

Brain changes during adolescence

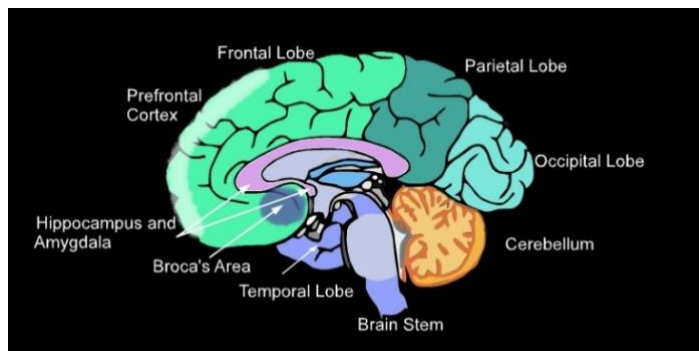
Adam D'Souza is a teacher, writer and educational consultant. He has held leadership roles in some of London's most distinctive schools. His articles about education have appeared in the Daily Telegraph, TES, Prep School Magazine and Time & Leisure. His organisation, The Commons, specialises in school entrance preparation for leading independent and grammar schools.

First, a caveat: I am neither a doctor nor a psychologist. This paper is based on my reading of scientific literature as a teacher, supported by the anecdotal evidence of the classroom observations and conversations with lots of parents.

There are two bits of the brain we are looking at:

- **The prefrontal cortex:** this is the outer surface of the brain, the bit that looks like coiled intestines. This part of the brain, broadly speaking, is responsible for the 'higher' functions of reasoning and cognitive thought. The Nobel Prize-winning psychologist Daniel Kahneman referred to this as System 2 in his book *Thinking Fast and Slow*.

- **The amygdalae** are two clusters of cells, each about the size of an almond. They are buried deep inside the brain, just above the brain stem. The amygdalae are involved in memory forming, and handling reactions to stressful stimuli — sometimes known as 'flight or fight'. Kahneman calls this System 1, as it was the first to evolve. It used to be the case that scientists thought all parts of the human brain developed continually throughout childhood. However recent research suggests this is not the case. When babies are born they have quite a developed prefrontal cortex. This makes a lot of sense: babies and toddlers are learning machines, who can soak up huge amounts of information from the world around them. The amygdalae are there to protect the body, and eliminate stressors. During the pre-teen and teen years, the brain 'prunes' the prefrontal cortex into a structure better suited for adulthood. During this period of pruning, the brain leans more on the amygdalae, resulting in more emotional reactivity, impulsive behaviour, aggression and sometimes risk-taking behaviour. This process typically starts at about age 10-11 and continues throughout the teen years.



Scenarios

Johnny was a golden child at primary school, beautifully behaved and polite. He got glowing reports from his Year 3 teacher, and his school books were impeccably presented. Each afternoon after school Johnny would happily do 30 minutes of violin practice with no complaint. Then, in Year 6, his school books started to look like a spider had drunkenly crawled across the page; his violin was gathering dust in the corner.

Penny is prepping for entrance exams to grammar school. She is pretty good at English but she rushes her maths and makes silly mistakes. She can explain exactly why she should be spending more time on homework and reading. But doing it is another matter. When mum asks her to do some 11+ practice questions, there is a massive argument, culminating in shouting and slamming of doors.

Timmy has just started at secondary school. *Other* parents say that Timmy is such a nice boy. He is friendly and courteous when going to his new friends' houses, even when covered in mud after rugby practice. But he seems to be constantly in trouble at school. After receiving yet another call from the head of year, dad sighs in desperation, "What were you thinking?!" ... "Er, I dunno," is the vague reply. Timmy hangs his head and looks away.

In all three of these scenarios, the amygdalae are overriding the prefrontal cortex. The brain is reacting against what it sees as a stressor, by fighting or running away from a challenging situation.

How to handle it

1. Routines/structures.

The amygdalae are reactive parts of the brain, so avoiding surprises wherever possible is important. If you reflect on your child's behaviour, you will probably find that the times they kicked off were when something was sprung upon them, rather than planned in advance. A routine gives the pre-teen or teenage brain a structure, which helps their prefrontal cortex to 'step up' and override the amygdalae.

2. Use external pressure.

School teachers, tutors, music teachers, sports coaches can be so valuable. They are able to say things to your child that would result in a huge fight at home. Part of creating an identity is having something to push back against, and that is likely to be you!

Finally, letting bygones be bygones.

Just as a baby bird starts flapping its wings in the nest to prepare for flying, adolescents start testing the boundaries of the home. Even for the most impeccably behaved children, some arguments and tantrums will be inevitable. Having firm boundaries is important, and poor behaviour should not be rewarded. On the other hand, dwelling on past misdemeanours is unhealthy.

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Created April 2021