



G.A.T.E.WAYS invites
gifted Year 3 and 4 children
with a love of science to
'Our Brilliant Brains'

G.A.T.E.WAYS is an independent organisation offering challenging and enriching activities and experiences to develop and extend highly able children. Established in 1994, G.A.T.E.WAYS runs a range of stimulating school programs as well as the Saturday Brainwaves Club. This JOURNEY for both girls and boys will run over four sessions.

Your brain is an incredible and fascinating organ. It's soft and squishy, but its 1.1 trillion cells can process 11 million pieces of information *every second*! It is thought to be literally the most complex object known in the universe. But, even with all that infrastructure, it sometimes makes mistakes. Our conscious mind can only process a tiny fraction of the information coming in, so our brains take shortcuts which can lead to some very interesting situations! Optical illusions, selective attention, forgetfulness – these are all ways that we can observe the shortcuts our brains take – sometimes with very funny and peculiar results!

But, neuroscience can also help us train our brains to function even more effectively. Your brain is like a muscle: the more you use it the bigger it grows. Every time you stretch your mental abilities, your brain sprouts more neural connections. The more neural connections, the better your brain works. We'll see how well our own memories work and then learn a variety of techniques to improve it. Better brains, here we come!

Session 1: But how does it work?!

We'll begin our Journey by discovering how a lump of squiggly grey matter contains the most sophisticated information processing software known. What on earth is an occipital lobe, and why is neural plasticity important? We'll explore some of the parts of the brain – like the neurons, lobes and hemispheres – and the functions of the brain – like vision, walking, language and decision making. We'll even try and understand just how complex our brains are by setting up our own simulated neural network! We'll observe what happens to our reaction time when our brain is concentrating on more than one thing, and we'll consider the effect of damage to particular parts of the brain by looking at some case studies. If someone says, "You know that smoodle pinkered and that I want to get him round and take care of him like you want before?" (*don't worry, this isn't meant to make sense!*) do we know that Wernicke's area might be involved?! In order to consolidate our understanding of brain structures and function we'll construct our very own brain hats to take home. You'll be identifying your parietal lobe and motor cortex in no time!

Please bring: 30 cm ruler, sticky tape, glue stick, scissors

Session 2: Trick me if you can

The brain is an absolutely amazing organ, but it's not perfect. Your brain can only process fifty pieces of information per second, not the 11 million pieces that are coming in. So, sometimes, it takes shortcuts which can lead to all kinds of crazy situations! You might see things that aren't really there, or you might miss the things that are right before your eyes! In this session we're going to explore lots of fun tricks, optical and auditory illusions, and phenomenon that we experience as a result of our brains trying to filter through too much information and make quick judgements on our behalf. You'll be amazed at what your eyes are telling you, even when you know what to look for. Our brains know how to interpret a 3-dimensional world, so when we look at 2-dimensional shapes in pictures our brains sometimes see differences that aren't really there. You'll find it hard to believe that two shapes are the same size, even when we prove it – again and again! Did you know that selective attention helps us filter through the information streaming in from our environment, but it can also cause us to miss things that are right in front of us? We'll demonstrate how with some hilarious results!

Session 3: Forget about it

Want to know how humans in Ancient Rome could memorise 3-hour speeches when they didn't even have paper to write them down?! Most people can only remember between five and nine pieces of information at any one time, but in this session we'll start to look at memory and the ways that we can train ourselves to improve it. We'll begin by exploring our own current memory abilities before discovering some simple strategies to improve our recall. We'll then learn about the first of our major strategies to significantly improve our ability to remember lists of ordered information: the method of loci, or the memory palace. As you imagine walking through your very own memory palace, you'll be able to leave memories on 'hooks' throughout the palace that you can recall whenever you need. This technique was first recorded in 90 BCE and is still used today by memory champions all over the world! With a little practice, you can use it too!

Session 4: Total recall

Want to know how memory champions can memorise a whole deck of fifty-two playing cards in order?! In our second memory session, let's take our memory palace, and turbo charge it by putting our cards into costumes! Sounds crazy, but the sillier something is, the more memorable it will be, so let's create characters for the cards so that we can really stretch the limits of what we thought was possible. We'll learn about peg words and some of the approaches that memory champions use, and then build our own personalised system for memorising the cards. With a little bit (well maybe a lot) of practice, memorising a whole deck of cards could be your next party trick! We'll consider all of the memory enhancing techniques we've learnt and discuss how we can apply them to real-world (and real-school) situations. To round out our session we'll do some new memory tests that we can compare with our performance from last session and see exactly how well we've been able to harness the power of our brilliant brains!

Requirements

Please bring a notebook, a well-stocked pencil case including scissors, a glue stick, sticky tape and a 30cm ruler, a snack (no nuts), a small labelled photograph of yourself and a stamped, self-addressed DL envelope for the return of your report.

Homework requirements and assessment

Homework may be set after each session to give students extra time to explore the new concepts. At the end of the program a short, written report will be completed on each student and forwarded home to parents. A copy should be made and forwarded to the school.

About the presenter

Dr Leanda Read has a Bachelor of Science degree with Honours and a PhD in Psychology. While she has been the director of a national company, a consultant with a not-for profit, a researcher, a university educator, and a parent, Leanda loves nothing more than working out ways to translate challenging information into engaging and accessible content for curious young learners.

