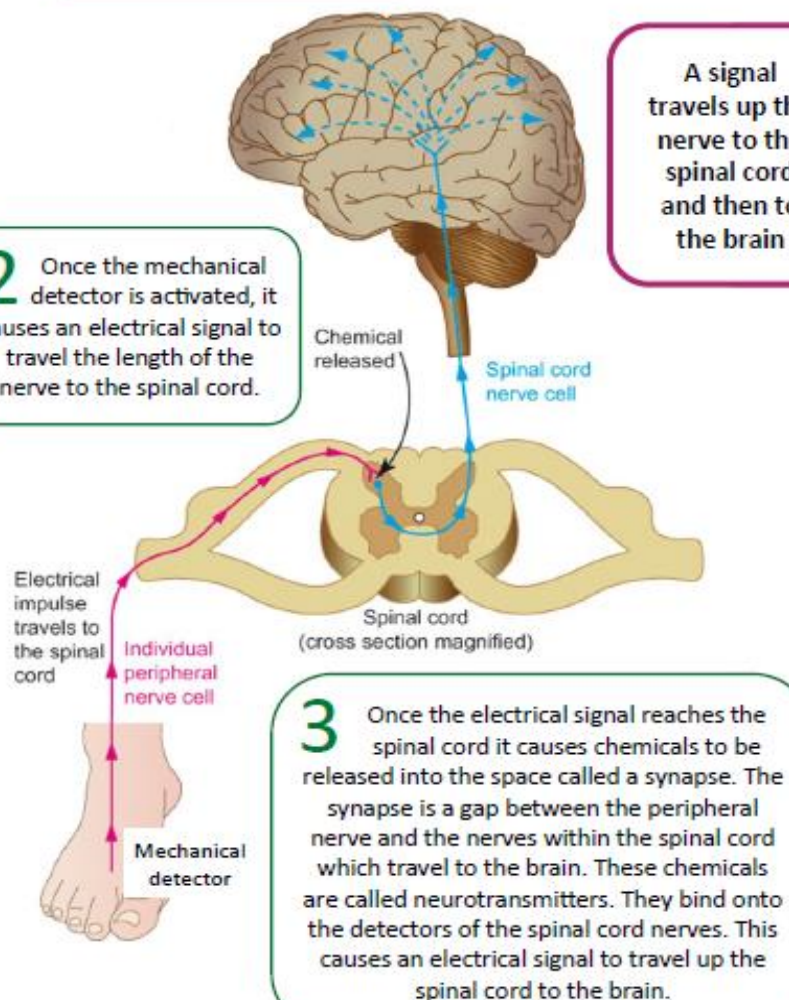




Let's take a closer look...

1 The mechanical detectors in George's foot will be activated by the pressure of the brick landing on his foot.

2 Once the mechanical detector is activated, it causes an electrical signal to travel the length of the nerve to the spinal cord.



3 Once the electrical signal reaches the spinal cord it causes chemicals to be released into the space called a synapse. The synapse is a gap between the peripheral nerve and the nerves within the spinal cord which travel to the brain. These chemicals are called neurotransmitters. They bind onto the detectors of the spinal cord nerves. This causes an electrical signal to travel up the spinal cord to the brain.

4 At this point, the brain receives information that the mechanical detectors in George's foot have been activated.

At this stage it is only a danger message, not a pain message. Before George can experience pain, the brain has to combine a lot of information to determine if there is any threat or danger.

The brain weighs up information to from George's:

Immediate environment:

Such as from his eyes and ears: If at that moment there is something occurring of greater threat or danger he is likely to feel less or no pain. For example if George sprained his ankle on crossing a busy road the chances are, that he would feel little pain until he got to the other side. This is because the brain concludes that there is potentially greater danger to life from being hit by a car than from any ankle damage. Therefore the brain is protecting him in that moment.

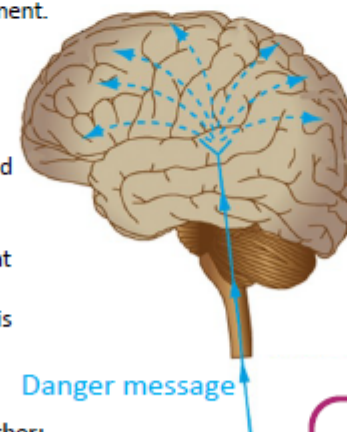
Memory:

What did this signal mean the last time the brain received it? Previously George had a brick fall on his foot which broke a bone. His brain is now more likely to conclude that there is potential damage based on past experience.

Lifestyle and work:

George is a postman. Any damage to his foot would result in him being unable to work or go on his next holiday. Therefore to ensure that George looks after his foot the brain will protect him by sending pain to stop him from using it to allow it to heal.

Thoughts and Feelings:
You may have experienced more pain at times of greater stress. If George was particularly anxious at the time about work or family life then the brain is more likely to conclude that he is in danger



Other:

Future plans, personal and cultural beliefs.

The brain has to make sense of the information it receives

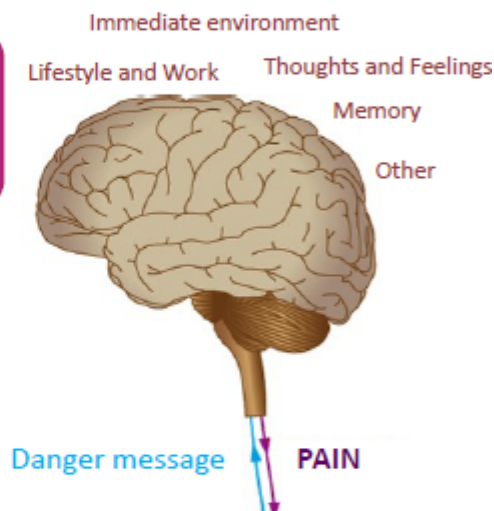


5 The challenge for the brain is to construct as sensible a story as possible, based on all the information it is receiving. If the brain concludes that there is potential danger it will produce pain. Therefore pain is referred to as an **output from the brain**.

George feels pain because the brain has concluded that there is threat to his foot based on all the information, not just the pressure signals from the foot.

Pain is influenced by your environment, memory, thoughts, feelings, lifestyle and beliefs

If the brain concludes that there is a potential or actual threat you may experience pain



From brain imaging we know that there is not one centre in the brain that is responsible for the experience of pain, but that many areas are involved simultaneously. The parts of the brain that are active include areas responsible for sensation, movement, emotions and memory. Although there is some consistency, the exact parts of the brain and amount of activity at each brain area vary from person to person but also in the same individual depending on the context.

This is why every pain experience is unique.

6 When the brain concludes that George is in danger and produces a pain output it also calls upon other systems to protect George. The following systems may also be activated:

1. The sympathetic nervous system which can increase George's heart rate and make him sweat
2. The muscle system to protect his foot and keep it still
3. The endocrine system to reduce his gut activity so that energy is diverted to help the healing process
4. The immune system to produce chemicals which promote healing.

In acute pain, these systems are only activated for a short time. In persistent pain they are activated for longer periods of time, the consequences of which, will be described later.

Many systems are activated to promote healing

