving, so it is easier to become distracted or lose focus on one particular thing.

**DIVIDED ATTENTION** – This is splitting your attention between multiple demands, such as watching the TV while having a conversation, or looking after a child while cooking a meal. It can be more difficult to divide your focus between tasks requiring your attention and still achieve them to a good standard. It is okay to take time to reduce your need for multi-tasking.

**SUSTAINED ATTENTION** – This is your ability to focus and hold your attention on a task for a long period of time. Sometimes after brain injury people find they have shorter attention spans or that they struggle to concentrate for as long; they may jump from one task to the next before completing the original task, or find it difficult to follow the storyline of a film/TV show.

**SWITCHING/ALTERNATING ATTENTION** – Sometimes we are required to multitask, or switch between activities; for instance, when making a cup of tea we may write a card while waiting for the kettle to boil, or when trying to hold a conversation on the phone and if someone else enters the room and talks to you. After brain injury it can be difficult to turn our attention from one thing to another.

**PERSEVERATION (OR REPETITION)** – Perseveration refers to when people find it difficult to change topics or tasks. After brain injury, people may appear repetitive, coming back to the same discussion point for instance, or struggle to know when to stop doing an activity. This can be because their brain has identified something of importance, but struggles to ‘switch off’ the notification when it has been done. It may also relate to some memory difficulties.





# Ways to help you manage:

## ***ATTENTION STRATEGIES***

- Decrease the number of distractions around you. Being in a noisy room with lots of stimulation can cause fatigue and reduce your ability to be attentive, so turn off the TV if you are having a conversation.
- Focus on one task at a time rather than starting different tasks all at once.
- Reduce the number of senses you need to use at the same time, such as listening to an audiobook with your eyes closed.
- Set timers and take regular breaks to prevent becoming overtired or overstimulated.



## How friends and family can help:

### ***SUPPORTING ATTENTION***

- Be aware of distractors - noises and situations that may be overwhelming. Help reduce these as much as possible.
- If possible, take on some responsibilities that may be more cognitively demanding and make your loved one feel overstimulated or drained afterwards (such as shopping).



# Perception

This is your ability to make sense of information and is slightly different to attention. You may be able to attend to information (e.g. see a brown rectangular object with black L-shaped objects around it), but find it more challenging to make sense of pictures and shapes (recognising the objects as a table with chairs). This may make things such as moving around a building or performing physical tasks with accuracy more difficult. Difficulties with perception does not mean you have bad vision but because of a brain injury it means you may have difficulty processing all parts of an environment or an object. Some specific challenges after brain injury associated with perception are:

**AGNOSIA** – This is often used as a general term, used to describe a difficulty recognising familiar objects. There are specific types of agnosia such as prosopagnosia (or ‘face blindness’) where a person experiences difficulty recognising human faces, this can include family and friends. People may find using context, such as where they are or recognisable features (like a scarf) helpful.

**NEGLECT** – This is a very specific impairment resulting from brain injury where you are less able to ‘attend’ to a part of your body or space in your visual field. It can appear as though the person with brain injury is ‘blind’ to a specific space (e.g. their left side), and may mean that they miss food on their plate, walk into doorways, or not use a part of their body even though they are physically able to. This can be helped by others prompting and encouraging the person to attend to the missed area, e.g. “look at your arm”, or “turn your head to see over there” (used with gestures such as pointing).



## Ways to help you manage:

### **PERCEPTION STRATEGIES**

- Consciously look around your environment (things around you and where you are). Scan from left to right to make sure you have 'seen' everything.
- Touch and move objects around you to support your perception of them and help you recognise them. Seeing things from new angles can help trigger our brain to better recognise or understand them.
- Use the context around you. For instance, recognising the room as a bathroom can help you identify a toothbrush as a toothbrush instead of a fork; so keeping things in rooms where they usually belong can help.

## How friends and family can help:

### **SUPPORTING PERCEPTION**

- Think ahead about situations with the person where some difficulties managing the environment may occur and how they would like support, such as at a restaurant. It may be helpful to have a way to prompt the person around their environment or recognise signs when they are struggling.
- Use movement and gestures, such as pointing, to help your loved one 'see' the whole environment around them; prompt them to regularly look around, or look at/touch a limb if they are not using it often.



**VISION**



**HEARING**



**SMELL**



**TASTE**



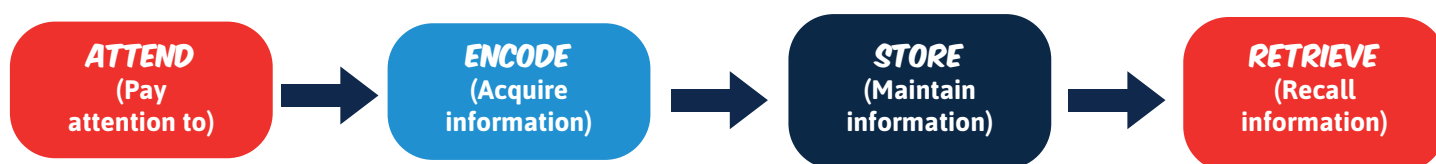
**TOUCH**



# Memory

Changes to memory are common after brain injury. You may notice events that happened weeks or months before the brain injury are difficult to remember. This is because your brain's processes for taking in and storing information has been disrupted by damaged areas of your brain. That said, memories from a long time ago are often easier to remember for people living with brain injuries; this is long-term memory.

## **STAGES INVOLVED IN MEMORY AND REMEMBERING**



Being able to remember something involves four key stages. The information needs to be attended to, encoded in some way (e.g. remembering its colour or the sound of a word, being given meaning), stored (this involves retaining the information, for example repeating it), and then found so it can be retrieved. After a brain injury, there can be difficulties with any of these stages of memory.

It is important to remember that everyone forgets things sometimes. However, after a brain injury you may have trouble learning and remembering new information, recent events, or what's happening from day to day.

It is also worth mentioning that sometimes our memory is worse due to our emotional state; feeling low or anxious can make it harder to process and store information, making us seem more forgetful.

There are many types of memory that can be commonly affected, associated with each stage of the memory process mentioned above. Later in the booklet there are also some strategy suggestions for supporting memory.

# Memory

**SHORT-TERM MEMORY** – Challenges you may notice include remembering new information, instructions and following information just given to you verbally or written down. This can cause confusion and distress.

It is normal for some people to be unable to remember events leading up to their injury and then store new memories for a period of time after it (especially injuries that involved impact to the head). This can be referred to as **POST-TRAUMATIC AMNESIA (PTA)**, and may last minutes, weeks or months after brain injury. Usually this naturally resolves, but it can take longer with more severe injuries.

**WORKING MEMORY** – This memory type is what helps to manipulate multiple pieces of information instantly, and helps when making short-term and long-term memories. Examples of working memory include counting your change from a shop, or remembering a person's address while listening to instructions on how to get there, or remembering/writing down a phone number that someone has just told you.

**PROSPECTIVE MEMORY** – This is your memory for tasks that you need to do in the future, that are on your 'mental to-do list', such as remembering to send a birthday card to someone.

**PROCEDURAL MEMORY** – This is your memory for procedures, remembering how to do something, like making a cup of tea, riding a bike, or a particular protocol you have in place at work.

**EPISODIC MEMORY** – This is your memory for things that have happened to you, key moments in your life and being able to remember where/when something happened. It is often referred to as our long-term memory.

**SEMANTIC/DECLARATIVE MEMORY** – This is your knowledge of information that you've acquired over your life, like knowing who the President of USA is, what temperature water freezes at, or the capital city of France. Sometimes after brain injury people may confuse these 'facts' and general knowledge.



# Ways to help you manage:

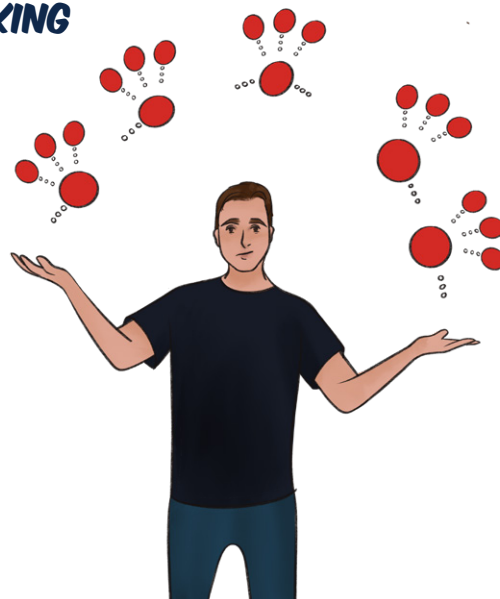
## MEMORY STRATEGIES

- Have a routine and set locations where you keep important items such as keys, phone, TV remote, and utensils.
- Use external memory aids on a regular basis, these are often helpful if used on more than one occasion. Some examples include using note books, calendars, writing down daily schedules and lists, and cue cards. Smart phones are helpful and can provide prompts for scheduling appointments and events.
- Chunking information – Split information into smaller more manageable 'chunks'. For example: The phone number 07753456245 is easier to remember if broken into small sections to become 077 – 534 – 562 - 45. You can try to remember one chunk at a time.

### NO CHUNKING



### CHUNKING





## Ways to help you manage:

- Alternatively, you could group information into meaningful categories (a shopping list could be grouped into 'Fruit', 'Vegetables', 'Fridge items', etc.) Using keywords can be helpful - remembering "I need to buy ingredients to bake a cake" is easier than remembering "I need to buy eggs, flour, sugar, butter, icing..."
- Repetition – You can support learning and retrieval of information with spaced exposure to (and therefore retrieval of) information. This can be supported with a technique called expanded rehearsal, where information is given at increasingly delayed intervals (e.g. 20 seconds, 1 minute, 5 minutes, 20 minutes, 1 hours...). This can prevent overstimulation.
- Make links – Linking new things to be learned with other things that are meaningful can also be helpful as it builds a deeper level of processing for the information. This could be associating a new activity with an existing routine (taking medication at mealtimes), or learning a new name by making a link ("Abby with the curly hair").
- Give yourself time to rest. If you cannot remember something, try not to use excessive energy trying to remember as this can cause more tiredness, distress and anxiety, meaning you are less likely to remember. Instead, return to it after a rest.
- Give yourself time in the day to practice new information and these strategies.



# How friends and family can help:

## **SUPPORTING MEMORY**

- Support your loved one through the use of external memory aids, e.g. by installing calendars and memo/white boards in the home. Help them maintain these memory aids so they stay up to date.
- Encourage building associations or the internal memory strategies discussed above, such as helping the person think of a way to remember the name of the person you've just met and repeating information where helpful.



### **FOLLOW A ROUTINE**

Having set routines for daily living can help your loved one gain a sense of familiarity and reduce the demands on their memory.



### **EXTERNAL AIDS**

There is strong evidence supporting the use of external aids to compensate for memory challenges.



### **PRACTICE AND REPETITION**

Repeat practice can establish neural networks that become automatic. Neurons that fire together, wire together.

# Executive function

The phrase executive functioning refers to the most complex form of skill and task that our brain performs. It is most commonly associated with our frontal lobe (behind your forehead and eyes), but realistically involves the use and management of many areas of our brain. It is called 'executive' because it is like the boss of the brain, and is often thought of as the skills that separate humans from animals. It is a general term that involves skills such as being able to understand and use new information to make new meaning, understand and follow social norms to act acceptably, or organising your thoughts to make plans or solve problems.

It is a complex concept; you may find it helpful to read more in other resources that P.A.U.L For Brain Recovery has created regarding Executive Functioning and Changes in Emotions and Identity following Brain Injury.

You may have noticed some changes in your:

**PROCESSING INFORMATION** – You may find it's more difficult to organise multiple thoughts in your head or more easily feel overloaded with information. Often after brain injury our thinking speed is slowed down and we, or those around us, notice it takes more time to consider questions or think about more complex tasks. This can cause people to feel frustrated and angry.

**AWARENESS AND INSIGHT** – Sometimes the brain is unable to understand that it is damaged due to the very nature of brain injury. When we break an arm, the arm sends signals to the brain to inform the brain of the damage and create a plan for how to manage the injury; however, the brain is sometimes unable to send signals to itself to share awareness of its own injury. This can cause a person to struggle recognising they have a brain injury (particularly in the absence of external physical signs, such as bleeding), and make it harder to be aware of how they are different, or what support they may need.



## Executive function

**PLANNING AND ORGANISING** – You may notice it has become more difficult to plan for your day, schedule appointments or complete tasks that require multiple steps, such as cooking or baking. The more complicated the tasks, the more challenging it is, such as making a sandwich compared to a roast dinner; this is because there are more steps involved, which require organisation.

**SOCIAL APPROPRIATENESS** – Sometimes after brain injury we are more impulsive or less able to be considered in our thoughts, feelings and behaviour. This can mean we act in ways that are not considered socially appropriate. Others may feel the brain injured person is more selfish or cares less; this is not necessarily the situation, it is more a case of losing some of the social filters that once guided them.

## Ways to help you manage:

### **EXECUTIVE FUNCTION:**

- When organising your day, write a to-do list of what needs to be done and when. You may want to re-organise the list depending on the task's priority or time it needs to be done. You could then perform them in the order they are written and tick off completed tasks to help you stay organised.
- Ensure activities are 1) Prioritised 2) Planned and 3) Paced to protect against fatigue.
- Break down difficult or more complex activities into smaller steps. For example, instead of writing 'prepare lunch' you may find it helpful to write down what you need and how to make your lunch, like following a recipe.
- When deciding what steps you need to do to finish a task, it may be helpful to think of the end goal and work backwards.
- Allow yourself time to make sense of new information. Give yourself time to think through things. Perhaps write it out or ask questions, and identify when you are feeling saturated or overwhelmed, and may need a break to 'digest' and process things. Support the use of external memory aids, e.g. by installing calendars and memo/white boards, and maintaining them so they stay up to date.
- Encourage building associations or the internal memory strategies discussed above, such as ways to remember the name of the person you've just met and repeating information where helpful.



# How friends and family can help:

## **SUPPORTING EXECUTIVE FUNCTION**

- Think ahead about situations with the person (particularly more challenging, new or complex situations), and talk them through with your loved one. For example, plan and rehearse an upcoming event and what they need to think about and do. Preparation, such as planning what to wear, where to sit, and what to eat, can reduce the cognitive demands on the brain at the time.

## **OTHER IDEAS:**

- Communication can be key to understanding. Talk to your loved one and share experiences.
- It is also important to remember the person behind the brain injury, and support them in maintaining meaningful, enjoyable activities.
- Talk together about what to do if a situation gets too distressing. For example, if they are in a busy shop, would you: immediately go home, take a deep breath, sit down, or ring someone for support?

This booklet is very broad and covers a lot of complex cognitive functions our brain performs. It aims to help you identify difficulties and provide initial strategies. You may find it helpful to explore particular areas in more detail.

P.A.U.L For Brain Recovery has further literature, you can also talk to the team personally, or you may find it helpful to seek referrals to specific healthcare services, such as Neuropsychology, Occupational Health or Speech and Language Therapy.

**FOCUS ON:**

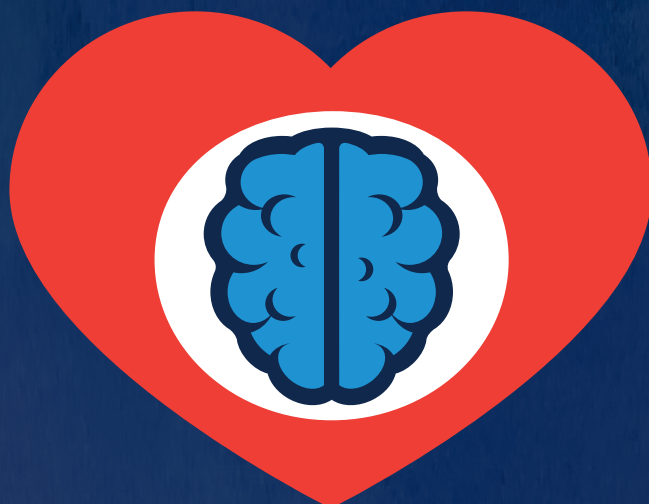
*how far you've come*

**NOT**

*how far you have to go*



Please get in touch if the charity can help you further with your recovery journey



# P.A.U.L<sup>TM</sup>

For Brain Recovery

---

6-10 Story St, Hull HU1 3SA  
[www.paulforbrainrecovery.co.uk](http://www.paulforbrainrecovery.co.uk)  
01482 620229



@P.A.U.L For Brain Recovery

**P . A . U . L**  
POSITIVITY      AWARENESS      UNDERSTANDING      LOVE