Editorial

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Critical thinking is hard to pin down. It means different things to different people, it has different purposes and contexts, and it doesn't always travel well across disciplines. This edition of *Issues* canvasses critical thinking as a way of "thinking about thinking", and as a cognitive approach to new information – making a well-informed judgement.

Tim Mendham is a skeptic – spelled with a 'k' to separate himself from cynics or nay-sayers taking a negative view because of prejudice, fear or ignorance. As President of the Australian Skeptics he professes an open mind rather than an empty head. "Critical thinking is the basic tenet of the skeptical approach," he writes (p.4). "It is an approach that underpins all of its activities and findings, drawing on the scientific method (research, analysis and peer review) to provide the evidence for our points of view."

Comprehension, or "unpacking information", enables evaluation, a key component of critical thinking, says Deborah Graham of James Cook University (p.8). "Effortless thinking" has its place when rapid processing of information is needed, but it can tend to drift into areas where more thought is required. Stereotypes, prevailing thinking, guesswork based on past experience, and perception of authority can all cause or perpetuate such thinking. Conversely, thinking about thinking is empowering as it "puts the individual in control".

Critical thinking can be useful whether you're making a purchase or thinking about religion, as Mendham explains. Edward Sykes of the Australian Science Media Centre takes up the issue of critical thinking about science in the media (p.12). Journalists are often accused of "hyping" science stories, but this can sometimes be traced back to the people writing the media releases on which the articles are based. Sykes offers some tips to journalists sifting through mountains of science in their inboxes. Assessing journal quality and statistics are two of the measures he advises.

Understanding and assessing probability is difficult for many people, explains Peter Bowditch of the Millennium Project and the Australian Council Against Health Fraud (p.16). When big lottery prizes are on offer, "many more people buy tickets … so the probability of any individual number combination winning stays the same but the likelihood of having to share the prize increases, as does the likelihood that someone will win". The effectiveness of health scare campaigns can sometimes be attributed to an ignorance of probability. Uncritical thinkers are easy prey for "selective users" of statistics.

Amanda Wilson and Jane Robertson of the University of Newcastle say that our preoccupation with health, and the less-than-rigorous comparisons of new and existing therapies, is a dangerous mix (p.18). Media stories alerting people to potential health concerns may cause "moral panic … where concerns regarding a lifestyle or health practice are associated with threatening or negative consequences". They list a few simple questions that can help to assess the veracity of health news or claims. The Media Doctor Australia website rates many health stories appearing in Australian media.

Rachael Dunlop, a medical researcher and Vice President of the Australian Skeptics, begins with the statistic that one in two Australian adults are using the internet to self-diagnose medical conditions (p.23). What is the government doing to encourage critical thinking in this situation? During MedicineWise week in February 2011, a government-funded advertising campaign directed consumers to the National Prescriber Service (NPS) website, where questions were

posed to help consumers better understand their medications. Homeopathic preparations are a confusing case: many slip below the registration process because they are so dilute that they are deemed not to have an active ingredient. This, however, does not prevent them from being sold in pharmacies alongside registered products. Furthermore, some homeopathic preparations are registered despite there being "no evidence that homeopathy is any more effective than a placebo". The NPS information about homeopathy is not relieving the confusion, Dunlop says.

Such products are obviously selling; otherwise they wouldn't appear in pharmacies. So why are they popular in the face of contradictory evidence? We may be rationalising rather than reasoning, says Chris Mooney (p.27). "Our 'reasoning' is a means to a predetermined end … and is shot through with biases. They include 'confirmation bias', in which we give greater heed to evidence and arguments that bolster our beliefs, and 'disconfirmation bias', in which we expend disproportionate energy trying to debunk or refute views and arguments that we find uncongenial."

How should critical thinking be taught and what are the outcomes? Many institutions claim that they embed it across the curriculum, but few teach it as a dedicated course. Teaching a Philosophy and Reason course in Queensland schools, Peter Ellerton (p.33) "was quite struck by how the three strands of the course – deductive logic, critical thinking and philosophy – manage to get across just about every thinking skill I have come to believe is essential for good citizenship. Not only that, but state-wide testing shows these students performing at the very highest level across all scientific, numeracy and literacy arenas." Drawing on the "reasoning tools" component of general thinking, Ellerton gives examples of deduction and induction, which "provide the overall architecture of reason, rarely articulated in syllabuses but supplying a very useful framework for developing programs of critical thinking".

Revisiting the idea of empowerment, Fiona Patterson of Monash University and education consulting firm Mind Muse, advocates argument mapping as a tool that can enable students to feel confident to respond to the unknown (p.36). Using the six-stage visual guide, students can document the structure and content of an argument. "Unlike a flow chart showing consequences or a series of explanations, it leads us to accept or reject the main issue under consideration," she says.

"Tests of 'academic reasoning' focus on the mental processes that underpin school and tertiary studies, rather than the specific knowledge and skills of particular academic disciplines," say Sam Hambur and Sean Pywell of the Australian Council for Educational Research (p.41). Although reasoning processes are learned in a particular context, this does not mean they cannot be transferred.

Some methods of teaching do not lead to student ability to apply learning in new situations, says education consultant Caroline Cotton (p.42). Problem-based learning encourages techniques such as synthesis, analysis and evaluation in a group environment. "By solving problems, students also have the opportunity to develop critical thinking skills," Cotton explains. With good problem design and teacher guidance, students move beyond simple recall to "become self-directed learners, are more questioning, collaborate well with others, reflect on their learning, and learn methods and strategies to become good problem-solvers".

Martin Bridgstock of Griffith University holds Ellerton's view that critical thinking is not highly portable (p.44). His chosen arena for teaching critical thinking is paranormal claims. His popular course has caused "skeptical shock" in some of his promising students. They begin to scrutinise their beliefs and those of their family and friends – and the shift in their perspective can be a disturbing experience.

"Biology, cognition and popular culture are all factors that increase our susceptibility to belief and to allow us to misinterpret events as being paranormal," says Krissy Wilson at the University of Tasmania (p.47). Research into the differences between believers and non-believers casts belief in a mostly negative light. Wilson says that despite this there could be a place for belief: as a coping mechanism for the harsh realities of life.

Bridgstock says imparting the skill of critical thinking is a valuable exercise. He says "you must decide exactly what you mean by it, and what areas of knowledge you want it to apply to. Then, engage people's interest and foster active attempts to apply the ideas. It is hard work, and it isn't easy, but the results can be very worthwhile."