

Executive Functioning

Problems with executive functioning are common after Traumatic Brain Injury (TBI). The term executive functioning is used to refer to abilities that are similar to those needed by a chief executive of a company. The chief executive of a company is responsible for making important decisions about the business. They create plans for the future, respond to customer feedback, fix problems with the business, communicate with employees, shareholders customers and other businesses. The chief executive must watch to be sure that the company is working efficiently to get the best results and make complex decisions about the management of the company.

You may have heard of the frontal lobes of the brain. The human frontal lobes are larger (as a percentage of total brain size) than any other animal. A lot of the work the frontal lobes are the executive abilities. Being located at the front of the brain, our frontal lobes are prone to injury. Because of this it is common for people to have problems with executive functioning after a TBI.

Deficits in executive functioning can have a big impact on a person's behaviour, their ability to keep friendships and successfully return to previous roles (e.g. work, study or head of the family).

Some of the executive functions that may be disrupted after a TBI include:

Reasoning, Novel Problem Solving & Decision Making

Life is full of challenges. We are often faced with situations that are new or unfamiliar and in which we to decide what to do.

For example:

- *John is an apprentice mechanic and only last week bought his first car. As he is driving to work he notices that the temperature gauge is in the red zone.*
- *Alice has three jobs to finish at work, but only enough time to finish two of them before going on holiday at the end of her shift.*

The choices Alice and John make rely upon their ability to think of several options and then decide on the best action to take. The decision will be based on their understanding of the problem, the chances of a "good result" for each option and awareness of their

own skills and when/if they may need to seek help. Whether John and Alice succeed or fail will rely upon their problem solving and decision making abilities.

Planning & Organisational Abilities

Foresight is the ability to think about the future. When we decide on future actions we are making a plan. Some examples of this include:

- What will I have for dinner tonight? What preparation will be needed?
- I'm going on a ski trip. What clothes and equipment should I pack?
- I want to be a corporate lawyer. What do I need to do to achieve this goal?

Even the best plans will fail if we are not organised. For example:

- Steak, mashed potato and eggs for dinner will not work very well if you start cooking all three at the same time

We sometimes hear people with TBI talk about things they want to do (e.g. mow the lawn, pay bills etc), but never manage to get done. This can be caused by poor planning.

Initiation - "Get up and Go".

The energy and drive to do things is also reliant on our frontal lobes. People who lack this ability are sometimes described as inert (inert = "not moving"), or as having apathy. We rely on our initiative to get started. Getting out of bed each morning, asking the boss for a raise or getting off the couch to make something to eat at lunch time – all require initiative. A lack of initiative can cause people to behave like "couch potatoes" unless someone is around to help by prompting (or energising) them to get going.

Disinhibition

Humans are social creatures. We learn at a young age that it is necessary to adapt the way we behave depending on where we are, what we are doing or who we are with. Most people behave differently when eating dinner at McDonalds than they would at Grandma's for a roast dinner. The language people use at the pub or the footy differs from how they talk to the boss at work or when they meet a priest.

So, we are able to inhibit or “put the brakes on” our behaviour. This ability to control our behaviour can change after a TBI. Some common examples of disinhibited behaviour after TBI include:

- *Eric is a 48 year old man. Before his injury he was a quiet and reserved person who worked as a clerk. After his TBI Eric began to:*
 - *Swear excessively in public*
 - *Speak his mind without thinking about the consequences. This sometimes offends others. His cousin was none too happy when he told her she was “fat” last week!*
 - *Telling strangers personal details about his life. The other day Eric told a bus driver about the difficulties he and his wife were having in their sexual relationship. It was peak hour and the bus was full of passengers at the time.*
 - *Eric’s family and work colleagues have commented that he just won’t “shut up”. This is called verbosity – better know as “verbal diarrhoea”.*

Inflexible Thinking & Perseveration:

Our ability to think in a flexible way allows us to adapt to change in occurs around us. Thinking flexibly means we can come up with different - sometimes better - ways of doing our job. It also allows us to find a different route to work when the road is closed by a truck accident. Flexible thinking is especially important when we are in danger. For example:

- *If a fire blocks your way to the front door you may decide to climb out a window to escape. Flexible thinking allows you to do this even though you have only ever left the flat by the front door in the past.*
- *A Zulu tribesman will walk an extra three miles over the hills if he finds the valley trail to his village blocked by a pride of lions.*

A reduced ability to think flexibly will decrease our ability to adapt successfully to changes. Severe inflexibility can cause perseveration. This is a tendency to get “stuck” doing the same thing over and over. E.g.:

- *Susan has a lot of trouble stopping herself once she gets started on an activity. She injured her gums after she was discharged home from rehabilitation. It turned out that she had been brushing her teeth for more than one hour non-stop each morning. Now she sets a two minute alarm before she starts brushing. The alarm alerts her and she is able to stop brushing.*

Insight

What are my strengths, weaknesses and limitations? Can I run fast? Am I good at algebra or public speaking? I've been drinking at the pub all day, am I OK to drive home?

This self-knowledge is related to our insight – that is, our ability to “see” and understand ourselves. This includes understanding what our weaknesses are and how these difficulties impact our ability to achieve what we want to do, both now and in, say, 6 months time. Problems with insight can occur following damage to the frontal lobes and right side of the brain.

Loss of insight following a TBI can change the way a person engages in rehab. It may also affect their ability to drive.

- *Alan is in a TBI Rehabilitation Unit. He had a very severe brain injury in a motor bike accident. His left arm and leg are paralysed, but he has no insight or awareness of the changes to his body. Alan says he feels “good as gold”. But he frequently falls out of bed when trying to get up and walk to the “hotel restaurant” for a meal. It is important that he should have physiotherapy twice a day. However, Alan never liked exercising and sees no reason why he should start now!*
- *Bradley is a courier driver. He was injured in an MVA while working. His injury included a large subdural haematoma (a blood clot over the surface of the brain) over the right side of his brain and contusions (bruising) to his right frontal lobes. Since the injury he has become impulsive and reckless. His reaction time and concentration are poor and he lacks insight. Last Tuesday, when pushing his trolley at the local supermarket, Bradley mistakenly knocked over two displays of tinned vegetables and ran into three customers. Bradley had a big argument with the rehab team when they told him he was not fit to drive. The RTA has cancelled his Driver's License because of the injury.*