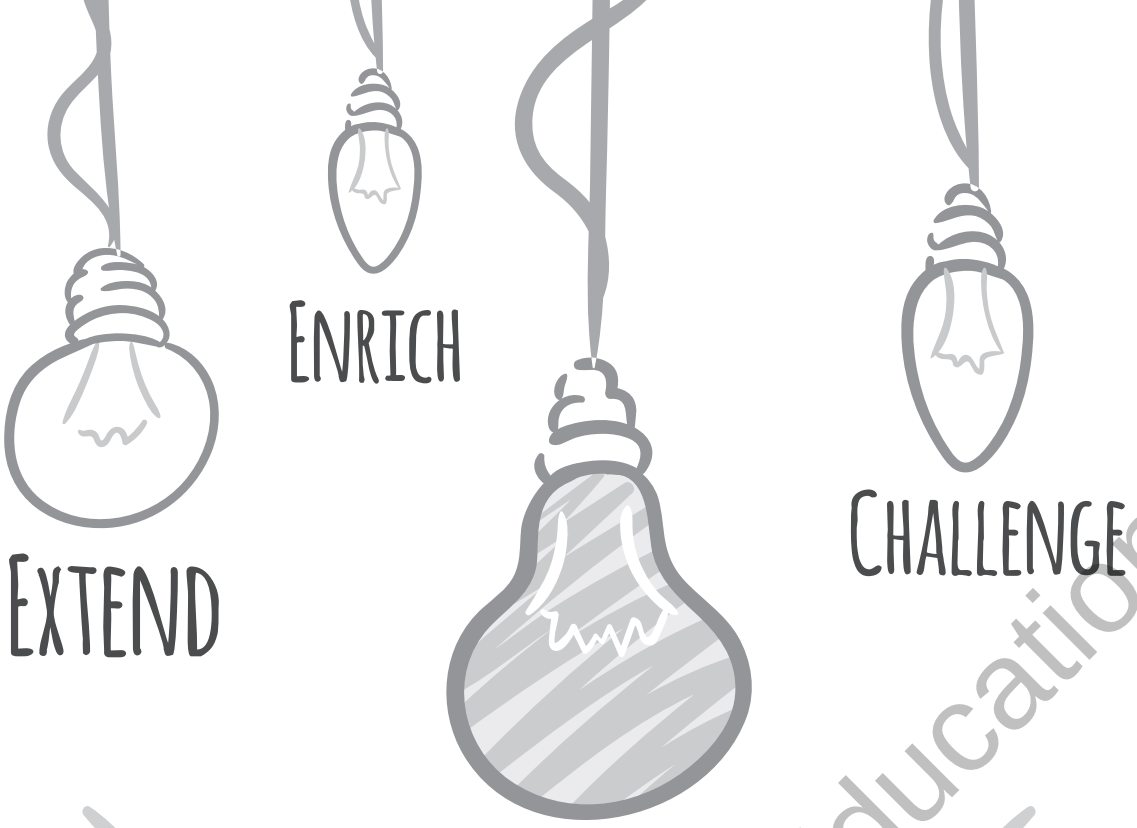

Thought Works

Teaching Critical Thinking to Middle-Years Students

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Contents

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Introduction

The role, or function, of reasoning has often been misunderstood as being wholly concerned with the determining of facts or discovering of truths. It is a misunderstanding that has informed educational practice and even helped shape curricular design. However, the actual role reasoning plays in thinking is, as Plato wisely pointed out to us some 2400 years ago, somewhat more complicated than this. This is because critical thinking is as much a function of reasoning, and is as fundamental to teaching and learning, as is the determining of facts or discovering of truths. ***Thought*works** has been designed to shed some much needed light on the less-understood role that reasoning plays in human enquiry. By unpacking some of the key concepts and understandings that underpin sound critical thinking, the aim of this book, then, is to provide some much needed clarity on the precise nature of reasoning itself.

So what is critical thinking? What is reasoning?

For our purposes it will suffice to define reasoning as that cognitive process or skill that is directed toward the forming of inferences, judgements and conclusions, from facts and logic. Moreover, and following philosopher R. B. Brandt's lead, let us use the term 'rational' to refer to those inferences, judgements and conclusions 'which survive maximal criticism by facts and logic'[1]. It is, I suggest, the development of rational inferences, judgements and conclusions that critical thinking is concerned with and which I believe ought to lie at the very heart of a contemporary education. The reasons for this are many.

Firstly, and as mentioned above, the retrieving, transferring, communicating and storing of facts and data represents only one of the functions of reasoning – critical thinking being the other. Secondly, the onset of the digital age has irrevocably ensured that the classroom teacher can no longer cling to the role of being the sole repository or most efficient disseminator of knowledge and information. The reality perhaps is that she/he never was. This is not to disparage the role of the teacher, quite the contrary. The role of the classroom teacher has now morphed into the expert thinker and facilitator – where rational intelligence, argument and analysis, questioning and critiquing, is expertly modelled and deliberately cultivated. Not since the time of Socrates and Plato has this cornerstone of western classical education become so important.

Thirdly, and to borrow a common catchphrase, we now find ourselves living in a global village, with an increasingly global culture. In this global village, social forces like improved electronic communications, international business and trade, the internet, mass media and social media, and even the environment have radically transformed the educational landscape. In this era of increased cultural diffusion and realignment, particularly toward the Asia-Pacific region, in everything from politics and law, to science, economics and technology, educational providers need to respond accordingly and produce critical thinkers of the highest order, capable of negotiating their way through these emerging challenges. This narrative is not a contemporary one either. Plato's world, the world of disparate city states, each with their own laws and culture, also faced similar challenges as they came into contact first with each other and then with the more advanced civilisations to their east. Then, as now, the educational investment in critical and creative thinking, problem-solving and problem-posing, open-mindedness and intellectual rigour, and the capacity for rational discernment (to analyse and contribute to a range of debates) has become indispensable.

[1].R. B. Brandt, *A Theory of Good and the Right*, (Oxford University Press, 1979), p. 10.

But perhaps the most important reason why sound critical thinking ought to be nurtured in schools is because it is not merely an intellectual virtue confined to the classroom, but an essential life skill, intimately connected to human understanding and happiness. It is no accident, then, that thinking (processes) now feature so prominently in the Australian Curriculum. The educational goal of developing deep, transferable understandings and skills are embedded in its policy fibre.

Of course, teaching and modelling skilful and effective thinking is no easy task, especially at the middle secondary level when students are increasingly, and often independently of their teacher or school, acquiring personal points of view in relation to civics, ethics, beliefs and values. Although different taxonomies and models on *how* to teach thinking have now been around for some time, precious few resources exist that delve into *what* thinking is or, more precisely, what the correct methods of reasoning are. Rightly or wrongly, this has traditionally been confined to the province of logic (philosophy).

My aim, then, in writing this book has been to assist teachers to better understand what sound critical thinking looks like and to provide students in the middle years with concise and accessible activities to hone critical thinking competencies and skills. Written with the view to addressing the general capability categories of critical and creative thinking, ethical behaviour and personal and social competence in the Australian Curriculum, the intention is that ***Thought*works** will help to stimulate authentic classroom discussion and encourage higher-order thinking. Each exercise anticipates the next and either focuses on a particular facet of reasoning, or introduces philosophical problems and enquiries that enable both teacher and student to apply learnt thinking skills. ***Thought*works** has also been positioned to meet the needs of both highly-able students, capable of working at greater depth than their age peers, as well as mixed ability students, or those with purely an interest in, but no prior knowledge of, philosophy. Accompanied by teacher notes, exercises are limited to a page and should ideally be worked through sequentially, allowing students to build on their repertoire of critical thinking competencies and skills.

Chapter 1 begins with a brief overview of some of the key building blocks in logic. These include: the correspondence and coherence theories of truth, possibility and actuality, necessary and contingent sentences, and, of course, the concepts of knowledge, belief and justification. We conclude the chapter with a look at Plato's famous allegory of the cave and Descartes' evil demon argument. In Chapter 2, the theme continues with a look at what characterises sound critical thinking or, more specifically, logical consistency. These include an introduction to what philosophers have dubbed the charge of arbitrariness, the principle of sufficient reason, meaningless statements and the law of excluded middle. The concept of possible worlds is also expanded.

We again continue our exploration of reasoning in Chapter 3, where we turn to the methods of critical thinking and in particular the concept of argument. Deduction and induction are contrasted and different types of inductive reasoning are introduced. We also contrast what it means for an argument to be rationally successful with what it means for an argument to be valid. In Chapter 5 key fallacies in reasoning are introduced and, finally, in Chapter 6, students have the opportunity to use their learnt skills to grapple with some of the most famous (or infamous) problems in philosophy, many of which have dominated western critical thought.

Before one can embark on a quest to understand *how* to teach critical thinking skills, one first needs an introduction into *what* sound critical thinking is. ***Thought*works**, I hope, goes some way to achieving this. But of course it is only a starter. Fostering a culture of critical enquiry can hardly be captured in a book – it is the teacher's role, as carriers of school and class cultures, on whom this onus lays.[2]

[2] For a guide on the sorts of strategies one can use to structure and encourage discussion in the classroom, I recommend Mike Gershon's Discussion Tool-kit which can be found by visiting www.tes.co.uk

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1. The Correspondence and Coherence Theories of Truth

Introduction

What is truth? More specifically, what does it mean for a sentence to be true? Admittedly, it's not something we ordinarily think about. But almost everyone would agree that it is in some sense connected to the world around us – that is, to reality. What this connection is, historically, has been a matter of intense debate. A theory of truth purports to answer this question and two such theories have attracted particular attention. The *coherence theory of truth* states that a sentence is true insofar as it coheres with other sentences that one also happens to hold. In contrast, the *correspondence theory of truth* states that a sentence is true if it corresponds to, conforms or agrees with the way things really are in the world. Supporters of this theory claim that truths correspond to what they call 'facts' or 'states of affairs'. Although defining 'facts' and 'states of affairs' is notoriously difficult, the correspondence theory appears to be the most promising account of truth to date. Indeed, most people today talk as though some sort of correspondence theory is right and in this book we will do so too.

So what, then, is wrong with the coherence theory? Why is coherence alone insufficient to account for truth? Put simply, the reason is because there are just as many coherent untruths (or falsities) as there are coherent truths. That coherence without reference to facts is insufficient to account for truth provides us then with an appropriate starting point for our exploration into the workings of rational thought and is the focus of our first discussion. But, first, a few words about some related concepts:

A sentence, according to our correspondence definition, will, to repeat, be said to be true if it corresponds to 'facts' or 'states of affairs' (the way things really are in the world) and false if it does not. Sentences that can be assigned truth or falsity, known also as truth-values (and of which there are only two) are called *truth-functional.* Sentences that are truth-functional state or declare something about the world and unsurprisingly are called declarative sentences. Note that not all sentences are truth-functional and therefore declarative. Questions, commands and exclamations typically cannot have truth-values assigned to them and so are not truth-functional.

Can sentences, one might ask, have more than one truth-value? Can a sentence, say, be partly true and partly false, or perhaps change from one to the other? Further still, is truth or falsity a matter of degree, or an all or nothing affair? In short, are truths and falsities *universal, absolute and eternal*? The view that we'll be adopting here, and the prevailing view in logic, is that truths and falsities are indeed universal, absolute and ahistorical (eternal).

Sometimes different sentences seem to mean the same, or say the same thing, only in different ways. Thus:

It is the 1st of January.

Today is the first day of the year.

are different sentences but seem to convey the same meaning. That is, they are expressing the same proposition or statement. One could argue, then, that it is propositions which are true or false, or 'carry' the meaning of sentences. However, in this book, we will use the words 'sentence', 'proposition' and 'statement' interchangeably.

To sum up then, to argue that the truth-values of sentences are universal is to argue that truth-values are valid at all places and for everyone. The sentence, 'Adolf Hitler came to power in 1933' or 'All triangles have three sides', would be true irrespective of if they were uttered in Melbourne or Mars (provided, of course that we agreed on the meanings of the terms contained in the sentences). Similarly, to argue that truth-values are *ahistorical* is to argue that the truth-values of sentences are valid in all times. So the sentence 'Adolf Hitler came to power in 1933' or 'All triangles have three sides', would be every bit as true, whether uttered now or in a million years from now. Lastly, to argue that truth-values are absolute is to argue that they are unchanging and immutable.

But, one might object, can ethical or aesthetic truth-claims likewise be said to be universal and ahistorical – that is, valid at all places and in all times? Might they not be entirely relative? Still, others might be tempted to argue that ethical and aesthetic statements are not truth-functional at all but are, instead, more like prescriptions or expressions of emotions. These are all certainly great questions worth pursuing in class but ones we'll be returning to in Chapter V. For now, however, it will suffice to say that relativism (denying the existence of universal truths including and, perhaps especially, ethical ones) is something most philosophers, as we'll later discover, have been desperately eager to avoid.

Understandings

The coherence theory of truth states that a proposition is true insofar as it coheres with some specified set of other propositions. To cohere means to be consistent with. So, for example, for a coherent theorist, the proposition 'James is a child' is true, simply meaning that there exists a set of other propositions (e.g. 'James was born six years ago', 'James is in primary school', 'James still has his baby teeth', etc.) to which the above proposition can also be consistently added. Conversely, for a coherent theorist, the proposition 'Phar Lap is alive' is false, and means that there exists a set of other propositions (e.g. 'Phar Lap's remains are in a museum', 'Phar Lap won The Melbourne Cup in 1930', 'Horses live an average of 20 to 30 years', etc.) to which the above proposition does not cohere. Coherent theorists think that the truth of a proposition is determined by the way it is related to other propositions that are accepted as true. So they think of truth as being relative. Critics argue that the argument looks circular: A proposition is true if it fits in with other propositions. The propositions that it needs to fit in with are the ones that are already accepted – and the ones that are already accepted are those that are considered true. Critics also point out that consistency alone is not enough to ensure truth. The proposition 'Harold Holt was abducted by aliens' is consistent with a set of propositions that one may hold (e.g. 'Harold Holt disappeared while swimming', 'Harold Holt's body has never been found', etc.). But, one would hardly want to accept the proposition 'Harold Holt was abducted by aliens' as true.

The correspondence theory of truth states that a proposition is true if it corresponds to (conforms to or agrees with) the way things really are in the world. To embrace this view is to believe that there are objects, facts or states of affairs, and that to say that a proposition is true is to say that the proposition corresponds to those objects, facts or states of affairs. So, to say that 'Beijing is in China' is true, as it is to say that there exists in the world a country called 'China' and a city called 'Beijing' and that Beijing is related to China by virtue of it being located in it. Correspondence theorists, and there are many varieties of them, have tended to think of truth as something absolute. And, although not perfect, the way most of us use the word truth seems to suggest that we, too, hold some sort of correspondence relationship between propositions that we take to be true and the way the world really is.

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Possible Worlds (Part 1)

Think left and think right and think low and think high
Oh, the thinks you can think up if only you try! – Dr Seuss

Gottfried and Isaac walked out of the classroom, grabbed their lunches and sought out a quiet spot to eat. They would often sit in the play-ground and argue about all sorts of things whenever they had the chance and today was no exception.

Isaac finished his lunch first. He took out a dice from his pocket that he had stolen from class and tossed it in the air. It bounced off his head and landed in front of him.

'Four,' he muttered.

Gottfried stared at the dice and thought deeply about the seemingly innocuous sequence of events he had just witnessed.

'I wonder why?' he asked.

'What do you mean?' said Isaac. 'I threw the dice, and it landed on "four".'

'Yes, but why did it land on "four" and not "one" or "two", or "three", "five" or "six", for that matter? Any of these were equally possible. Why did it land on "four"?'

'Well that's easy,' said Isaac. 'I suppose it was possible for it to have landed on something different, but it landed a "four" because of the way I initially held the dice, the force of my throw coupled with the wind resistance, gravity, direction and speed and … '

'Yes. Of course I know that!' Gottfried interrupted.

Isaac seemed pleased with himself, but Gottfried was far from finished.

'Let me put it this way: If you were all-knowing, you might be able to explain all the causes which, together, resulted in your landing a "four" a few moments ago. However, why, at that precise moment in time, did the universe conspire to cause you to throw a dice at all, or for it to land on "four"?

Isaac looked puzzled.

'Why, for that matter, is it that we're both sitting here now and not, say, predisposed to playing football instead? Why is it that you are that tall when you could have been born with different genes that would have made you taller, or shorter, with pink hair and wings or with three legs and horns? Come to think of it, why is there life at all? Why didn't the universe turn out to be devoid of life, or of matter, or time? Why is it that there are only eight planets in our solar system, when there could have been twenty, when it could have been otherwise? Why are there suns and galaxies, black holes and worm holes, nova and supernovas, when there could have been, say, nothing? Why couldn't the universe be contracting, rather than expanding, cyclical or static? The universe could have turned out in any manner of different ways, indeed, an infinite amount of different ways, but didn't. It turned out this particular way.

Why, though, this particular state of affairs over others? Why did it turn out to have the particular "personality" that it does? It seems so ad hoc, so messy and random. It's not like the universe is uniform in any way. It's not like it's all made of one substance, like say putty or jelly, infinite in extent and for all time.'

Isaac sat there bewildered by what he had heard.

Just then, Samuel and Caroline, who had also heard the conversation, and were the only other two in their class remotely interested in such metaphysical questions, sat down beside them.

'Well we might not know. But, perhaps, God would know,' said Samuel. But this did little to persuade Gottfried.

'Bringing God into the picture doesn't resolve anything. If he does exist, why does he have the particular characteristics that he does. And if there is a God, why, then, is there just one, why not two, or ten or a million of them?' Gottfried replied.

They all sat back and thought about it for a while.

'I see what you mean,' Isaac confessed, finally conceding Gottfried's point.

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26. Abortion and the Charge of Arbitrariness

Introduction

The issue of abortion is one that has historically been fuelled, perhaps understandably, by emotively charged arguments and language that, more often than not, has pitted the principle of right to life against a woman's right to determine what happens in and to her body. Moreover, it is a constantly evolving issue as both advances in medical science improve our understanding of the early development of human life and technological breakthroughs, like the controversial abortion drug RU486, force advocates on both sides to shore up their arguments.

Nevertheless, dissecting the underlying assumptions that invariably underpin most people's opinion on the subject remains a highly valuable critical thinking activity when approached from a purely teaching and learning perspective. In this section, we distance ourselves from the broader, often emotively laden, debates (legal, religious, cultural, etc.) to narrow down our focus instead on the moral question 'At what point does terminating the development of a human life become morally unacceptable and why?'

The challenge that this question presents us with is in generating a position that does not leave us exposed, either to the charge of arbitrariness (of formulating a belief or stance in the absence of any justification or reason) or defending a position that is ultimately inconsistent, highly unpalatable or both.

To take just one example, traditionally, birth has, up until relatively recently, served as the obvious demarcation point. This is primarily for reasons to do with *viability,* the point or phase in the early development of a human where it can survive outside the uterus. However, medical advances have ensured that the limit of viability has progressively been pushed back well before birth and in some countries to as early as Week 22 of prenatal development. Should, then, the point beyond which an abortion becomes morally unacceptable be determined by something so seemingly arbitrary as one's location, by one's postcode? Should terminating a human life in Week 26 be *morally* wrong if performed in a developed country like, say, Australia, but not if performed in a less developed one like, say, Mali, all other things being equal? Or, to take a more radical example, consider a world in which *ectogenesis* exists:

Ectogenesis (or exogenesis) is defined as the gestation of an organism outside the uterus using entirely artificial means. Although presently more science-fiction than science fact, it is a thought-experiment nevertheless that casts additional doubts on the alleged moral significance of birth and on arguments based on viability.

Ectogenesis (or exogenesis) is the gestation of an organism outside the uterus using entirely artificial means.

Lastly, and as mentioned above, the meanings that are attached to the expressions and terms that feature in moral discussions as conflict-ridden as abortion are often emotively loaded (for example, as in the expression 'killing an unborn child'). So it is important that any objective critical classroom discussion begins by ensuring that all discussants have an understanding of the precise scientific meanings of the terms involved and devoid of any emotive (pejorative) meaning.

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Name: .....

Date: .....

Reflections

Help

A **duty theorist** believes that there are certain moral duties or moral principles that human beings have an overriding obligation to follow. For example, a doctor has an overriding duty of care towards his patients and parents have an overriding duty to provide food and shelter to their children, etc. Duty theorists are **non-consequentialists** because they likewise hold the view that moral acts are right or wrong in themselves, that is, regardless of the consequences that those acts produce. So to argue, say, that 'One ought never to treat people as means to an end' is morally right is to argue that it is **prima facie** right (or right in itself) and that we are morally obligated or duty-bound to abide by it, irrespective of the consequences. In contrast, **consequentialists** hold the moral view that the rightness or wrongness of an act depends on the outcome(s) that act produces.

Focus Question

- Which of consequentialism or non-consequentialism do you find more persuasive? Why?
- Did Tony's doctor choose the morally correct action?

Activities

1. Tony is in an unenviable predicament. But what would you do if you were in his shoes? Would you donate your kidney if it helped to bring about the following: (Tick or cross your answers.)
   a. Help scientists find a topical cream that would smooth the appearance of wrinkles.
   b. Help scientists find a topical cream that would prevent the outbreak of pimples.
   c. Help alleviate the effects of mild strains of seasonal flu.
   d. Help scientists find a likely cure to a slightly painful genetic condition that afflicts 100 people in the world.
   e. Help scientists find a likely cure to a very painful, but not terminal, genetic condition that afflicts hundreds of people around the world.
   f. Help scientists find a likely cure to a very painful genetic condition that afflicts millions of people around the world.
   g. Help scientists find a likely cure to a slow-spreading contagious disease that might otherwise kill hundreds of people.
   h. Help scientists find a likely cure to a fast-spreading contagious disease that might cause pain, discomfort and death to millions or even billions of people.
   i. What if the continuation of our species was potentially at risk?

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