

The Starman and Me by Sharon Cohen

TOPIC SHEET – BRAIN IMPLANTS

The Human Brain and Nervous System

Our brains control everything that happens in our bodies and everything we do. You can think of the brain as a sort of “command centre” because it’s connected to all parts of our body by **nerves**. The brain and the nervous system control how we think, move, remember, decide, and many other functions that we’re not even aware of. So, it’s important that the brain is protected by a hard, bony **skull**. The **spinal cord** that runs down our back is the main route along which the signals travel. It is protected by the bones in our spine.

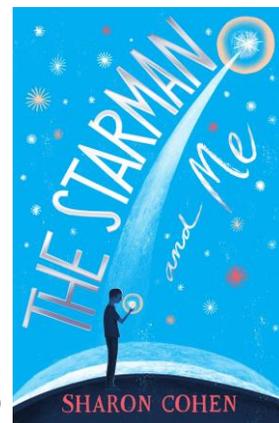
Nerves are a bit like wires that carry signals or impulses around the body. Nerve cells are called **neurons**. When a neuron is stimulated – by heat, cold, touch, sound vibrations or some other message – it begins to generate a tiny electrical pulse. This electrical and chemical change travels the full length of the neuron. But nerves aren’t all joined together so when the electrical pulse gets to the end of the neuron, it needs help getting across to the next neuron. That’s where chemicals come in; the electrical pulse in the cells triggers the release of chemicals that carry the pulse to the next cell.

There are two main types of nerves in the body: **motor nerves** and **sensory nerves**.

1. Motor nerves allow the brain to control our **muscles**. The brain sends signals along the motor nerves to tell our muscles to expand or contract so we can move.
2. Sensory nerves control our **senses**. They carry signals to the brain to tell it about what’s going on in the outside world. They come from our skin (touch), nose (smell), eyes (sight), tongue (taste), and ears (hear).



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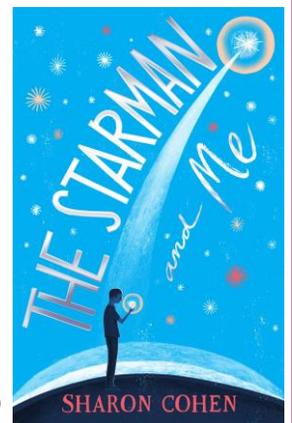
More facts about the human brain

- The human brain is the largest brain of all vertebrates (that is, animals with backbones) relative to body size
- It weighs about 3.3 lbs (1.5 kilograms)
- The brain makes up about 2 percent of a human's body weight
- It contains about 86 billion nerve cells (neurons which send the nerve signals)
- It contains billions of nerve fibres (like wires which carry the nerve signals)
- The nerve cells are connected by trillions of connections, or synapses

What are Brain Implants?

Brain implants (also called neural implants or brain chips) are electronic devices that are placed directly on to the brain. They are made of silicon and are about 4 millimetres long and 4 millimetres wide. They are used to help people regain abilities that have been lost due to an accident or a disease that has affected their nerves in some way.

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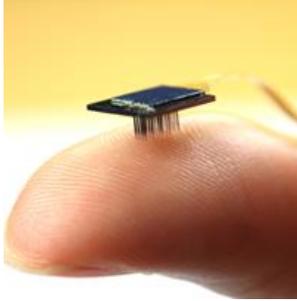


Figure 1 A Brain Implant
©Ubergizmo



Figure 2 An Artificial Hand
©Bebionic

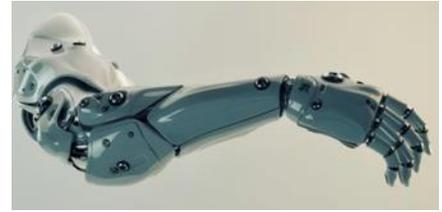
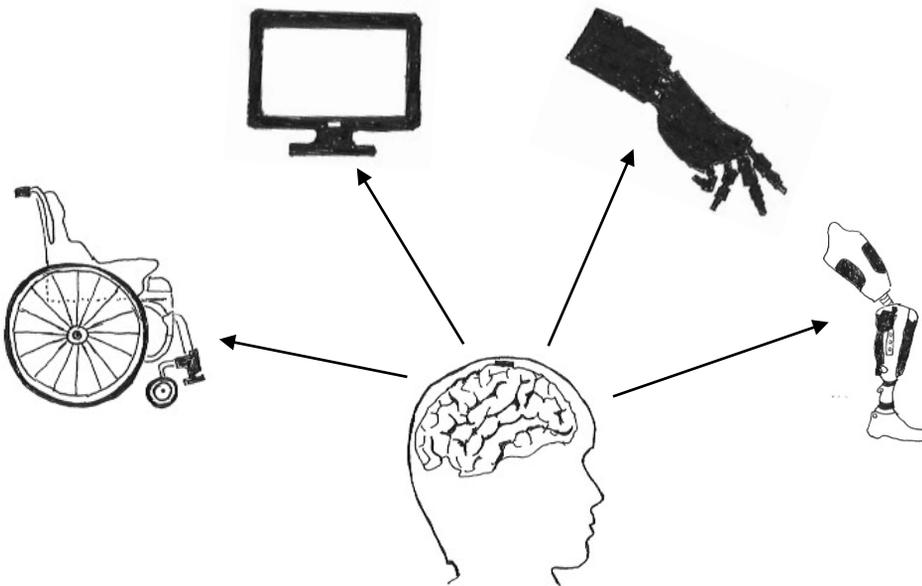


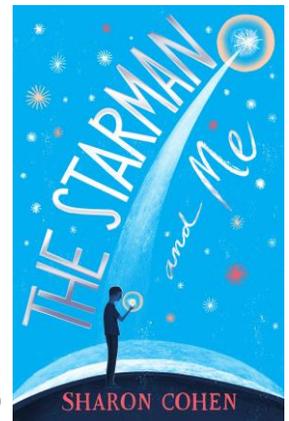
Figure 3 An Artificial Arm and Hand
©Shutterstock

The sensors (spikes) on the implant (Figure 1) detect tiny electrical signals from the brain and transmit those signals to another device such as an artificial hand (Figure 2), arm/hand (Figure 3), leg, wheelchair or computer (Figure 4). So, a brain implant helps the person to move again, just by using their thoughts. Brain implants are not only used for disabled people and they are still being developed for other uses as well.

Figure 4 Different ways brain implants could be used



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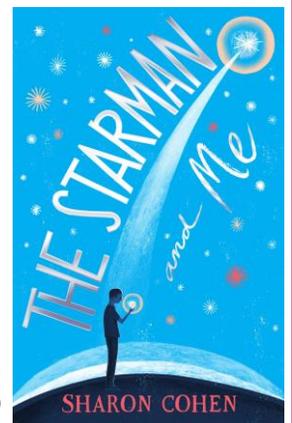


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ACTIVITIES

1. Read pages 81-84 of *The Starman and Me* where Kofi's dad talks about his amazing invention, a brain implant called MINDLINK.
 - a. What is MINDLINK and who is it going to help?
 - b. What are people able to do once they have MINDLINK?
 - c. Janie makes some suggestions as to what MINDLINK could be used for. What are they?
 - d. On which part of the brain is MINDLINK placed?
2. Professor Quix stole MINDLINK and put it in Rorty's brain. Rorty discovers that he can do some amazing things using the device.
 - a. Make a list of the things Rorty is able to do.
 - b. What do you think Professor Quix wants to use MINDLINK for (p.196) and what is the name of his secret operation?
3. Brain implants are already helping people who can't move parts of their body. Can you think of, or find out, other ways brain implants could be used in the future?



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ANSWERS

1. Read pages 81-84 of *The Starman and Me* where Kofi's dad talks about his amazing invention, a brain implant called MINDLINK.
 - a. MINDLINK is a silicon chip or brain implant. It will help people who have lost the use of their arms and legs.
 - b. When it's implanted on the brain it can learn what the brain signals mean then uses those signals to operate computers, devices and other machines such as robotic limbs.
 - c. Janie suggests MINDLINK could be used for camouflage, telekinesis, creating things, colouring objects.
 - d. MINDLINK is placed on the motor cortex of the brain.
2. Rorty can do some amazing things using the MINDLINK brain chip such as:
 - a. sending electronic messages (p. 7/8), writing/painting using his fingers (p.10/11/62/63), moving objects (p. 20, 21, 38, 265, 319-322), disappearing (p.112/113, 194), copying/pasting objects (p. 58, 97), camouflaging someone (p. 107), making something shrink (p. 243).
 - b. Professor Quix wants to use MINDLINK so soldiers can communicate by sending thoughts to each other in warfare. The secret operation is called Operation Silent Talk.
3. Future uses of brain implants could be: operating your arms and legs if you have paralysis, operating artificial/robotic limbs; seeing in the dark; restoring lost memory; improving memory; controlling electronic devices with your mind; searching the internet with your mind.

