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The Royal Society of Edinburgh (RSE) is Scotland’s National Academy of Science & Letters. An independent body with charitable status, its multidisciplinary fellowship of 1400 men and women of international standing represents a knowledge resource for the people of Scotland. Committed to its Royal Charter of 1783 for the “advancement of learning and useful knowledge” the Society recognises the important role it can play in today’s Scotland. Working as part of the UK and within a global context, the RSE seeks to contribute to Scotland’s social, economic and cultural wellbeing by:

- organising conferences and lectures for the specialist and for the general public on topics of national and international importance;
- providing independent, expert advice to key decision-makers in Scotland;
- awarding over £1.7 million annually to Scotland’s top young academics to promote research in Scotland;
- enabling leading Scottish-based researchers to collaborate with the best of their international counterparts;
- inspiring school children in classrooms from the Borders to the Northern Isles and promoting their interest in science, society and culture;
- producing academic journals of international standing.

The Tall Tales about Mind and Brain was organised as part of the RSE’s programme of events for young people and the wider public from across Scotland. The content of this Supporting Resource Pack for Teachers contains individual views that do not necessarily represent the views of the RSE.

For further information on the Young People’s activities, please contact the Education Team at:

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Introduction
Tall Tales about Mind and Brain

The Royal Society of Edinburgh’s Conference Tall Tales about Mind and Brain aims to unravel psychology and neuroscience topics that are seen in the popular press but are often misinterpreted; the so-called Tall Tales.

The programme is designed to complement the Higher Human Biology and Psychology curricula. The themes include:

- Memory and Learning, including Intelligence;
- Language and Communication;
- Brain and Behaviour.

Topics will challenge conventional thinking and explore myths and 'old wives tales' such as:

- Do we really use only 10% of our brains?
- Can we stimulate the creativity of the right hemisphere?
- Can we believe our memories?
- Can one become more intelligent listening to Mozart's music?
- Can we detect a liar?

The Conference, and this Supporting Resource Pack for Teachers, therefore covers questions that are often discussed in the popular press, or are argued about in school lessons and therefore does not just approach the subject matter from a purely scientific perspective. To this end, the most accrued beliefs about how the mind works will be evaluated in the light of the evidence that we have to support them (or not).

This pack has been provided for you to use with your students before and after the Conference, as well as independently. The pack includes supporting background information and relevant websites for the following sessions:

1. **Tall Tales on Memory and Learning.**
   b. The Myth of the Incredible Witness
   c. The Perils of Intuition
   d. Magic and the Paranormal: The Psychology

2. **Tall Tales on Intelligence.**
   a. Bigger and Better? Brain Size and Species?
   b. Intelligence
   c. Myths about Intelligence and Old Age

3. **Tall Tales on Language and Communication.**
   a. Facts and Fallacies about Bilingualism
   b. Are we in our Right Minds?
   c. Lie Detection: Pitfalls and Opportunities
   d. Massimo Polidoro’s Magic Show

4. **Tall Tales on Brain and Behaviour.**
   a. Lunar Madness
   b. Why do we believe in Strange Things?
   c. The Belief Engine

5. **A brief overview as to what each recommended website contains.**

6. **Student evaluation sheets to aid learning and comprehension.**

   The evaluation sheets are intended to be used as an exercise immediately following the Conference (or in conjunction with the resource notes within this pack, independent of the Conference) to check understanding and to aid learning. To this end students should bring a pen and paper for notetaking.
purposes during the Conference and complete the evaluation sheets as a classroom-based or homework activity in the future.

7. **Links to the Higher Human Biology and Psychology curricula.**

8. **Additional Information**

   In addition to this resource pack, two books:


   and


   are both recommended as background reading to *Tall Tales about Mind and Brain* as both books summarise the thoughts of the speakers who will be at the Conference, in an accessible language, and are available in paperback.
1. TALL TALES ON MEMORY AND LEARNING

Professor Alan Baddeley CBE FRS, Professor of Psychology, University of York

“Does your lack of recall hinder you in negotiations or an argument? Does it cause embarrassment when you can’t remember names or birthdays?”

The book *Your Memory A User’s Guide* written by Professor Alan Baddeley CBE FRS, Professor of Psychology, University of York, one of the world’s leading experts in the human memory, is fascinating and accessible and clearly explains how your memory works and how to make it work for you. Combining anecdotes and exercises with scientific developments and statistics, Alan Baddeley presents this complex topic in a highly accessible way. This comprehensive book is “recommended for the specialist and non-specialist alike” (*American Journal of Psychology*).

b. The Myth of the Incredible Witness
Professor Tim Valentine, Professor of Psychology, Goldsmiths, University of London

Students can test their own powers of observation as an eyewitness at:
http://www.youramazingbrain.org/testyourself/eyewitness.htm

Professor Tim Valentine’s publications on eyewitness identification can be downloaded at:
www.valentinemoore.co.uk/trv/

The most relevant is probably a review Valentine (2006) Forensic Facial Identification.

Another site that would also be good for a school discussion is:
http://www.innocenceproject.org/

It is the site of a project in a New York Law School which investigates cases of people who have been wrongly convicted in the USA and are exonerated by DNA evidence that was not available at their original trial. Of course, it relies on samples being available and having been stored. It exploits the greater sensitivity of DNA testing which is now available. There have been 197 exonerations so far, including some of the prisoners on death row. Click on ‘understand the causes’ for material which shows that mistaken eyewitness ID evidence is the leading factor of wrongful conviction (75% of cases).

Students may be interested to know that this project is the inspiration for the recent BBC drama series *Innocence Project*.

c. The Perils of Intuition
Professor David G Myers, Professor of Psychology, Hope College, Holland

The Powers of Intuition
Thinking without Awareness

Recent cognitive science reveals an unconscious mind—another mind backstage—that Freud never told us about. Much thinking occurs not ‘on-screen’ but ‘off-screen’, out of sight, where reason does not know. Studies of ‘subliminal priming,’ ‘implicit memory,’ right-hemisphere processing, and thinking without language dramatically illustrate our non-rational, intuitive powers. We know more than we know we know.

Social Intuitions
People have a dual attitude system. Our likes and dislikes, our preferences and prejudices, are partly conscious, partly unconscious. Our perceptions and emotions often occur instantly, prior to any reasoning. Given but a fleeting glimpse, we can read emotions from a face and feel attracted or repelled. Observing a teacher’s warmth and enthusiasm for but a few seconds, we can intuit their students’ evaluations. Are some people more skilled at reading people, than others?

Intuitive Expertise and Creativity

Experts from chess masters to professional athletes develop remarkable powers of instant, intuitive judgment. Intuition also comes as sudden flashes of insight and creativity. How can we increase our own creative intuition?

The Perils of Intuition

i Intuitions about Our Past and Future

How accurately do we recall our past? Predict our future? How accurately do we discern what influences us? How trustworthy are sincere testimonials about various programmes for health and happiness? And our ever-present question: how can we think smarter?
ii Intuitions about Our Competence and Virtue

Provocative and sometimes humorous phenomena such as ‘self-serving bias,’ ‘illusory optimism,’ and the ‘overconfidence phenomenon’ confirm what literature and religion have long presumed—the powers and perils of pride.

iii Intuitions about Reality

Optical illusions and other intuition puzzles suggest that the human mind does not give first priority to logic. Our flawed statistical intuition often distorts our understanding of people and events. So do other intriguing phenomena such as the ‘fundamental attribution error,’ ‘illusory correlation,’ ‘confirmation bias,’ and ‘belief perseverance.’

Practical Intuition

i Sports Intuition

Every sports fan knows that athletes can be superstitious. But challenge their intuitions about the basketball ‘hot hand’ or baseball players’ hitting streaks and be ready for a spirited debate. Many sports superstitions stem from our bent to discover order in random events.

ii Investment Intuition

Drawing on their experience and intuition, can savvy investment professionals beat the market average? If so, can we know who these savvy people are? If not, how can we think smart when investing?

iii Clinical Intuition

In the contest of professional intuition versus statistical prediction, how do clinicians fare when predicting suicide or parole risks? How do political leaders fare when anticipating world events? How do attorneys fare when selecting jurors? And how can we think smarter when making important professional judgments?

iv Interviewer Intuition

How do personnel directors fare when hiring employees? What information and what type of interview, works best?

v Risk Intuition

Our intuitions inform our fears. But when deciding whether to fly or drive, to exercise or smoke, to build nuclear or coal-fired power plants, how effectively do we intuit risk? And how does the way decisions are framed influence our intuitive judgments?

vi Gamblers’ Intuition

Why is gambling growing and what is the psychology of gamblers’ hunches and hopes? Why are gamblers’ perceptions so radically askew from the statistical reality of various games?

vii Psychic Intuition

What shall we say about claims of premonitions, mind reading, clairvoyance, and the prophetic power of dreams? Has anyone, anywhere, evidenced such powers of intuition? If not, why do so many people believe?

Reference materials include two newspaper essays:

http://davidmyers.org/Brix?pageID=65
http://www.davidmyers.org/Brix?pageID=132

d. Magic and the Paranormal: The Psychology

Dr Peter Lamont, School of Philosophy, Psychology and Language Sciences, the University of Edinburgh

The following account is taken from an article on The Guardian website:

http://books.guardian.co.uk/departments/artsandentertainment/story/0,,106836,00.html

Founded in 1905, the Magic Circle is a clandestine organisation for magicians, conjurors and illusionists, allowing them to discuss their ideas in an environment where their secrets are safe. Its motto is Indocilis Privata Loqui, which roughly translates as “Keep Your Trap Shut”. It is rare that journalists are allowed to visit the Circle, located in an alley behind London’s Euston station.

Peter Lamont and Richard Wiseman will escort us through their insights not only as magicians, but also psychologists working at the Universities of Edinburgh and Hertfordshire respectively. They have organised a unique seminar devoted to the psychology of magic. For a magician to perform a successful trick it is not...
enough to have nimble fingers or a clever gadget - it is also necessary to exploit the psychology of the situation.

For centuries, magicians have accumulated a whole series of psychological insights. However, this has never been formally documented until Lamont and Wiseman published *Magic in Theory*. The book has three aims: to help magicians improve their performance, to provide psychologists with knowledge from a previously untapped source and to teach parapsychologists some of the ruses used by pseudo-psychics.

*Magic in Theory* is an intriguing text, despite its analytical, clinical and dry approach. It outlines the nine types of conjuring effects (for example: vanish, penetration and restoration) and then examines one particular illusion in detail. The trick under scrutiny is the vanishing of a coin, whereby a magician appears to pass a coin from one hand to another, closes the hand around the coin, and then opens it to show that the coin has disappeared. Lamont and Wiseman refer to the coin vanishing as the “effect” and label the so-called false transfer at the heart of it the “method”. The effect is what the audience sees and the method is the magician’s secret way of achieving the effect. Ideally, the audience fully appreciates the effect, but cannot deduce the method.

The challenge for the magician is to divest the effect from the method so completely that the audience has no hope of reconstructing the method after the trick is over. This is achieved using the psychology of misdirection.

Misdirection generally means directing the audience’s attention towards a particular area, enabling the magician to perform the vital conjuring action unnoticed elsewhere. This exploits several psychological principles, such as the fact that the human mind is easily distracted by novelty or movement, and the tendency to look where others are looking. Hence, a magician shows a hat empty, and then introduces his glamorous assistant. On the way to the stage, she falls. As the magician and audience turn to see what happened, the magician sneaks a rabbit into the hat. As Lamont explains, however, this is a rather crude example.

In addition to physical misdirection, there is mental misdirection, which misdirects suspicion rather than attention. This hinders the audience’s attempt to figure out how the trick is done. If the magician can direct the audience’s suspicion towards a false method, they will be less likely to discover the real one. They think they know the method, but at the end are shown to be wrong. By that time, it is too late for them to figure out the real method.

These psychological swindles are also used by fake psychics, and Wiseman has exposed several cases of bogus psychic phenomena. A few years ago, he investigated Swami Premananda, an Indian guru who apparently materialised trinkets out of thin air. Wiseman’s investigation suggests that Premananda may have been using the sort of misdirection typically employed by magicians: during Wiseman’s visit, the Swami attempted to make a trinket appear, but failed.

Everyone around him relaxed their attention, giving the Swami an opportunity to surreptitiously take a trinket secreted in his lap and hide it in the palm of his hand. The Swami chatted away for a few minutes, and then suddenly “materialised” the object. Wiseman believes the Swami was using misdirection to divert onlookers’ attention away from the moment in time that the trick actually took place.

As Lamont pointed out during his Magic Circle seminar, the pseudo-psychic has several advantages over the magician. Magicians are generally not allowed to fail, and cannot afford to chat for a considerable length of time before producing an apparent miracle. Furthermore, the magician is being scrutinised by a critical audience keen to try to work out how his tricks are accomplished. In contrast, many of the people watching a supposed psychic seem less determined to find out how the trick might be performed, because they already believe they have an explanation - namely the power of the paranormal.

Lamont has also studied Victorian spiritualism and recreated séances typical of the period using conjuring and psychology. His experiences have confirmed his belief that performing a trick as a pseudo-psychic is often easier than doing it as a magician, because the associations are very different. Using a magic wand to discover a selected playing card looks like trickery, while using a pendulum to locate a chosen Tarot card looks more like the paranormal. Even if nobody knew the real method, in the first case, everyone would assume it was a trick. In the second case, however, many people would assume they had seen a paranormal phenomenon.

Although Wiseman retains an open mind about the possibility of paranormal phenomena, he regularly lectures about paranormal fraud and is keen to educate the public about pseudo-psychics and the psychology of magic: “I want people to be critical thinkers. At the end of the day, I am not really bothered if a person believes in psychic phenomena, as long as they have thought about it critically.”

Part of Wiseman’s motivation for this is the lack of balance in the media: “Psychic stuff sells newspapers and gives TV high viewing figures, but the other side of the story, the straightforward explanation, is much less appealing and is given much less airtime.” According to him, one of the worst offenders was ITV’s *Beyond
Belief series presented by David Frost. Wiseman says that while the programmes claimed to present scientific demonstrations of the paranormal, there were few experimental safeguards and no detailed analysis. He could explain all the effects using good psychology and techniques within the magician's armoury, and without invoking the paranormal.

When paranormal experiments are done in the laboratory, the results are generally less than astounding. Wiseman's most recent research paper, written with Julie Milton at the University of Edinburgh, was an analysis of 30 - strictly controlled experiments on extrasensory perception (ESP): so-called ganzfeld tests. The bad news for psychics is that this vast amount of data did not support the existence of any paranormal phenomena.

Similar experiments in the 70s and 80s claimed to show evidence for ESP, but it is now generally accepted that they were open to fraud and misinterpretation. Unfortunately, the pro-ESP results of these studies were widely reported and have been cited as reliable evidence. Not surprisingly, the new paper by Wiseman and Milton has received virtually no coverage, presumably because its conclusion does not support the existence of the paranormal. After six hours in the company of magicians, I leave the Magic Circle with an even healthier level of scepticism about the paranormal than when I entered. Peter Lamont also recommends his book as reference material, Lamont, P. & Wiseman, R. (1999) Magic in theory: an introduction to the theoretical and psychological elements of conjuring (University of Hertforshire Press).
2. TALL TALES ON INTELLIGENCE

a. Bigger and Better? Brain Size and Species
Dr David Carey, School of Psychology, University of Aberdeen

You may expect larger animals to have larger brains and if so is there a relationship between body size and brain size? This relationship is studied for the following reasons:

- It may help us to learn something interesting about brains, cognition, and intelligence in general;
- If there is a general relationship between body and brain size, then we need to factor it out when talking about brain size and intelligence (or cognition), for example, cows have bigger brains than most monkeys, but that most likely has more to do with cows having larger bodies than large cow intelligence.

There are multiple methods for studying the brain and its relationship to behavioural complexity, the methods used are:

- Looking at the absolute magnitude of the brain;
- Measuring volume of grey matter versus volume of nerve cells;
- Looking at specific brain structures;
- Measuring brain size versus body size;
- Measuring cortical folding;
- Measuring neocortex;
- And looking a specific brain structures.

For further information and classroom based exercises refer to the following websites:
Neuroscience for Kids- Brain Comparisons
http://faculty.washington.edu/chudler/compare2.html
Brain and Body Size and Intelligence
http://serendip.brynmawr.edu/bb/kinser/Int3.html

b. Intelligence
Professor Michael Anderson, Department of Psychology, the University of Western Australia, Perth
Anderson (2001), Conceptions of Intelligence, Journal of Child Psychology and Psychiatry

Abstract
This paper argues for the scientific utility of the concept “intelligence”. In the first section three common arguments against the validity of general intelligence are discussed and dismissed. The second section presents the evidence in favour of the proposition that individual differences in IQ may be based on differences in speed of information processing. However, the third section shows that executive functions, particularly inhibitory processes, represent a more likely basis for the development of intelligence. The theory of the minimal cognitive architecture underlying intelligence and development (Anderson, 1992a) shows how speed and executive functioning might represent two dimensions to one an individual differences (within age) dimension based on speed and the other a developmental dimension based on changing executive functioning. In the fourth section this theory is used to generate new insights on the nature of intellectual disability and specific cognitive deficits and to make practical suggestions for educational intervention for low-IQ children.

Key Words: Cognition; developmental delay; educational attainment; executive function; intelligence; learning difficulties; mental retardation.

Correspondence
Requests for reprints to: Dr Michael Anderson, Department of Psychology, University of Western Australia, Nedlands, Perth WA 6097, Australia (E-mail: mike@psy.uwa.edu.au).

c. Myths about Intelligence and Old Age
Professor Ian J Deary FBA FRSE, Professor of Differential Psychology, Department of Psychology, University of Edinburgh

Welcome to the Lothian Birth Cohort 1921 Study (LBC1921).
A cohort is a group of people who share something in common. The participants in this study share their year of birth - 1921 - and the study has been gathering information about them from their childhood onwards. The study is based in the Lothian Region of Scotland.

The project is examining lifetime influences on the process of cognitive ageing (changes in thinking skills with age). Some of the factors that may be important are: early life cognitive ability, social and economic circumstances, and genes. See the links below to find more information about the project, the research team, study publications, and related projects. If you have any queries, please do not hesitate to contact us at: Lothian Birth Cohort 1921 Study, Department of Psychology, School of Philosophy, Psychology and Language Sciences, The University of Edinburgh, 7 George Square, Edinburgh, Scotland, EH8 9JZ.

Taken from http://psy-web.psy.ed.ac.uk/research/lbc/LBCpublications.htm
3. **Facts and Fallacies about Bilingualism**

Professor Antonella Sorace, Professor of Developmental Linguistics, Linguistics and English Language, University of Edinburgh

Anyone who has seen a small child switching from one language to another is likely to be amazed - and perhaps envious - at how effortlessly they are able to do this. Stories of immigrant children interpreting for their parents are commonplace, and in some parts of the world it is quite normal for children to be exposed to two or even more languages right from birth. Yet in modern industrial societies, growing up with more than one language is often regarded as 'special'. Bilingualism is still surrounded by false beliefs and misunderstandings, even among the otherwise educated and scientifically minded. Many people are ready to believe that handling two languages at the same time is too much of a burden for the infant’s brain, or that the languages compete for resources in the brain at the expense of general cognitive development. The contrast between these false beliefs and the amazement often expressed by people at how easily children pick up two or more languages can be seen as a ‘bilingual paradox’.

Professor Antonella Sorace is involved in raising the awareness of bilingual families, educators, and policymakers by disseminating the results of research on bilingual development and cognition. She has been addressing the following questions:

i  **Don’t children get confused when they hear two languages spoken around them?**

The short answer is no. Children are incredibly sensitive to the different ways people speak. Even when they only hear one language, they learn very quickly about differences between the way men and women talk, the difference between polite and impolite ways of talking, and so on. For children, the bilingual situation is just a matter of another difference between people!

Fifty years ago educators throughout North America used to tell immigrant parents that it was better for their children’s schooling if they spoke English at home. Some researchers thought that early exposure to two languages put children at a disadvantage. Newer research tells us that this is not so, and there may be advantages to being bilingual (in addition to knowing more than one language), such as more flexible thinking. The disadvantages that earlier research found were generally economic disadvantages, linked to the hardships of immigrants’ lives.

Bilingual development sometimes results in slightly slower language development than for some monolingual children. Our older child was still saying things like *Where you are?* instead of *Where are you?* in English at four and a half. This is a normal developmental stage for monolingual English children, but they usually figure out that they have to say *Where are you?* by the time they’re three or four. Our older child just took a little longer.

ii  **Do bilingual children ever mix their languages up?**

Like adult bilinguals, bilingual children often use words from one language when speaking the other. (This is called code-switching.) But this doesn’t mean they are confused about which language they are speaking. In our Italian-English bilingual home, a lot of our food vocabulary is Italian, and we use this even when we’re speaking English (and when English words are available). So we’ll talk about pollo instead of chicken and sugo instead of sauce. Yet in speaking to monolinguals, bilingual children are careful to use only the relevant language.

iii  **So how do we start teaching our children two languages?**

The main thing to keep in mind is that parents don’t really teach children to speak, any more than they teach them to walk or smile. The most important things in language development are exposure and need. If children are exposed to a language in a variety of circumstances with many different people from the time they are born, and if they feel they need the language to interact with the world around them, they will learn it. If they are exposed to two languages in varied circumstances with different people from the moment they are born, and if they need both languages to communicate with the people around them, they will learn both.

iv  **Do you really mean that if our children are exposed to two languages from birth they will learn both, just like that?**

No, but children can do this with no difficulty, and it doesn’t do them any harm. The hard part is making sure they have enough natural exposure to both languages. Most of the time, one of the two languages you want them to learn will be more important somehow, and the trick is to provide enough opportunities for them to use the less important one in a way that isn’t forced or artificial. The best way, if you can manage it, is to put children in situations where only the less important language is used so that there is no temptation to mix languages or revert to the more important language.
v What do you mean by saying that one language is more important?

One language is likely to seem more important to children when that language is needed more frequently than the other. For example, suppose the American woman and Turkish man in the bilingual home speak to each other in English, the children will notice that English is used in cases where Turkish isn’t and think that English is more important. But if the same family moves to Turkey, the children will notice that Turkish is used in lots of cases where English isn’t, and may decide Turkish is more important. Some children are very sensitive to these differences and may be reluctant to use the less important language — especially if other children don’t use it. Others don’t seem to mind.

When we talk about one language being more important here, we’re only talking about the children’s point of view! Nonetheless, many adult bilinguals are dominant in one of their languages. Even if the differences between their two languages are subtle, most bilinguals feel slightly more at home in one language than the other in certain settings or for talking about certain topics.

vi Would it be better to start teaching the second language after children have a good start on the first?

No, definitely not, especially in the bilingual home situation where the second language is likely to seem less important to the children anyway. Introducing the second language later is just about guaranteed to make them think it’s less important and not worth the effort.

On the other hand, in the bilingual setting situation (say, the Korean couple living in the United States), there isn’t any harm in letting children’s exposure to English begin naturally and gradually. As long as the family stays in the US and the children go to American schools, there is no risk that they will fail to learn English. Actually, the more common problem with the bilingual setting situation is that the children sometimes reject their home language in favour of the outside language.

vii My partner and I speak different languages. Should we only speak to our children in our own language if we want them to be bilingual?

Many experts recommend the one-parent-one-language method for a bilingual home. The idea is that Mommy (or Mamma, or Mutti) always speaks her own language with the children, and Daddy (or Papa, or Vati) always speaks his own language with them. This is a good basis for a successful bilingual home, but it’s not the only one, and even one-parent-one-language can go wrong.

viii What are some of the problems with one-parent-one-language?

One problem can be balance. Children need to hear both languages often and in a variety of circumstances. If they never hear the less important language except from one parent, they may not get enough exposure for that language to develop naturally. It is especially true that when both parents understand the more important language, the children don’t feel they need the less important one. In these cases it is essential to find other sources of exposure and other ways of creating the sense of need. Monolingual grandparents can be especially helpful! Can you enlist a cousin or grandmother or a paid babysitter who speaks the other language to look after the children? Is there a daycare or playgroup where they can hear the other language? Can you get videos and story tapes in the other language? All of these can make a big difference - especially exposure that involves interaction with other people, not just watching TV. When our children were small, we did things like this to reinforce Italian in a largely English-speaking setting.

Another problem is keeping the situation natural. If children feel that they are being forced to do something weird or embarrassing, they will probably resist it. Explicit rules - say, speaking one language on some days and the other on others - can be very hard to enforce and can help create a negative attitude.

Still another problem is exclusion. If one of the parents doesn’t speak the other’s language (in our example, suppose the American woman doesn’t speak Turkish), the children will know that every time they say something in Turkish to their father they are excluding their mother from the conversation. This may make children reluctant to speak one of the parents’ languages when both parents are present. In our experience, a bilingual home is more likely to succeed if both parents at least understand both languages — that way, nobody is ever excluded from a family conversation.

ix What about siblings?

The arrival of a second child can upset the language balance in a bilingual home, and it’s common for a second child to be less fully bilingual than the first. Usually the first child speaks to the second in the more important language, increasing the exposure the second child gets to that language and decreasing the sense of need for the less important one. Think about what you want to do about this in advance. Come up with a strategy that fits your own situation — but it’s probably worthwhile to try to enlist the older child or children to promote the less important language in your home situation.
My children used to speak our home language just fine, but now that they’re going to school, they mix it up with English all the time. What can I do?

Relax. Language mixing is normal where everyone speaks both languages. It doesn’t mean that the children will forget one language, and it doesn’t mean that they can’t tell the difference any more between two languages. If you scold them for speaking English it may create a negative attitude about the home language and actually make things worse. Instead, create natural situations where the children really need the home language — like calling on those monolingual grandparents again!

You can understand this kind of language mixing if you keep in mind that simple exposure is an important ingredient of children’s language development. When your children were small, they were probably more exposed to your home language — say Korean — than they were to English. Now that they are going to school, they are exposed only to English for hours a day, and they are learning all kinds of new words and new ways of using language — but only in English. They probably don’t know the Korean word for notebook or social studies or principal. When they use an English word in a Korean sentence, tell them what it’s called in Korean rather than worrying that they’re losing their home language. Remember, even if they end up with English as their dominant language, they can still be perfectly competent Korean speakers as well.

http://www.ling.ed.ac.uk/~antonell/generalpublic.html

Professor Antonella Sorace’s website also includes the article she wrote for Sergio Della Sala’s book on Tall Tales about the Mind and Brain

b. Are we in our Right Minds?
Professor Michael C Corballis, Department of Psychology, University of Auckland

Students might like to simply measure their handedness, as an indication of the relative frequencies of left- and right-handers.

Below is a list of supporting articles. Attention is drawn especially to those with asterisks which are Professor Corballis’ books in this area specifically, and his chapter in the new book, Tall Tales.

c. Lie Detection: Pitfalls and Opportunities
Professor Aldert Vrij, Professor of Social Psychology, Department of Psychology, University of Portsmouth

Detecting deception by manipulating cognitive load
Aldert Vrij, Ronald Fisher, Samantha Mann and Sharon Leal

The traditional arousal-based approach

Concern with crime and terrorism makes it increasingly important to be able to detect lying. Most lie detection tools used to date are arousal-based protocols. The majority of these protocols are based on the assumption that, because of their fear of being caught, liars will be more aroused when answering key relevant questions (“Did you steal the money?”) than when answering comparison questions.

However, according to the US National Research Council’s well documented report [1], this premise is theoretically weak. Liars do not necessarily reveal more signs of arousal when answering key questions. Conversely, truth tellers might be anxious and hence show signs of arousal when answering key questions.
ii Orienting-based arousal approach

Another arousal approach to detecting deception is based upon the premise that liars will show enhanced orienting responses when they recognise crucial details about the crime in the key questions [2]. Suppose a body was found in the kitchen, but the suspect denies knowledge of the crime. The suspect could then be asked where the body was found: “in the bedroom, bathroom, kitchen or living room?” Interview protocols designed to demonstrate orienting responses could be difficult to apply, however, because they require the examiner to possess specific knowledge about the crime, and also because they require impractically sophisticated equipment to measure physiological responses (e.g. skin conductance, EEG).

iii The innovative cognitive-load approach

Given the theoretical weakness of the fear-based arousal approach and the practical difficulties of the orienting-based arousal approach, we propose a new approach to discriminate between liars and truth tellers. This novel approach rests on the premise that, in interview settings, lying is cognitively demanding. This extra cognitive demand is caused by liars having to engage in additional tasks: inferring what others are thinking, ‘keeping their story straight’ and monitoring and controlling their behaviour, so that they avoid creating the impression of lying.

Many sources support the premise that lying is cognitively demanding. First, in police interviews with real-life suspects, lies are accompanied by increased pauses, decreased blinking, and, for males, decreased hand and finger movements, all of which are signs of cognitive load [3, 4]. Second, police officers who saw videotapes of interviews with suspects judged that the suspects were thinking harder when they lied than when they told the truth [5]; third, participants in mock-suspect experiments directly assessed their own cognitive load during interviews and reported that lying was more cognitively demanding than truth telling [6]. Fourth, deceiving is associated with activating executive ‘higher’ brain centres such as the prefrontal cortex [7]. Increased activation in these areas inhibits ongoing unnecessary motor behaviours (e.g. fidgeting) [8]. This last finding might account for two interesting phenomena: (i) when police officers examined video fragments of real-life suspect interviews, they thought that the suspects looked less nervous when they lied than when they told the truth [5], and (ii) professional lie detectors, who focus on suspects’ fidgeting behaviour, are poor at detecting deception [9].

If lying is cognitively demanding, then attending to signs of cognitive load should improve people’s ability to detect deception. In experimental testing, police officers discriminated between liars and truth tellers more accurately when asked “How hard is the person thinking?” than when asked “Is the person lying?” [9]. Moreover, only when asked to look for cues of cognitive demand (‘thinking hard’), did they pay attention to the cues that actually discriminate between truth tellers and liars, such as decreased hand movements.

Lie detection could be enhanced further by using interview techniques strategically to increase interviewees' cognitive demand; for example, by requiring interviewees to perform a concurrent secondary task (‘time-sharing’) while being interviewed. Liars, whose cognitive resources will already be partially depleted by the act of lying, should find this additional, concurrent task particularly debilitating. This should show up as a poorer performance on the primary task (e.g. providing a statement during the interview), and also on the secondary task (e.g. remembering information provided through a set of headphones). We would encourage researchers to develop manipulations to increase cognitive load during interviews, and to develop new dependent measures of cognitive load, in the service of enhancing lie detection.

Acknowledgements

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References

[1] National Research Council (2003), The Polygraph and Lie Detection, Committee to review the scientific evidence on the polygraph (2003), The National Academic Press, Washington, DC


d. Massimo Polidoro’s Magic Show

Massimo Polidoro

The *Fortean Times* frequently contains articles on bizarre things that quite often are due to perceptual mistakes - like, seeing a face in a rock formation, for example. As a classroom activity, after seeing such pictures in this magazine you could invite your students to collect similar images or take pictures around their house or town where a face could be recognised in some natural formation, in a stain on the wall, in a shadow, in the clouds and so on. (This is something that will be discussed during the lecture at the Tall Tales Conference and students may be invited to contribute their collection of images, on the day.)

Here is the webpage address where these images can be found:
http://www.forteantimes.com/gallery/simulacra.shtml

If students could also view magic shows such as those of Derren Brown or David Copperfield, then how the mind is tricked in similar instances could also be discussed.
It happens at least once every month. Sometimes, rarely, it happens twice a month. Up there in the sky, is it a bird? Is it a plane? No, it’s a FULL MOON.

Popular legend has it that the full moon brings out the worst in people: more violence, more suicides, more accidents, and more aggression. The influence of the moon and behaviour has been called The Lunar Effect or The Transylvania Effect. The belief that the full moon causes mental disorders and strange behaviour was widespread throughout Europe in the middle ages. Even the word lunacy meaning insanity comes from the Latin word for moon.

You may hear people say, “Just ask an emergency room nurse or a police phone operator. They will tell you that they are busier on nights when there is a full moon.” Is there scientific evidence to support these beliefs? Let’s look at the data.

i Problems Studying the Lunar Effect

Perhaps one of the first things that you notice about these studies is that the results are inconsistent. Some studies show that a particular behaviour will occur more often during the full moon and other studies show no relationship between behaviour and the full moon. This finding alone casts doubt on the theory that the full moon influences behaviour. It may also be that experiments have been designed differently. For example, some studies include full moon behaviours that occur a few days before and after the full moon, while other studies include only those behaviours within a single day of the full moon.

ii Selective Memory

Because many people believe that the full moon can affect behaviour, experiments must be designed carefully to eliminate the possibility that people’s beliefs will influence the data. For example, if people know that they are in an experiment which studies how the moon affects behaviour, they may act in ways that change the results. It is possible that people have a selective memory for strange events that happen on the full moon; they remember strange incidents that occur during a full moon, but forget when these same things happen at other times.

iii Correlation Does NOT Mean Causation

It is also important to remember that studies that examine relationships between behaviour and the phase of the moon determine only correlations. These types of studies determine if one set of numbers varies in a reliable manner with another set of numbers. If they do, then it can be said that a relationship exists.

The existence of a relationship between two variables DOES NOT mean that one variable causes the other variable. For example, if you looked for a relationship between the number of points scored by a basketball team and the number of books checked out of a library on different days, you might find a significant relationship. This doesn’t mean that the score of basketball games causes people to check out library books or that checking out library books causes the basketball team to score more points. The reason why these two activities vary in a similar fashion is completely unknown and untested. It just happens that the two measurements vary in a related fashion.

In the basketball/library book example, the relationship could be caused by many things, maybe even by the weather. Maybe there was a lot of rain when the basketball scores and library books were counted. Perhaps the rain caused the basketball players to practice more (resulting in more points scored) and caused more people to visit the library (resulting in more checked-out books).

Some experiments do show that on days with a full moon there is more abnormal behaviour. However, many of these studies have been criticised because they were not performed properly. For example, some of these experiments:

- tested only a few people over a short period of time;
- did not analyse the data with proper statistical tests;
- did not take into account the day of the week on which the full moon occurred;
- did not take into account whether the full moon occurred on a holiday or a weekend.

The full moon appears once every 29.53 days.
Sometimes there are two full moons in one month. It is possible to have a month without a full moon, but this does not happen very often and it can happen only in the month of February. You will have to wait until February 2018 for the next month without a full moon.

Taken from, and for further information, refer to the website, http://faculty.washington.edu/chudler/moon.html

b. Why do we believe in Strange Things?
Professor Chris French, Professor of Psychology, Psychology Department, Goldsmiths College, University of London

http://www.goldsmiths.ac.uk/apru/lectures

There can be little doubt that the paranormal is accepted as real by the majority of the British public. A poll carried out in 1998 put the figure at over 60% (Daily Mail, Feb. 2, 1998). Although, most of the evidence put forward in support of paranormal claims is in fact very much weaker than indicated in media presentations.

However, the perceived general cultural acceptance of the paranormal reinforces, for many people, their own personal experiences of ostensibly paranormal events. The challenge to those who adopt the working hypothesis that paranormal forces do not exist is to provide plausible non-paranormal accounts, supported by strong empirical evidence, wherever possible, of the ways in which psychological and physical factors might combine to give the impression that a paranormal event had occurred when, in fact, it had not.

Explanations require the consideration of such factors as cognitive biases, anomalous psychological states, personality factors, developmental issues, and the nature of memory, the psychology of deception and self-deception, and a range of other psychological variables.

Anomalistic psychology may be defined as the study of extraordinary phenomena of behaviour and experience, including (but not restricted to) those which are often labelled paranormal. It is directed towards understanding bizarre experiences that many people have without assuming a priori that there is anything paranormal involved. It entails attempting to explain paranormal and related beliefs and ostensibly paranormal experiences in terms of known psychological and physical factors.

Psychology, neurology, and anomalistic psychology may be defined as the study of extraordinary other scientific disciplines that are rich with explanatory models for human experiences of many kinds, but these models are rarely extrapolated to attempt to explain strange and unusual experiences. The paranormal is here defined as "alleged phenomena that cannot be accounted for in terms of conventional scientific theories"; although it is recognised that new discoveries in physics, biology, and other sciences may be of relevance in understanding anomalous experiences.

The definition of the paranormal adopted by those working in this area typically goes beyond the core phenomena of ESP, PK, and life after death, and includes such topics as belief in astrology, UFOs, dowsing, the Bermuda triangle, and so on. It should be noted that the aims of anomalistic psychology would still be valid even if the existence of paranormal forces were to be established beyond doubt, because there is little question that most paranormal claims can be plausibly explained in non-paranormal terms.

Research within these areas covers the following topics within anomalistic psychology including (but not limited to):

- Cognitive biases related to ostensibly paranormal experiences
- Personality characteristics associated with paranormal belief and experience
- The development and maintenance of paranormal and related beliefs
- The functions of paranormal and related beliefs
- Altered states of consciousness
- Hypnosis
- Dissociative states, including dissociative identity disorder
- False memories
- Reality monitoring
- The psychology of deception and self-deception
- Placebo effects
- The psychology of psychic readings
- The psychology of superstition
- The psychology of coincidences
- Hallucinations
- Sleep-related disorders, including sleep paralysis
- Religious experiences and religious beliefs
- Critical evaluation of specific paranormal claims
- The media and the paranormal
Non-paranormal accounts for a range of ostensibly paranormal experiences including:

- ESP
- PK
- Psychic readings
- Psychic healing
- Alternative and complementary medicine
- Out-of-body and near-death experiences
- Astrology and other divinatory techniques
- Reincarnation
- UFOs and alien abduction
- Ghosts and poltergeists
- Crystal power
- Dowsing

Taken from the website
http://www.goldsmiths.ac.uk/apru/what.php

c. The Belief Engine
Professor James E Alcock, Department of Psychology, University of York, Toronto

Professor Alcock focuses on his idea of the Belief Engine and the following is taken from his original article on this theme (which can be found online at http://www.csicop.org/si/9505/belief.html. In addition this website also provides further information.)

Our brains and nervous systems constitute a belief-generating machine, a system that evolved to assure not truth, logic, and reason, but survival. The belief engine has seven major components.

The following beliefs are strongly held by large numbers of people. Each of them has been hotly disputed by others:

- Through hypnosis, one can access past lives;
- Horoscopes provide useful information about the future;
- Spiritual healing sometimes succeeds where conventional medicine fails;
- A widespread, transgenerational Satanic conspiracy is afoot in society;
- Certain gifted people have been able to use their psychic powers to help police solve crimes;
- We can sometimes communicate with others via mental telepathy;
- Some people have been abducted by UFOs and then returned to earth;
- Elvis lives;
- Vitamin C can ward off or cure the common cold;
- Immigrants are stealing our jobs;
- Certain racial groups are intellectually inferior;
- Certain racial groups are athletically superior, at least in some specific sports;
- Crime and violence are linked to the breakdown of the traditional family;
- North Korea’s developing nuclear capability poses a threat to world peace.

Despite high confidence on the part of both believers and disbelievers, in most instances, neither side has much, if any, objective evidence to back its position. Some of these beliefs, such as telepathy and astrology, stand in contradiction to the current scientific worldview and are therefore considered by many scientists to be irrational. Others are not at all inconsistent with science, and whether or not they are based in fact, no one would consider them to be irrational.

Nineteenth-century rationalists predicted that superstition and irrationality would be defeated by universal education. However, this has not happened. High literacy rates and universal education have done little to decrease such belief, and poll after poll indicates that a large majority of the public believe in the reality of ‘occult’ or ‘paranormal’ or ‘supernatural’ phenomena. Why should this be so? Why is it that in this highly scientific and technological age superstition and irrationality abound?

It is because our brains and nervous systems constitute a belief-generating machine, an engine that produces beliefs without any particular respect for what is real or true and what is not. This belief engine selects information from the environment, shapes it, combines it with information from memory, and produces beliefs that are generally consistent with beliefs already held. This system is as capable of generating fallacious beliefs as it is of generating beliefs that are in line with truth. These beliefs guide future actions and, whether correct or erroneous, they may prove functional for the individual who holds them. Whether or not there is really a Heaven for worthy souls does nothing to detract from the usefulness of such a belief for people who are searching for meaning in life.

Nothing is fundamentally different about what we might think of as irrational beliefs; they are generated in the same manner as are other beliefs. We may not have an evidential basis for belief in irrational concepts,
but neither do we have such a basis for most of our beliefs. For example, you probably believe that brushing your teeth is good for you, but it is unlikely that you have any evidence to back up this belief, unless you are a dentist. You have been taught this, it makes some sense, and you have never been led to question it.

If we were to conceptualize the brain and nervous system as a belief engine, it would need to comprise several components, each reflecting some basic aspect of belief generation. Among the components, the following units figure importantly:

- The learning unit;
- The critical thinking unit;
- The yearning unit;
- The input unit;
- The emotional response unit;
- The memory unit;
- The environmental feedback unit.

i The Learning Unit

The learning unit is the key to understanding the belief engine. It is tied to the physical architecture of the brain and nervous system; and by its very nature, we are condemned to a virtually automatic process of magical thinking. ‘Magical thinking’ is the interpreting of two closely occurring events as though one caused the other, without any concern for the causal link. For example, if you believe that crossing your fingers brought you good fortune, you have associated the act of finger-crossing with the subsequent welcome event and imputed a causal link between the two.

Our brain and nervous system have evolved over millions of years. It is important to recognise that natural selection does not select directly on the basis of reason or truth; it selects for reproductive success. Nothing in our cerebral apparatus gives any particular status to truth. Consider a rabbit in the tall grass, and grant for a moment a modicum of conscious and logical intellect to it. It detects a rustling in the tall grass, and having in the past learned that this occasionally signals the presence of a hungry fox, the rabbit wonders if there really is a fox this time or if a gust of wind caused the grass to rustle. It awaits more conclusive evidence. Although motivated by a search for truth, that rabbit does not live long. Compare the late rabbit to the rabbit that responds to the rustle with a strong autonomic nervous-system reaction and runs away as fast as it can. It is more likely to live and reproduce. So, seeking truth does not always promote survival, and fleeing on the basis of erroneous belief is not always such a bad thing to do. However, while this avoidance strategy may succeed in the forest, it may be quite dangerous to pursue in the nuclear age.

The learning unit is set up in such a way as to learn very quickly from the association of two significant events, such as touching a hot stove and feeling pain. It is set up so that significant pairings produce a lasting effect, while non-pairings of the same two events are not nearly so influential. If a child were to touch a stove once and be burned, then if the child were to touch it again without being burned, the association between pain and stove would not automatically be unlearned. This basic asymmetry-pairing of two stimuli has an important effect, while presenting the stimuli unpaired (that is, individually) has a much lesser effect, is important for survival.

This asymmetry in learning also underlies much of the error that colours our thinking about events that occur together from time to time. Humans are very poor at accurately judging the relationship between events that only sometimes co-occur. For example, if we think of Uncle Harry, and then he telephones us a few minutes later, this might seem to demand some explanation in terms of telepathy or precognition. However, we can only properly evaluate the co-occurrence of these two events if we also consider the number of times that we thought of Harry and he did not call, or we did not think of him but he called anyway. These latter circumstances, these non-pairings, have little impact on our learning system. Because we are overly influenced by pairings of significant events, we can come to infer an association, and even a causal one, between two events even if there is none. Thus, dreams may correspond with subsequent events only every so often by chance, and yet this pairing may have a dramatic effect on belief. Or we feel a cold coming on, take vitamin C, and then when the cold does not get to be too bad we infer a causal link. The world around us abounds with coincidental occurrences, some of which are meaningful but the vast majority of which are not. This provides a fertile ground for the growth of fallacious beliefs. We readily learn that associations exist between events, even when they do not. We are often led by co-occurring events to infer that the one that occurred first somehow caused the one that succeeded it.

We are all even more prone to error when rare or emotionally laden events are involved. We are always looking for causal explanations, and we tend to infer causality even when none exists. You might be puzzled or even distressed if you heard a loud noise in your living room but could find no source for it.
ii The Critical-Thinking Unit

The critical-thinking unit is the second component of the belief engine, and it is acquired, acquired through experience and explicit education. Because of the nervous-system architecture that I have described, we are born to magical thinking. The infant who smiles just before a breeze causes a mobile above her head to move will smile again and again, as though the smile had magically caused the desired motion of the mobile. We have to labor to overcome such magical predisposition, and we never do so entirely. It is through experience and direct teaching that we come to understand the limits of our immediate magical intuitive interpretations. We are taught common logic by parents and teachers, and since it often serves us well, we use it where it seems appropriate. Indeed, the cultural parallel of this developmental process is the development of the formal method of logic and scientific inquiry. We come to realize that we cannot trust our automatic inferences about co-occurrence and causality.

We learn to use simple tests of reason to evaluate events around us, but we also learn that certain classes of events are not to be subjected to reason but should be accepted on faith. Every society teaches about transcendental things, ghosts, gods, bogeymen, and so on; and here we are often explicitly taught to ignore logic and accept such things on faith or on the basis of other people’s experiences. By the time we are adults, we can respond to an event in either a logical, critical mode or in an experiential, intuitive mode. The events themselves often determine which way we will respond. If I were to tell you that I went home last night and found a cow in my living room, you would be more likely to laugh than to believe me, even though there is certainly nothing impossible about such an event. If, on the other hand, I were to tell you that I went into my living room and was startled by an eerie glow over my late grandfather’s armchair, and that the room went cold, you may be less likely to disbelieve and more likely to perk up your ears and listen to the details, possibly suspending the critical acumen that you would bring to the cow story. Sometimes strong emotion interferes with the application of critical thought. Other times we are cleverly gulled.

Rationality is often at a disadvantage to intuitive thought. The late psychologist Graham Reed spoke of the example of the gambler’s fallacy: Suppose you are observing a roulette wheel. It has come up black ten times in a row, and a powerful intuitive feeling is growing in you that it must soon come up red. It cannot keep coming up black forever. Yet your rational mind tells you that the wheel has no memory that each outcome is independent of those that proceeded. In such a case, the struggle between intuition and rationality is not always won by rationality.

Note that we can switch this critical thinking unit on or off. As I noted earlier, we may switch it off entirely if dealing with religious or other transcendental matters. Sometimes, we deliberately switch it on: “Hold it a minute, let me think this out,” we might say to ourselves when someone tries to extract money from us for an apparently worthy cause.

iii The Yearning Unit

Learning does not occur in a vacuum. We are not passive receivers of information. We actively seek out information to satisfy our many needs. We may yearn to find meaning in life. We may yearn for a sense of identity. We may yearn for recovery from disease. We may yearn to be in touch with deceased loved ones.

In general we yearn to reduce anxiety. Beliefs, be they correct or false, can assuage these yearnings. Often beliefs that might be categorised as irrational by scientists are the most efficient at reducing these yearnings. Rationality and scientific truth have little to offer for most people as remedies for existential anxiety. However, belief in reincarnation, supernatural intervention, and everlasting life can overcome such anxiety to some extent.

When we are yearning most, when we are in the greatest need, we are even more vulnerable to fallacious beliefs that can serve to satisfy those yearnings.

iv The Input Unit

Information enters the belief engine sometimes in the form of raw sensory experience and other times in the form of organised, codified information presented through word of mouth, books, or films. We are wonderful pattern detectors, but not all the patterns we detect are meaningful ones. Our perceptual processes work in such a way as to make sense of the environment around us, but they do make sense, perception is not a passive gathering of information but, rather, an active construction of a representation of what is going on in our sensory world. Our perceptual apparatus selects and organises information from the environment, and this process is subject to many well-known biases that can lead to distorted beliefs. Indeed, we are less likely to be influenced by incoming information if it does not already correspond to deeply held beliefs. Thus, the very spiritual Christian may be quite prepared to see the Virgin Mary; information or perceptual experience that suggests that she has appeared may be more
easily accepted without critical scrutiny than it would be by someone who is an atheist. It is similar with regard to experiences that might be considered paranormal in nature.

v The Emotional Response Unit

Experiences accompanied by strong emotion may leave an unshakable belief in whatever explanation appealed to the individual at the time. If one is overwhelmed by an apparent case of telepathy, or an ostensible UFO, then later thinking may well be dominated by the awareness that the emotional reaction was intense, leading to the conclusion that something unusual really did happen. And emotion in turn may directly influence both perception and learning. Something may be interpreted as bizarre or unusual because of the emotional responses triggered.

Evidence is accumulating that our emotional responses may be triggered by information from the outside world even before we are consciously aware that something has happened. Take this example, provided by LeDoux (1994) in his recent article in *Scientific American* (1994, 270, pp. 50-57):

An individual is walking through the woods when she picks up information, either auditory, such as rustling leaves, or visual, such as the sight of a slender curved object on the ground which triggers a fear response. This information, even before it reaches the cortex, is processed in the amygdala, which arouses the body to an alarm footing. Somewhat later, when the cortex has had enough time to decide whether or not the object really is a snake, this cognitive information processing will either augment the fear response and corresponding evasive behaviour, or will serve to bring that response to a halt. This is relevant to our understanding of paranormal experience, for very often an emotional experience accompanies the putatively paranormal. A strong coincidence may produce an emotional ‘zing’ that points us toward a paranormal explanation, because normal events would not be expected to produce such emotion.

Our brains are also capable of generating wonderful and fantastic perceptual experiences for which we are rarely prepared. Out-of-body experiences (OBEs), hallucinations, near-death experiences (NDEs), peak experiences; these are all likely to be based, not in some external transcendental reality, but rather in the brain itself. We are not always able to distinguish material originating in the brain from material from the outside world, and thus we can falsely attribute to the external world perceptions and experiences that are created within the brain. We have little training with regard to such experience. As children, we do learn to distrust, for the most part, dreams and nightmares. Our parents and our culture tell us that they are products of our own brains. We are not prepared for more arcane experiences, such as OBEs or hallucinations or NDEs or peak experiences, and may be so unprepared that we are overwhelmed by the emotion and come to see such experience as deeply significant and ‘real’ whether or not it is.

Ray Hyman has always cautioned skeptics not to be surprised should they one day have a very strong emotional experience that seems to cry out for paranormal explanation. Given the ways our brains work, we would expect such experiences from time to time. Unprepared for them, they could become conversion experiences that lead to strong belief. When I was a graduate student, another graduate student who shared my office, and who was equally as skeptical as I was about the paranormal, came to school one day overwhelmed by the realism and clarity of a dream he had had the night before. In it, his uncle in Connecticut had died. It had been a very emotional dream, and was so striking that Jack told me that if his uncle died anytime soon, he would no longer be able to maintain his skepticism about precognition; the dream experience was that powerful. Ten years later, his uncle was still alive, and Jack’s skepticism had survived intact.

vi The Memory Unit

Through our own experience, we come to believe in the reliability of our memories and in our ability to judge whether a given memory is reliable or not. However, memory is a constructive process rather than a literal rendering of past experience, and memories are subject to serious biases and distortions.

Not only does memory involve itself in the processing of incoming information and the shaping of beliefs; it is itself influenced strongly by current perceptions and beliefs. Yet it is very difficult for an individual to reject the products of his or her own memory process, for memory can seem to be so ‘real.’

vii The Environmental Feedback Unit

Beliefs help us to function. They guide our actions and increase or reduce our anxieties. If we operate on the basis of a belief, and if it ‘works’ for us, even though faulty, why would we be inclined to change it? Feedback from the external world reinforces or weakens our beliefs, but since the beliefs themselves influence how that feedback is perceived, beliefs can become very resistant to contrary information and experience. If you really believe that alien abductions occur, then any evidence against that belief can be rationalized away, in terms of conspiracy theories, other people’s ignorance, or whatever.
As mentioned earlier, fallacious beliefs can often be even more functional than those based in truth. For example, Shelley Taylor, in her book *Positive Illusions*, reports research showing that mildly depressed people are often more realistic about the world than are happy people. Emotionally healthy people live to some extent by erecting false beliefs, illusions that reduce anxiety and aid well-being, whereas depressed individuals to some degree see the world more accurately. Happy people may underestimate the likelihood of getting cancer or being killed, and may avoid thinking about the ultimate reality of death, while depressed people may be much more accurate with regard to such concerns.

An important way in which to run reality checks on our perceptions and beliefs is to compare them with those of others. If I am the only one who interpreted a strange glow as an apparition, I am more likely to reconsider this interpretation than if several others share the same view. We often seek out people who agree with us, or selectively choose literature supporting our belief. If the majority doubts us, then even if only part of a minority we can collectively work to dispel doubt and find certainty. We can invoke conspiracies and cover-ups to explain an absence of confirmatory evidence. We may work to inculcate our beliefs in others, especially children. Shared beliefs can promote social solidarity and even a sense of importance for the individual and group.

**In Conclusion**

Beliefs are generated by the belief engine without any automatic concern for truth. Concern for truth is a higher order acquired cognitive orientation that reflects an underlying philosophy which presupposes an objective reality that is not always perceived by our senses.

The belief engine chugs away, strengthening old beliefs, spewing out new ones, rarely discarding any. We can sometimes see the error or foolishness in other people’s beliefs. It is very difficult to see the same in our own. We believe in all sorts of things, abstract and concrete, in the existence of the solar system, atoms, pizza, and five-star restaurants in Paris. Such beliefs are no different in principle from beliefs in fairies at the end of the garden, in ghosts in some deserted abbey, in werewolves, in satanic conspiracies, in miraculous cures, and so on. Such beliefs are all similar in form, all products of the same process, even though they vary widely in content. They may, however, involve greater or lesser involvement of the critical-thinking and emotional-response units.

Critical thinking, logic, reason, science, these are all terms that apply in one way or another to the deliberate attempt to ferret out truth from the tangle of intuition, distorted perception, and fallible memory. The true critical thinker accepts what few people ever accept, that one cannot routinely trust perceptions and memories. Figments of our imagination and reflections of our emotional needs can often interfere with or supplant the perception of truth and reality. Through teaching and encouraging critical thought our society will move away from irrationality, but we will never succeed in completely abandoning irrational tendencies, again because of the basic nature of the belief engine.

Experience is often a poor guide to reality. Skepticism helps us to question our experience and to avoid being too readily led to believe what is not so. We should try to remember the words of the late P. J. Bailey (in *Festus: A Country Town*): “Where doubt, there truth is, ‘tis her shadow.”
### 1. TALL TALES ON MEMORY AND LEARNING

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<th>SUPPORT MATERIAL</th>
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<td>b. The Myth of the Incredible Witness</td>
<td><a href="http://www.youramazingbrain.org/testyourself/eyewitness.htm">http://www.youramazingbrain.org/testyourself/eyewitness.htm</a> Easy to use with lots of different activities for individuals to take part in. There are also resources for classroom-based activities provided. In addition there is a link for teachers (in the top right hand corner) that relates the content within this site to the Curriculum. <a href="http://www.valentinemoore.co.uk/trv/">http://www.valentinemoore.co.uk/trv/</a> This site provides a good bibliography for the student and the teacher. <a href="http://www.innocenceproject.org/">http://www.innocenceproject.org/</a> An interesting site that could be used by students for independent study. The stories, fact sheets and legal information provided could be a good resource for debates on wrongful imprisonment. However, please note the site only provides American examples.</td>
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<tr>
<td>c. The Perils of Intuition</td>
<td><a href="http://davidmyers.org/Brix?pageID=65">http://davidmyers.org/Brix?pageID=65</a> <a href="http://www.davidmyers.org/Brix?pageID=132">http://www.davidmyers.org/Brix?pageID=132</a> These sites are suitable for both students and teachers. They provide a good resource for articles and reading lists on a variety of topics linked to intuition and the information approaches this topic from a wide variety of points of view.</td>
</tr>
<tr>
<td>d. Magic and the Paranormal: The Psychology</td>
<td><a href="http://books.guardian.co.uk/departments/artsandentertainment/story/0,,106836,00.html">http://books.guardian.co.uk/departments/artsandentertainment/story/0,,106836,00.html</a> The article on the magic circle in this web site will provoke initial thoughts and questions which students will then need to research further from other sources. Peter Lamont who cited this article suggests that the most obvious reference would be: Lamont, P. &amp; Wiseman, R. (1999), Magic in theory: an introduction to the theoretical and psychological elements of conjuring, University of Hertfordshire Press. It is now available in paperback. Although he advises that ‘it may be a little dry for school students.’</td>
</tr>
</tbody>
</table>

### 2. TALL TALES ON INTELLIGENCE

<table>
<thead>
<tr>
<th>SUPPORT MATERIAL</th>
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</tr>
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<tbody>
<tr>
<td>a. Bigger and Better? Brain Size and Species</td>
<td>&lt;<a href="http://faculty.washington.edu/chudler/compar">http://faculty.washington.edu/chudler/compar</a> e2.html&gt; &lt;<a href="http://serendip.brynmawr.edu/bb/kinser/Int3.h">http://serendip.brynmawr.edu/bb/kinser/Int3.h</a> tml&gt; &lt;<a href="http://www.highnorth.no/Library/Myths/br-be">http://www.highnorth.no/Library/Myths/br-be</a> an.htm&gt; All three of these web sites contain clear and interesting facts about the brain and experiments associated with the brain. They would be suitable for the teacher as background support information and also as support material that students could access directly for independent study.</td>
</tr>
<tr>
<td>b. Intelligence</td>
<td>N/A</td>
</tr>
<tr>
<td>c. Myths about Intelligence and Old Age</td>
<td>&lt;<a href="http://psyweb.psy.ed.ac.uk/research/lbc/LBCp">http://psyweb.psy.ed.ac.uk/research/lbc/LBCp</a> ublications.html&gt; General reference only.</td>
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### 3. TALL TALES ON LANGUAGE AND COMMUNICATION

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<tbody>
<tr>
<td><strong>a. Facts and Fallacies about Bilingualism</strong></td>
<td>A interesting discussion about bilingualism. It is suitable for students and teachers. The site links to articles, a lecture and interviews which could be used by individuals for independent study or as resources for class-based/ group work debates/ activities.</td>
</tr>
<tr>
<td><a href="http://www.ling.ed.ac.uk/~antonell/generalpublic.html">http://www.ling.ed.ac.uk/~antonell/generalpublic.html</a></td>
<td></td>
</tr>
<tr>
<td><strong>b. Are we in our Right Minds?</strong></td>
<td>N/A</td>
</tr>
<tr>
<td><strong>c. Lie Detection: Pitfalls and Opportunities</strong></td>
<td>N/A</td>
</tr>
<tr>
<td><strong>d. Massimo Polidoro’s Magic Show</strong></td>
<td>An interesting site that students could access directly. There is a photo library full of weird and wonderful images that could spark some interesting debate in the classroom. You could also invite your students to collect similar images or take pictures around their house or town where a face could be recognised in some natural formation, in a stain on the wall, in a shadow, in the clouds and so on and display them back at school.</td>
</tr>
<tr>
<td><a href="http://www.forteantimes.com/gallery/simulacra.shtml">http://www.forteantimes.com/gallery/simulacra.shtml</a></td>
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### 4. TALL TALES ON BRAIN AND BEHAVIOUR

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<tbody>
<tr>
<td><strong>a. Lunar Madness</strong></td>
<td>This site provides access to data (other sites and articles) that either supports or disputes the theory that ‘the moon affects behaviour’. The site therefore provides good background information for teachers for lesson preparation and/or students doing independent study on this area.</td>
</tr>
<tr>
<td><a href="http://faculty.washington.edu/chudler/moon.html">http://faculty.washington.edu/chudler/moon.html</a></td>
<td></td>
</tr>
<tr>
<td><strong>b. Why do we Believe in Strange Things?</strong></td>
<td>This site provides lots of information in relation to ‘belief system’ and links to a discussion forum, online media, online resources, email network, associations and publications. It supplies good background information for teachers for lesson preparation and/or students doing independent study in this area.</td>
</tr>
<tr>
<td><a href="http://www.goldsmiths.ac.uk/apru/what.php">http://www.goldsmiths.ac.uk/apru/what.php</a></td>
<td></td>
</tr>
<tr>
<td><strong>c. The Belief Engine</strong></td>
<td>A concise article about belief systems and would be suitable for individual work as well as background information for teachers carrying out lesson preparation in this area.</td>
</tr>
<tr>
<td><a href="http://www.csicop.org/si/9505/belief.html">http://www.csicop.org/si/9505/belief.html</a></td>
<td></td>
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</tbody>
</table>
In addition the following two books are also recommended in support of this resource:


and


Both of these books summarise the thoughts of the speakers who will be at the Conference *Tall Tales about Mind and Brain*, in an accessible language and are available in paperback.

The Foreword by Alan Baddeley in Professor Sergio Della Sala’s, *Mind Myths*. Exploring popular assumptions about the mind and the brain, explains that currently there is a gap between what scientists know about the mind and brain and the assumptions that others draw from sources of everyday information such as newspapers, popular press and television. *Mind Myths* attempts to close this gap by bringing together top international neuroscientists and psychologists and provides a fascinating and scientifically reliable insight into the neuropsychological and cognitive phenomena that are frequently reported in the media. A multitude of mind myth topics are tackled, for example:

- the resuscitation from coma thanks to a patient’s favourite songs;
- the creativity of the right hemisphere;
- the false memory syndrome;
- the placebo effect;
- learning while sleeping.

*Mind Myths* also includes the remarkably persistent fallacy that we only ever use 10% per cent of our brains, the assumption that our right brain functions as artistic hippies and our left as desiccated accountants!

*Tall Tales about the Mind & Brain: Separating facts from fiction* tackles, for example, some of the following questions:

- Is there such a thing as a gay gene?
- Does the size of the brain matter?
- Does the moon influence our behaviour?
- Can we communicate with the dead?
- Can graphology tell us anything about a person’s character?
- Is the human brain clonable?
- What role do dreams have in cognition?
- Can mind conquer matter and diseases?
- Are out-of-body experiences possible?
- Can we trust our intuitions?

To some, the answer to all these questions might well be a resounding ‘no’, but to many people these represent serious beliefs about the mind and brain - beliefs that drive their everyday behaviour, beliefs that cost them huge amounts of money. Whole industries have been developed, founded on these dubious claims about the mind and brain. Even major corporations have dabbled with assessment methods such as those advocated by graphology, accepting and rejecting candidates on the basis of their handwriting. People subscribe to expensive therapies founded on beliefs rather than science, or risk their health buying books that tell them how they can conquer illness through positive thinking, perhaps at the expense of more scientifically proven treatments.

*Tall Tales about the Mind and Brain* presents a sweeping survey of common myths in a lighthearted and accessible style; it exposes the truth behind these beliefs, how they are perpetuated, why people believe them, and why they might even exist in the first place.
Student evaluation sheets to aid learning and comprehension

1. **TALL TALES ON MEMORY AND LEARNING**
   a. **Memory: A User’s Guide**
      1. Why does your lack of recall hinder you in negotiations or an argument?
      2. How does your memory work?
      3. How can you make your memory work for you?
   b. **The Myth of the Incredible Witness**
      In 75% of cases, mistaken eyewitness ID evidence has lead to wrongful convictions. Provide two psychological reasons that demonstrate how and why eyewitnesses can be mistaken.
   c. **The Perils of Intuition**
      1. Discuss the questions below and in your answers highlight psychologists' views about them:
         - Are some people more skilled at reading people than others?
         - How can we increase our own creative intuition?
         - How accurately do we separate what influences us when predicting the future and recalling the past?
      2. Why is it suggested that the human mind does not give first priority to logic?
         Professor David Myer's article ‘Intuition or Intellect' on his website
         http://www.davidmyers.org/Brix?pagid=132
         describes some examples which demonstrate how our intuitions about reality may be flawed. Who and what are the examples he uses?
   d. **Magic and the Paranormal: The Psychology**
      1. Which psychological principles, does Wiseman suggest, do magicians use to perform magic, such as vanishing tricks?
      2. Explain a case, which Wiseman has investigated, whereby his evidence gathered suggests, that psychics maybe fakes.
      3. Why are results that aim to disprove the paranormal rarely reported?

2. **TALL TALES ON INTELLIGENCE**
   a. **Bigger and Better? Brain Size and Species?**
      1. In Dr. Brynmawr’s website
         http://serendip.brynmawr.edu/bb/kinser/Int3.html
         there is an experiment that demonstrates how ‘simple things can yield surprisingly complex systems’, but do they learn and create categories? Carry out the experiment in order to provide evidence, as to whether simple things that produce complex systems can learn and create categories during the process or not.
      2. In Professor Chudler’s web site
         http://faculty.washington.edu/chudler/compare2.html
         he answers questions about different brain sizes and functions found in a variety of species. Use his website to help you answer the following questions:
         - Do all structures of the brain have a right and left side?
         - How big is a dolphin’s brain?
         - Are there muscles in the brain?
         - Do lobsters have a brain and do they feel pain like humans do?
   b. **Intelligence**
      1. Is intelligence genetic?
      2. Is the environment play a role in determining intelligence?
      3. Should we base our decision - making about education on intelligence differences?
      4. Is intelligence associated with race?
      5. Do we have only one intelligence or several different intelligences?
      6. If one is good at something they will be good at everything; true or false?
      7. Can intelligence be measured? If so, can it be summarised by one factor/ one unique score?
      8. Does intelligence change across the lifespan?
9. Is the social background and the wealth of a person associated with higher intelligence in older life?
10. Does intelligence necessarily decline with age?
11. Can childhood intelligence predict our performance in later life?
12. Does higher education protect against decline in older life?

c. Myths about Intelligence and Old Age

The Lothian Birth Cohort 1921 Study (LBC1921) is examining lifetime influences on the process of cognitive ageing (changes in thinking skills with age). List some of the factors that may be important to this study and explain why.

3. TALL TALES ON LANGUAGE AND COMMUNICATION

a. Facts and Fallacies about Bilingualism

‘Bilingual children are slowed down in their general cognitive development by the burden of handling two languages’

Antonella Sorace’s research suggests that this is a myth. What are her findings and reasoning’s to support this view?

b. Are we in our Right Minds?

Does evidence from current research support the assumption that brain asymmetry is uniquely human?

c. Detection: Pitfalls and Opportunities

1. In experimental testing, which two approaches enabled police officers to discriminate between truth tellers and liars more accurately? Why did these approaches help?
2. When trying to detect lies, four approaches could be used. Describe the differences between each approach and how effective each approach is deemed to be.

4. TALL TALES ON BRAIN AND BEHAVIOUR

a. Lunar Madness

1. Is there scientific evidence to support the belief that the moon affects behaviour?
2. What do we mean by correlation?
3. What experimental controls should be considered when carrying out experiments to try and determine cause and effect? Why do we need to consider these?

b. Why do we believe in Strange Things?

1. Why is there skepticism around paranormal activities?
2. What factors should/ could be considered in order to provide an explanation, in relation to trying to disprove a paranormal experience?
3. What is anomalous psychology?
4. What do we mean by cognitive biases, personality factors, developmental issues, the nature of memory, the psychology of deception and self-deception?

c. The Belief Engine

1. Why is it that in this highly scientific and technological age superstition and irrationality abound?
2. It has been suggested that if the brain and nervous system were to be conceptualised as a belief engine, then the following components would have to be included, each reflecting some basic aspect of belief generation:
   - the learning unit;
   - the critical thinking unit;
   - the yearning unit;
   - the input unit;
   - the emotional response unit;
   - the memory unit;
   - the environmental feedback unit.

Describe the above units and explain how they each play a part in belief generation.
Links to the Higher Human Biology and Psychology Curricula

Human Biology (Higher)

Unit 3: Behaviour, populations and the environment (Higher)

This unit examines some of the internal and external mechanisms that bring about behaviour. The organisation of the nervous system forms a basis for consideration of the cerebral hemispheres and some of the characteristics associated with the functioning of the human cerebral cortex in relation to sensory skills, motor skills, language skills and memory.

Nervous system and memory

Structure and function of the nervous system and its role in memory:

The brain

• Large size of the human brain.
• The cerebrum and its convoluted surface.
• Localisation of function in discrete areas and the function carried out.
• The relationship between the size of a discrete area and the function carried out.

Learning activities

Examine data on clinical observations of brain injuries and lesions, EEGs, brain scans and split brain studies as evidence on the localization of brain functions.

Memory

• Localisation of memory in the brain.
• The processes of encoding, storage and retrieval.
• Short-term memory.
• Transfer of information between short and long term memory.
• The evidence for a molecular basis for memory.

Learning activities

Examine audio-visual material or data on amnesiac studies which demonstrate different types of memory.

Design and carry out an investigation to determine the memory span for letters or numbers.

Carry out an investigation on increasing the memory span of short-term memory by ‘chunking’.

Carry out an investigation on the serial position effect.

Carry out an investigation on the factors which improve retrieval from long term memory.
Links to the Higher Human Biology and Psychology Curricula

Psychology (Higher)
Unit: Psychology: The Individual in the Social Context (Higher)

Domain: Psychology of Individual Differences
The area of psychology within which the study of atypical/abnormal behaviour and psychological disorder is located, and which, therefore, gives rise to wide application in therapy; influence of individual differences in virtually every other area of psychology, e.g. developmental, physiological, cognitive processes.

Topic: Intelligence
• Nature of intelligence; theoretical views of intelligence, including factor theories and information-processing approach.
• Nature-nurture debate in intelligence: effects of early deprivation and environmental enrichment; interactionist approaches.

Domain: Cognitive Psychology
Definition of cognition, the scope of cognitive psychology (i.e. attention, perception, memory, language, problem solving etc.) its place in the historical development of psychology, the current, dominant, information processing approach.

Topic: Memory
• The nature of memory, including its stages, capacity, duration, encoding.
• Models of memory, including the multi-store model and working memory.
• Theories of forgetting, including trace decay, displacement, interference, cue-dependent forgetting, repression and motivated forgetting.
• Application of memory improvement techniques to study and exam skills, for example: mnemonics, visual imagery, context and state dependency, elaborative rehearsal, spider diagrams/pictorial notes.

Domain: Research Methods
Theory about human behaviour – hypothesis – design/conduct research and collect data – support/reject hypothesis and confirm/adjust theory – new hypothesis etc.

Experimental method:
• Types of experiment – laboratory, field, natural/quasi experiments
• Features of the experiment: allows cause and effect conclusions, replicability
• Strengths and weaknesses of experimental methods
• Operationalisation of variables: independent variable and its conditions; dependent variable; control of extraneous and confounding variables
• Experimental designs: independent measures/groups, repeated measures, matched pairs; comparative advantages and disadvantages of each.