Sending messages

A critical number of open sensors will start the response

Neurones are electrically excitable. Every time a sensor opens and positively charged particles rush in, the neurone becomes a little more excited. When more sensors open and the excitement inside the neurone reaches a critical level, a rapid wave of electrical current travels up the neurone. This electrical current is the message, technically called a 'spike', or an 'action potential'. Action potentials are the way that nerves carry messages – an action potential is a single message.

On the graph on the facing page, the horizontal axis is time and the vertical axis is level of excitement (electrical charge or, for the electricians amongst you, the potential difference or voltage across the membrane of the neurone). Note at the start of the graph, how the level of excitement varies, mainly due to the number of sensors that are open. Also note the critical **'all or none'** threshold at which an action potential (message) occurs. When the actual level of excitement gets close to the critical level of excitement, then even small events that only open a few sensors may set off the message. So, if this neurone was specialised to carry 'danger' messages, then just a small stimulus like a tiny movement or a change in temperature can be enough to make it reach the critical threshold and may make it hurt (depending of course on the conclusions made by the brain).

Remember, when we are talking about danger reception, the message that is sent along the nerve to your spinal cord only says 'danger'. **It does not say 'pain'.** Somehow the spinal cord and brain has to receive and analyse these inputs and create meaningful experiences which may or may not include pain.