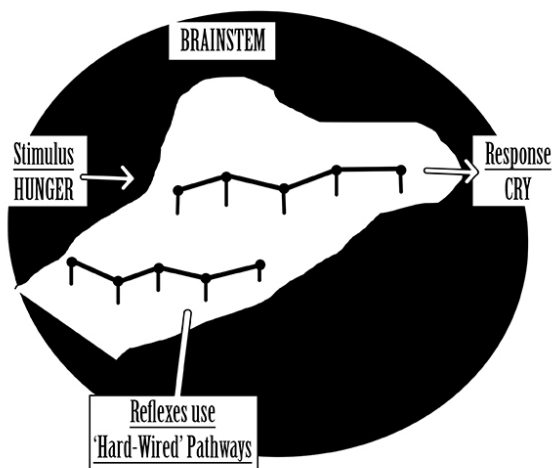
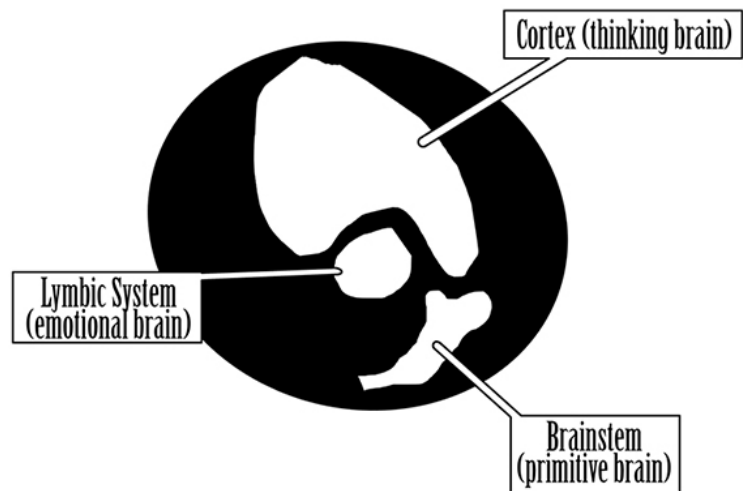


## Handout 2: The Neuroscience of learning social, emotional and behavioural skills

There are three parts to the brain:

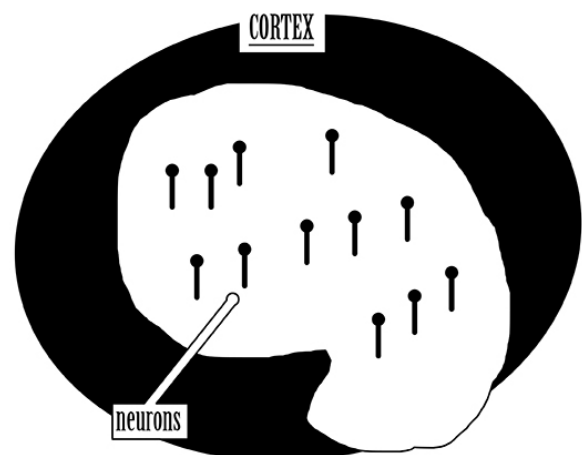
- The brain stem (responsible for autonomic functioning – breathing, heart-beating, digestion, reflexes etc.).
- The limbic system (the ‘emotional’ brain)
- The cortex (the ‘thinking’ brain)



At birth our behaviour is controlled by the brain-stem functions – our reflexes – so that if we are hungry we cry. These reflexes are ‘hard-wired’ and cannot be changed. This part of the brain is therefore incapable of ‘learning’.

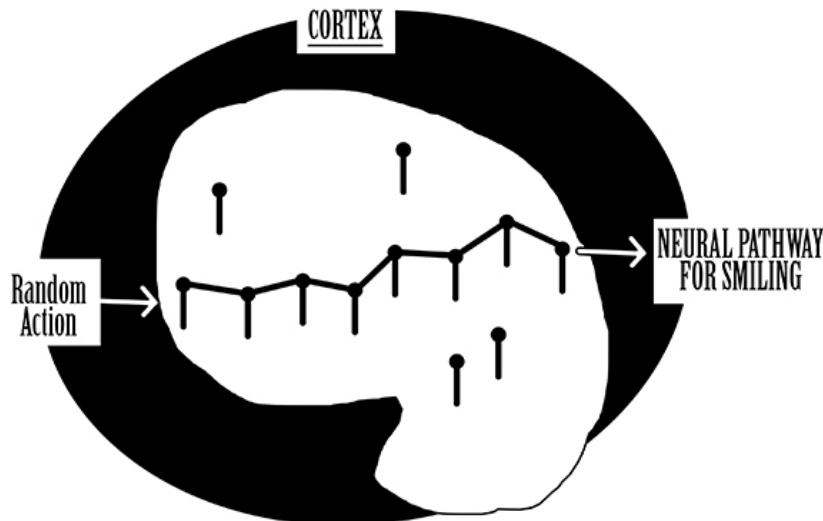
At this time the cortex is unformed. All the cells (neurons) that we will ever have are in place, but there are no connections between them.

As time goes on, the environment provides the baby with a multitude of experiences which cause the cortex to start developing. The baby begins to make connections in the cortex – each action



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causes neurons to join up and leaves a 'neural pathway' or network. At this point the baby is capable of 'learning' and the reflexes that have kept him alive are no longer in charge. For example the baby may smile (by chance). This leaves a neural pathway.

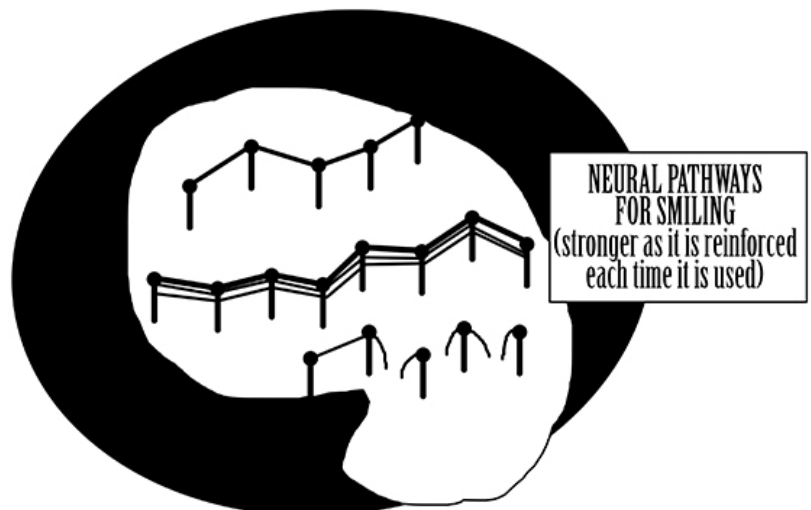


As babies are primed to seek contact (a survival mechanism), the response that the baby receives (usually an enthusiastic one from parents and others!) satisfies the drive to seek contact and therefore causes the baby to repeat the behaviour.

**Key point 1: Where neural pathways are used over and over again, they become stronger and more efficient. Where they are not used the connections wither and die.**

The baby will have many neural pathways from their random actions. However, not all will be reinforced by the environment (e.g. result in contact), and therefore are unlikely to be repeated. The connections between neurons which make up the neural pathway will therefore wither away.

As time goes by, the baby learns that its actions can bring about consequences. Let's move on a little and call the baby John. Now John is three and has learnt that when someone is in his way, if he hits them they will usually get out of his way. He has established an effective neural pathway to achieve what he wants.

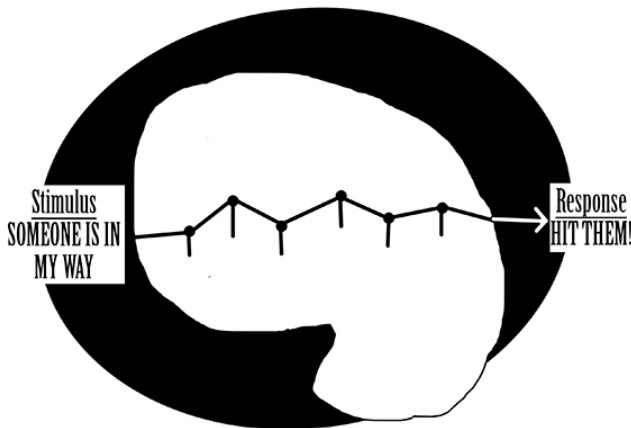


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As well as the external satisfaction of getting what he wants, there are two other reasons why John is likely to repeat his 'hitting' behaviour:

1).When we achieve what we set out to do the 'reward centre' in the brain releases pleasant bio-chemicals which make us feel good!

2).The brain is designed to be as efficient as possible. Therefore, if a neural pathway already exists that will get the job done, it will not seek to establish an alternative. (For example, do you often find yourself sitting in the same place in the staffroom, or when using the same toilet cubicle).



sitting in the same place in the staffroom, or when using the same toilet cubicle).

### Key Point 2: The brain will always seek to be as efficient as possible, using existing neural pathways.

When John goes to school, he is told that it is not nice to hit people, and in the school's explicit SEL lessons, he learns other ways of achieving his aim of getting someone to move out of his way, perhaps by asking them to move. Perhaps the class role-play the alternative behaviour. A new neural pathway is established...

John may be very good at the role-play, but when he goes out to play the teacher is surprised to find that he is in trouble for hitting another child who was in his way!

Should she be surprised? Well, no. For two reasons:

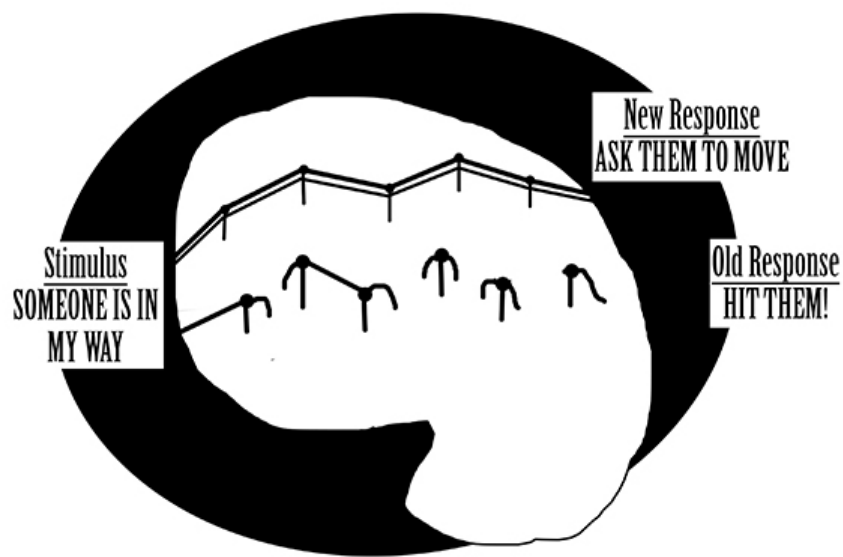
The 'old' pathway (for 'hitting') is well established (rather like a motorway) through reinforcement while the new pathway (for 'asking') has not been reinforced through repetition (and is rather like a dirt track).



As the brain is programmed to seek the most efficient way to achieve John's objective, clearly it is going to choose the motorway!

The schools task is to ensure that the 'new' neural pathway is built up through repetition until it becomes more efficient than the 'old' neural pathway, so that the brain will automatically use it as the 'default' response.

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If at the same time the 'old' response is not used, the connections will ultimately wither and die (see key point 1).

**Key Point 3: Multiple repetitions are required to build up alternative neural pathways, and therefore establish new behaviours as the 'default' response.**