Critical analytical thinking

Learning outcomes

This chapter offers you opportunities to:

* understand what is meant by taking a critical or analytical approach
* become more aware of how to use critical or analytical approach
* develop criteria for evaluating an argument or a line of reasoning in a piece of writing
* develop criteria for evaluating the evidence given in a piece of writing
* learn how to identify and draw valid conclusions.

Critical thinking

Critical thinking means weighing up the arguments and evidence for and against. Edward Glaser, who developed a test of critical thinking, defined it in this way (1941):

Critical thinking calls for a persistent effort to examine any belief or supposed form of knowledge in the light of the evidence that supports it and the further conclusions to which it tends.

In other words, Glaser emphasizes the importance of the following:

- *persistence*: considering an issue carefully, and more than once
- *evidence*: evaluating the evidence put forward in support of the belief or viewpoint
- *implication*: considering where the belief or viewpoint leads – what the belief or viewpoints leads – what conclusions would follow; are these suitable and rational; and if not, should the belief or viewpoint be considered

Critical analytical thinking

Critical analytical thinking involves additional processes:

- standing back from the information given
- examining it in detail from many angles
- examining material in terms of its components parts; identifying how these relate to each other
- checking closely whether it is completely accurate
- checking whether each statement follows logically from what went before
- looking for possible flaws in the reasoning, the evidence, or the way that conclusions are drawn
- comparing the same issue from the point of view of other theorists or writers
- being able to see and explain why different people arrived at different conclusions
- being able to argue why one set of opinions, results or conclusions is preferable to another
- being on guard for literary or statistical devices that encourage the reader to take questionable statements at face value

- checking for hidden assumptions
- checking for attempts to lure the reader into agreement.

Develop a detective-like mind

To develop crtical and analytical thinking ability, you might imagine that you are developing a detective-like mind.

Reading

Critical thinking when reading involves the following:

1 identifying the line of reasoning in the text
2 critically evaluating the line of reasoning
3 questioning surface appearances and checking for hidden assumptions or agendas
4 identifying evidence in the text
5 evaluating the evidence according to valid criteria
6 identifying the writer's conclusions
7 deciding whether the evidence given supports these conclusions.

Writing

Critical thinking when writing involves comparable processes:

1 being clear on your position on the issue, including hypotheses and/or conclusions
2 constructing a clear line of reasoning – an 'argument' leading to your conclusion
3 presenting evidence to support your reasoning
4 analyzing issues from multiple perspectives, weighing up the evidence for each
5 drawing together information and analyses, synthesizing these to construct your position in the issues
6 writing in a critical, analytical style, rather than in a descriptive, personal or journalistic style
7 reading your own writing crtically, as above, as well as your sources.

Listening

Critical thinking when listening involves the same awareness as when reading, plus:

1 checking for consistency in what the speaker is saying – does the speaker appear to contradict herself or himself; and if so, what is going on beneath that contradiction?

2 checking that body language, eye contact, and speed and tone of voice are consistent, r 'congruent', with what is being said: does the speaker look and sound as though he or she believes what he or she is saying?

These issues have been touched on in earlier chapters: the following pages explore them in more detail, and include some basic exercises so that you can try out your critical thinking skills.

Critical questions

In general, when working is a critical way you will be asking questions such as those below.

- Why?
- How far?
- How much?
- How often?
- To what extent?
- How do we know this is true?
- How reliable is this source?
- What could be going on below the surface?
- What do we not know about this?
- Which is preferable?
- For what reasons?

Critical thinking when reading

Critical thinking when reading is essential to academic success, as much of the writing you do for assignments will include critical analysis of the work of other people.

1 Identify the line of reasoning

Most of the texts you are required to read as a student will include an argument. In academic writing, an 'argument' is:

- a line of reasoning or
- an angle or a point of view or
- a position that is being defended or
- a case that is being made
    - backed up by evidence and examples and
    - leading to conclusions.

When reading, you need to keep asking yourself, 'What are the main things this writer wants me to accept? What reasons does she or he present to encourage me to accept this?

Activity : 1 Line of reasoning

Identify the main line of reasoning – the main argument – in Passage 1, 'Rochborough Health'.

Passage 1: Rochborough Health

Outdoor play has beneficial effects for children in terms of both their health and their levels of social interaction. According to clinical trails carried by Rochborough's Health Council Advisory Body in September this year, children who played outside for over fifty days in the year had a 20% higher lung capacity, and 30% lower incidence of asthma and bronchial conditions than children who played indoors. Children who played outdoors also reported having more friends than those who played indoors. A survey of 30 families by Rochborough Social Amenities Committee found that parents were more likely to let their children play outdoors if they had their own gardens or if there were supervised play areas nearby. Mr Arkash of Milton Road said his children did not feel safe playing on the Children's Meadow on the outskirts of Rochborough, as his son had been frightened by a fox there in the past. His little soon looked quite tearful as his father spoke. 'He often cries because he has nowhere to play', said his father. Supervised play areas can be expensive to provide. However, only 18% of home in Rochborough have gardens. Therefore, to improve the health of all its children, Rochborough needs to provide more supervised outdoor play areas.

Rochborough Playcouncli

Newsletter

2 Critically evaluate the line of reasoning

An argument can be critically evaluated in terms of whether it contains:

- relevant, contributing and sufficient propositions (reasons)
- logical progression
- false premises
- flawed reasoning.

Each of these is explored below.

Relevant, contributing and sufficient propositions

The Rochborough Health passage makes a number of statements or *propositions*. For example:

- Outdoor play improves levels of social interaction
- Only 18% of Rochborough homes have gardens.

These are some of the reasons it gives to support its argument. When examining the line of reasoning, you need to consider whether the reasons given are relevant and whether they support (that is, contribute to) the overall argument. For example:

- The reference to the isolated incident of a fox is not very relevant to the argument about health.
- The reference to the expense of supervised play areas is relevant to the argument – however, it weakens or undermines the argument rather than contributing to it, because the piece does not make clear how the expense could be met.

It is important to check that reasons and evidence are both relevant and supportive of the main argument, as this helps you to identify whether the writer's conclusion is valid. Even if the writer has given relevant reasons that contribute to the argument, however, she or he may not have given sufficint reasons to prove that this is the only conclusion that could be drawn.

Passage 2 : Injuries

There has been a tremendous rise in the rate of industrial injury. This year there were over thirty reports of repetitive strain injury in the factory (Smilex Injury Report 2013). All those injured worked in the fibre department. Ten years ago there were no reported injuries. This shows that our work conditions are taking a more serious toll upon our health than in the past.

Smilex News

The writer of Passage 2 begins from the premise (starting point) that there has been a great rise in industrial injury. The conclusion is that work conditions are having a more serious effect on health than in the past. The writer gives a relevant and contributory reason: the rise in the number of reported injuries. However, the writer does not consider other reasons why the number of reported injuries. However, the writer does not consider other reasons why the number of reported injuries might have increased – such as whether repetitive strain injury was known about thirty years ago, or whether people were less likely to report accidents in the past.

In addition, the writer has not looked at figures for any other types of injury, or at the health of workers in other departments. He or she makes generalizations based on only one kind of injury and one part of the factory. The writer may still be right about the rise in industrial injury, but has not proved this. He or she has not given sufficient reasons (or evidence) to justify the conclusion.

Logical progression

In everyday conversation, it is common practice when someone is speaking to assume that there is a logical connection between one thing that is said and the next. For written arguments and in academic contexts in general, you need to question whether one point does indeed follow logically from another. A line of reasoning will:

- begin form a premise
- follow in logical stages (A leads to B; B leads to C; C leads to D …)
- lead to a conclusion that follows directly from what has gone before (there are relevant reasons, in a logical order, which build towards the stated conclusion).

The premise in Passage 1 is that outdoor play is good for children's health. The logical progression would be:

- local evidence supports the health argument (that outdoor play is desirable)
- parents' attitudes support this argument
- a lack of facilities prevents outdoor play
- more outdoor play facilities are needed.

False premises

If there were a reason why outdoor play was not good for Rochborough children, the writer of Passage 1 would have started from a 'false premise'. The writer of Passage 2 may indeed have begun from a 'false premise' – believing that industrial injury is on the rise in the Smilex factory. No conclusive evidence of this is given, so it may of this kind.

Flawed reasoning

Here are some examples of 'flawed reasoning'.

Assuming a causal connection

If two things occur at the same time or place, it is easy to assume either that they must be connected or that one must have caused the other. For example:

I revised really well for that exam and got a low mark, so next time I won't revise and I should get a better mark.

This assumes a connection between revision and failure, without considering other possible reasons for failure. Similarly:

The number of cows on Britain has gone down, and the amount of cheese consumed is on the increase. Psychologically, people seem to eat more cheese when they feel that it will run out.

This assumes that the increase in cheese consumptions is related to the number of British cows, whereas it may have been for other reasons such as increased vegetarianism, or a rise in cheese imports. The decrease in the cow population might relate only to herds reared for meat – perhaps the number of milkin cows is unaltered.

These examples are chosen to highlight the faulty logic, but flawed reasoning of this sort is not always easy to spot.

Drawing general conclusions based on one or few examples

The woolen jacket caused a serious skin reaction in the three-year-old, so sale of woolen clothing should be banned.

Here a generalized conclusion is made on the basis of a very small sample of experience – just one example. (The importance of using an adequate sample is explored further below.) There may have been reasons for the reaction unique to that child.

Inappropriate comparisons

In Passage 1 a comparison is drawn between children who play indoors and those who play outdoors. However, it may have been that the children who played outdoors were already healthier, and those who played indoors did so because of poor health which might get worse if they played outdoors. For example, asthma sufferers are often allergic to pollen and might have been discouraged from playing outdoors.

3 Question surface appearances

Critical thinking requires that you examine these factors:

- Is the evidence what it appears to be?
- Might there be other explanations apart from the obvious one?
- Has all necessary information been given, or might other details lead to a different conclusion?
- Are there interested parties who would gain if the conclusions were accepted?
- Are there hidden assumptions or agendas?
- Does the evidence come from a reliable, disinterested source?

Activity 2 Vested interest

Look again at the ‘Rochborough Health’ passage.

- What hidden agendas might there be in this piece?
- What information may be missing that might lead to a different conclusion?

4 Identify evidence in the text

Identifying evidence in the text is usually fairly straightword. Look for statistics, examples, case histories, findings from experiments, surveys, questionnaires or case studies. The evidence may be anecdotal – that is, stories told by one or a few people about their experiences.

Activity 3 Types of evidence

What evidence is given in the 'Rochborough Health' passage ?

5 Evaluate the evidence

It is not enough for a student to write in an essay or report: 'There is evidence on both sides.' Evidence is not all of equal weight. How can we decide which evidence is better? Some basic guidelines are outlined below.

Use valid criteria to evaluate evidence

Critical thinking involves identifying valid criteria against which something can be evaluated .

For example, in declaring that somebody is healthy, a doctor takes into account certain criteria, such as body temperature, blood measurements, and the absence of known (or common) symptoms of illness. He or she evaluates whether signs of potential ill health are matters for concern and, on the basis of experience and established medical knowledge, comes to a conclusion about whether the evidence points more towards good health than to sickness.

The following sections give some criteria against which you can evaluate evidence in academic texts and for your own research.

Check the date of the research

Data may be out of date or conclusions based upon it may have revised .How would your attitude to the 'Rochborough Health' article change if you found out that it was written in 1300, or 1927, or 2013?

Check the source of your information

Articles in academic or professional journals and in recommended textbooks are usually based on in depth research, and are regarded as more reliable than findings recorded in magazines and newspapers. Newspapers and magazines may be useful primary sources for some subjects such as cultural studies, but are not generally regarded as 'authorities' to quote in essays.

Check for bias in your sources

Bias may not be obvious, and it does not necessarily mean that your source was being 'dishonest' or 'prejudiced'. If somebody has a strong interest in the survival of a particular hospital, for example, the evidence they present may be accurate, yet not the whole story. When thinking critically, we need to be continually questioning in our minds whether there may be hidden agendas, or reasons why the evidence appears to point one way than another.

It is always worth considering what political or economic interests might prevent the whole truth from emerging. Consider also how easy it would be, or would have been, for alternative views to be printed and circulated. For example, in some societies, such as sixteenth-century Britain, people who spoke, printed or sold certain viewpoints could be punished by death or loss of limb.

Today, it can be difficult for small organizations or individuals to get the funding they need to research and validate an alternative viewpoint. The overall picture may be distorted if not all the evidence has come to light.

Whilst it is not necessary for you to write about issues of economics, politics and media access in every essay, it is important to be aware of who has access to power, resources and information, who does not, and the possible implications

Beware the allure of numbers and statistics

It is important to check numerical data, and words that imply numerical data, as there are often misused and amounts misrepresented in order to sway the reader

Most/many

Notice words such as 'most' and 'many':

Most people said that they preferred oranges to apples.

'Most' is a very vague amount. If it *mattered* whether this statement were true or false, we would need more details. How many preferred oranges? Under what circumstances?

Percentages Notice when percentages are given. Supposing instead, the statement above read:

60% of people preferred oranges; 40% said they preferred apples.

This looks convincing: numerical quantities are given. But is the difference between 60% and 40% significant? Here we would need to know how many people were asked. If 1000 people were asked, of whom 600 preferred oranges, the number would be persuasive. However, if only 10 people were asked, 60% simply means that 6 people preferred oranges: '60%' sounds convincing in a way that '6 out of 10' does not. As a critical reader you need to be on the lookout for percentages being used to make insufficient data look impressive.

Sample size Notice also that if just 2 more people arrived who preferred apples, there would be 6 of each. A very small increase in the sample (the database of people asked) could easily overturn the original percentage, changing it to 50% for apples and 50% for oranges – no difference at all.

The sample size is the number of people, animals or objects used in the research, whether it's an experiment, a survey or whatever. Small samples give very unreliable information. All other things being equal, the bigger the sample, the more reliable the data. A thousand participants is often taken as a reasonable number for considering statistics to be 'significant'.

Representativeness The sample should be representative of the overall group being studied. If all those asked about fruit preference came from Seville and made their living from oranges, we might not consider them to be either typical or reliable as a sample. Similarly, if all those asked about their preferences were women, or aged ten, or from the south of England, it would not be safe to generalize from them to the rest of the population. To make the sample representative, researchers aim for a good mix of men and women, of different ages, backgrounds and interests.

Conditions of data collection If you found out that those who said they preferred oranges had each been given one free by the person conducting the survey, you might wonder whether the participants had had an ulterior motive in giving their answers, and whether the data were reliable.

Similarly, if the data were collected in face-to-face interviews by personnel wearing the logo of a company known for its orange juice, it is possible that some participants wished to please the interviewers. It is important to find out, where possible, about the conditions in which data were collected, to determine how trustworthy they are. Articles in academic journals usually give full details about the research conditions.

Emotive language and persuader words

Certain words can ve very persuasive, and can trigger a position of trust in the reader. Which words they are will vary from subject to subject. For example, for some people the word 'experiment' summons up notions of scientific accuracy and reliability. However, the fact that an experimental approach was used does not in itself mean that the evidence is sound.

Emotive words The use of words and phrases such as 'cruel', 'unfair', 'abuse', 'natural', 'normal', 'commonsense', 'innocent child', 'old', 'little', 'massive', 'unique', 'extremist', 'radical', 'youth', 'new' and even 'final offer' can prompt emotional responses that may lead the reader away from an accurate appraisal of the evidence presented. Emotive images, such as people crying, can be used in a similar way.

Persuader words These words and phrases draw you in by appealing to what they claim is evident. It may be true that what follows is evident, but you still need to be on the alert when you see such words. They include 'surely', 'clearly', 'obviously', 'it is evident that', 'it is plain to see that', 'naturally' and 'of course'.

Activity 4 Evaluating the evidence

Evaluate the evidence given in the 'Rochborough Health' passage, using the criteria outlined above.

6 Identify the writer's conclusions

Conclusions generally come at the end of the piece of writing. However, they may also be found at the beginning of the text or even in the middle. They are then harder to find and tend to be less effective.

Often conclusions are indicated by 'trigger words', such as 'therefore', 'so', 'hence' or 'thus'; or by the use of imperatives – words indicating that something has to be done, such as 'must', 'should' or 'need to'.

Activity 5 Conclusions

Identify the conclusion in the 'Rochborough Health' passage.

Sometimes, the conclusion may not be stated at all – it may only be implied by the argumenst and evidence. There may also be more than one conclusion stated explicitly and others implicit. For

implicit conclusions, you need to consider whether further conclusions are implied by the reasoning and the context. For example:

In Jonah Smith's new book, the characters are compelling, the story is interesting, it is very atmospheric, and there is a surprising twist to the plot. The book is excellent.

Here, the explicit conclusion is that 'The book is excellent', and the reasons for this judgment have been given – the characters, the story, the atmosphere and the twist to the plot. The implicit conclusion is that you too would enjoy this book.

Activity 6 Implicit conclusions

For each of the following short texts:

- Decide whether there is an explicit conclusion and, if so, say what this is.
- Say what you think the implicit conclusions would be.

1 You want a plant. You like this one and you can afford it.

2 The election closed very early, but only Happy Party voters had been told this would happen. Happy Party supporters prevented some opposition party voters from voting. Therefore, the election was unfair.

3 The tree is dangerous. It is leaning over the children's playground. It is heavy, rotten and could break at any time.

7 Evaluate whether the evidence supports the conclusions

A writer may present evidence which could be considered reliable, being based on good research, but then draw conclusions which are not warranted by the evidence. An exaggerated example illustrates this:

- Proposition 1 The karate champion is a woman. (Verifiable fact.)
- Proposition 2 My mother is a woman. (Verifiable fact.)
- Conclusion My mother is a woman, therefore she is a karate champion. (False conclusion.)

Check for hidden false assumptions

In the above example, the faulty reasoning was based on the false assumption that if one woman is a karate champion, then all women are karate champions. This false assumption is easy to spot, but is is not always so simple. Researchers may try to be objective, but it is very difficult to stand completely outside of the commonsense views and ideological context of the society in which one is writing.

Example

Consider the ideas discussed in the student essays about Bowlby's influential studies of the 1950s . Bowlby's findings (1951, 1969) suggested that infants who were separated from their mothers at an early age had behavioral and emotional difficulties later. This was used to argue the case against mothers working outside the home. The argument for mothers to stay home was no doubt based on genuine concerns for children's well-being, but the conclusion also suited the economic conditions of the time, as there was a shortage of jobs for men who had returned from the Second World War (1939-45).

Later, the conclusion that children were damaged by absent mothers and child care was heavily criticized (Clarke and Clarke 1976; Clarke-Stewart 1988; Tizard 1991). For example, it was argued that Bowlby's data was based on children in very extreme conditions, such as frightened war orphans and sick children in bleak hospitals and institutions of the 1950s. These children were not typical, and needed to be compared with average, healthy children attending friendly, well run nurseries, who saw their mothers everyday. However accurate Bowlby's research may have been, his findings may not have justified the conclusions drawn from them. It is quite likely that Bowlby was affected by the dominant belief system of his day, that a woman's place was at home with the children, and that this influenced his interpretation of the data. It is also likely that his opponents were influenced in their research by changing ideas such as feminism, or by the rising number of women in part-time work.

It is quite typical for research to progress in this way, with advances being made as later researchers question aspects of earlier research, such as whether the sample was representative or whether the research contained assumptions which were invisible to the researchers at the time.

Activity 7 Use of evidence

Do you consider that the evidence in the 'Rochborough Health' passage supports the conclusion drawn? What assumptions are made in the passage?

Critical analytical thinking

Now that you have worked through one passage step by step, try analyzing Passage 3, 'Children at Play'. This writer covers issues similar to those in Passage 2, so you can compare the passages.

Activity 8 Critical analytical thinking

For Passage 3:

- Is the line of reasoning good?
- What is the conclusion?
- How strong is the evidence?
- What are the underlying assumptions?
- How well do the reasoning and the evidence support the conclusion?

Passage 3: Children at Play

Children need to play outdoors and yet it is amazing how few children get that opportunity today. Although Smith (2004) argues that 48% of children prefer to play inside, Jones (1964) found that 98% of children in Britain prefer to play outdoors. I spoke to some parents in Rochborough who said their children missed out by not being able to play down by the river or roam the countryside in safety. Most children are now television addicts or, worse, are addicted to computer games. Everybody knows that this is damaging children educationally, and yet nothing is done about it. This is certainly true of Rochborough's children, and the main reason is that they do not have anywhere to play. Hardly anybody in Rochborough has a garden. It would be better for their health if they played outdoors, but parents say they won't let them unless supervised play areas are provided. The parents are worried that they are playing. What chance is there for the health of citizens in Rochborough if its children do not get to play outdoors, and end up as TV addicts?

Critical analytical thinking

Use the following checklist to analyze a piece of writing that you need to read for an assignment. You could also use this list to analyze your own writing.

Critical questions	**Analysis of the writing**
What is the main line of reasoning (the main thesis of argument)?	
Is the line of reasoning clear both in the introduction and in the conclusion?	
What is the key evidence used to support the line of argument? Is the evidence presented in a way that develops the argument and leads clearly to the conclusion?	
When was the evidence produced? Is it up to date? Is it still relevant?	

What (if any) would have been a better order in which to present the evidence so as to strengthen the line of reasoning?

Are there any examples of flawed reasoning? Attempts to persuade the reader through an appeal to the emotions? Is evidence interpreted and used correctly?

Has the writer given sufficient consideration to alternative points of view? Give examples.

Critical thinking when writing

Critical thinking when writing includes most of the elements of critical thinking you would use when reading. It can be more difficult to analyze your own work critically, however, and to recognize and admit to your own opinions and bias.

Be clear about your position on the issue, including hypotheses and conclusions

Students' writing is often weakened because their thinking is not clear before they start to write final draft. Time spent in such critical analysis is equivalent to 'elaborating the problem', was one way in which those who achieved good marks differed from those with poor marks.

Be clear about your conclusions

It is not unusual for students to hand in work which shows that although they have done the necessary reading and even given their work considerable thought, they are not sure of their conclusions. The whole of the piece of writing should lead to its conclusions: if these are vague, understated or poorly formulated, all of the writing loses its force.

As soon as you are given an assignment, write out your initial position on the issue and what you think your conclusion will be: what is that you are trying to prove? Put this where you can see it.

Whenever you find out something that requires you to revise or fine-tune your conclusion, write out a new one. It may seem paradoxical (or back to fron), but your writing will be clearer if you write

your conclusions first. If you are testing a hypothesis, keep clear records of evidence that either supports or does not support that hypothesis.

Construct a clear line of reasoning

If your conclusion are clear, your argument or line of reasoning is likely to be clear also. The conclusion gives you a goal at which to shoot.

Keep your writing focused, rather than rambling. Bear in mind four guidelines:

1 Early drafts help to elaborate and refine thinking. Your final version should state your position clearly.
2 Create a writing plan that sets out reasons, examples and evidence in the most logical order.
3 Consider how best to link up your material, so that your writing is not just a list of facts but an organized, well-developed argument.
4 Keep you argument clear: including too much detail can obscure it. Draw together your best material and ideas, selecting carefully. Shape these to support your argument. Use paragraphing, link words and phrasing to signposts points clearly.

Use evidence to support your reasoning

A large part of your assignment will consist of evaluating and presenting the best evidence to support your case.

Take multiple perspectives

The best answers identify how and why various experts agree or disagree on an issue, and demonstrate how the evidence supports, or does not support, their positions. This means considering strengths, weakness, and grey areas. The answer is seldom a straightforward one of right or wrong. Usually there are many contradictory pieces of evidence to weigh up and evaluate against each other. Your final position or conclusions may be a synthesis of these.

Analyze your own work critically

Your tutors or examiners will take a critical reading approach when marking your work. Before handing in an assignment, analyze it critically as you would other material you read. Be a fierce critic of your own work so that you can spot weakness and address them, and ensure that you are clear about the strengths of your own argument.

Critical analytical writing vs. descriptive writing

Critical Writing

In general, students lose more marks for lack of critical analysis than for any other single weakness in their work.

Good critical writing generally makes the difference getting the highest grade for a degree and getting a lower grade.

Typical tutor comments on student writing include

- 'More analysis needed.'
- 'Less description, more critique.'
- 'Too descriptive.'
- 'Descriptive rather than analytical.'
- 'You have told me what the theory is rather than how you evaluate it.'

Finding the balance

Both descriptive and analytical writing have their place. Descriptive writing is needed to give essential background information so that the writing make sense to the reader. However, this should usually be kept to the bare minimum – if you use up most of your word limit on description, you will have fewer words to use for the analytical writing that could bring you high marks.

Skilled writers use descriptive writing in the appropriate sections of their writing, or weave small amounts of descriptive writing into their critical writing. Some of the main differences between these two types of writing are outlined in the table below.

Descriptive writing	**Critical analytical writing**
states what happened	identifies the significance
states what something is like	evaluates strengths and weaknesses
give the story so far	weighs one piece of information against another
outlines the order in which things happened	makes reasoned judgments
instructs how to do something	argues a case according to the evidence
lists the main elements of a theory	shows why something is relevant or suitable
outlines how something works	indicates why something is appropriate or suitable
states when something occurred	identifies why the timing is of importance
states the different components	weighs up the importance of component parts

states options	gives reasons for selecting each option
lists details	evaluates the relative significance of detais
lists in any order	structures information in order of importance
states links between items	shows the relevance of links between pieces of information
gives information or reports	evaluates information and draws conclusions

Identifying critical and descriptive writing

Descriptive writing: an example

My name is John. I live at 33 Acacia Drive. I have five sisters and brothers. I am good at team games, and enjoy football, cricket, and baseball. Team games were encouraged by both my parents. All of my family took part in sport. Our teachers at Beckfield School were very interested in sports sciences. We were encouraged to drink lots of water to improve our performance. Our team always did well, so it seems to have worked. I also like to go running. I live in the beautiful Welsh borders, so it is a pleasure to take a healthy run each day.

Almost all of this passage consists of statements and descriptions. There is an evaluative comment ('our team always did well') and this is linked to possible reasons (drinking lots of water). However, this link is not analyzed in depth. The passage overall is descriptive. Compare this with the passage below.

Critical analytical writing: an example

At Beckfield School, teachers took a scientific approach to school sports over a ten-year period. In particular, pupils were encouraged to monitor their intake of liquids. All pupils were required to drink a minimum of eight glasses of tap water a day. The school did consistently well in sports competitions over this period, and the teachers claimed that this was proof of the importance of liquid intake to good performance. However, it is not clear that the school's sports performance can be attributed to water intake. Beckfield School's claims were investigated by an independent researcher, Martinez (2013). Martinez argued that although Beckfield's performance was good, its performance in competitions was consistent with what would be expected of a school of its size. In addition, interviews with pupils showed that most had not followed the school regulations on drinking water. Most pupils stated that they drank less than one glass of tap water a day. Although other research does not suggest that water intake benefits performance (Fredo 2010; Mitsuki 2010), Beckfield School's claims about the benefits of tap water in its sports success have not been proved. This is critical analytical writing. There is a clear line of reasoning which takes the reader through what the school claimed and the basis of the school's arguments. The writing then weighs the school's claims against other evidence. It draws upon published evidence rather than personal opinion. The writer considers both sides of the argument, taking account of published evidence that does support the importance of drinking water. This research has been weighed against the facts of the case. The writer draws conclusions: the 'school's claims about the benefits of tap water … have not been proved.' The conclusion is based upon the evidence.

The passage does not contain descriptive writing which gives background detail, such as the first four sentences. Although the passage contains many statements of fact, such as 'most pupils stated that they drank less than one glass of tap water a day', these statements are ordered in such a way that they build up the argument. They are also supported by sentences that introduce the argument, such as 'However, it is not clear that the school's sports performance can be attributed to water intake.'

Activity 9 Descriptive or critical

Identify whether the following passages are examples of descriptive or of critical writing.

Passage 1

In the West, all life forms are divided into one of two categories: plant or animal. Animals move and take in food. Plants are rooted into the earth in some way and lack locomotion. They photosynthesize their food. Zoologists study animals, and botanists study plants. Bacteria were classified as plants because many kinds of bacteria photosynthesise their food. However, they also have locomotion. Recent research has shown that there is an enormous variety of bacteria. Some are able to survive at extreme temperatures and in the absence of oxygen. Most plants cannot usually survive in those conditions. Therefore, even though bacteria photosynthesise, they are not now regarded as plants.

Passage 2

The difficulty in categorizing bacteria was partly based on the assumption that all life forms were divided into two main categories, plants and animals. Organisms that photosynthesized and lacked mobility were classified as plants; those that had locomotion and ingested food were classified as animals. Bacteria were traditionally categorized as plants because many forms of bacteria photosynthesized their food like plants. However, bacteria also have locomotion, associated with animal life. Genetic research has now shown that there are at least eleven major divisions of bacteria, all of which are more genetically distinct than plants are from animals (Fuhrman et al. 1092). In addition, the minute organisms formerly described as 'bacteria' are now found to consist of several major kingdoms and domains of unicellular and multicellular life (bacteria, archea, eucarya) (Woese 1994). This research is significant as it has shown that the fundamental division of all life forms into 'plant' or 'animal' was an error, and that plants and animals form only a very small part of a much more diverse range of living organisms.

Passage 3

Scientists do not agree about the extent to which creativity can be linked to activity in the right hemisphere of the brain. It is known that the biochemistry of the two hemispheres of the brain is different. For example there is more of the neurotransmitter, norepinephrine, in the right hemisphere than the left (Oke et al. 1978). Norepinephrine is associated with increased alertness to visual stimuli. It has been suggested by Springer and Deutsch (1981) that this may lead to increased right-hemisphere specialization for visual and spatial perception. However, thisk link is not yet proven. It is not yet clear whether one hemisphere of the brain can be responsible for any creative task. Moreover, although it might seem reasonable to assume that responsiveness to visual stimulus may be an important factor of creativity, this has also not yet been proved.

Passage 4

The brain contains millions of neurons. These communicate with each other through electrochemical activity at the synapses found at the end of each neuron. The chemicals that enable this communication to take place in our internal or external world. Some neurotransmitters are associated with mood swings, with depression, with rapid responses, and so forth.

Passage 5

Bowlby's Attachment Theory argues that child development is affected by the closeness of the bond between mother and child. Bowlby claimed that even short spells away from the mother during infancy could have a profound effect upon a person later in life. Ths became known as 'maternal deprivation theory'. According to this theory, the relationship with the mother during an early 'critical period' gives the developing child an 'internal working model'. This model then forms the foundation of all future relationships.

Critical thinking when listening

When would I do this as a student?

- In lectures and classes.
- When using podcasts of lectures.
- When using audio-material online.

Listening to audio material

It isn't always possible to go back over what was said, so it can be more difficult to catch flawed reasoning. It is also easier to be carried along by the skills and qualities of the speaker.

Prepare in advance Read or browse a reputable text before listening. If you are already informed about the subject, it is easier to identify flaws in the arguments or evidence.

Identify the thread Focus on the line of reasoning, or argument, just as you would when reading. This will help you avoid being distracted by interesting or emotive details and anecdotes.

Question closely what you hear, even if it sounds plausible or it is your lecturers speaking. Take nothing at face value.

Evaluate the evidence Identify the evidence used to support the argument. Apply the same critical approaches as when reasing.

Check when listening …

Check whether you are being swayed unduly by such factors as:

- The fame of the speaker
- Impressive verbal fluency or vocabulary
- clever phrasing
- use or humour
- the passion of the speaker
- appeals to your emotions
- use of possibly irrelevant facts, used to make speakers sound more authoritative
- repetition used to emphasize some points at the expense of others
- speakers hopping between topics, preventing you from analyzing their logic
- interviewers' use of unfair questioning techniques

Critical selection of podcasts

The value of podcasts

- There are podcasts of excellent academic quality, available as open source, giving you access to cutting edge research from around the world.
- You can listen back over the material, to help you analyze it critically and check the details.

Select good podcasts such as:

- Podcasts provided by your lecturers – as most likely to be relevant for your course.
- iTunesU: offers podcasts from all kinds of universities and colleges worldwide.
- Podcasts by known subject experts or produced by academic publishers.
- TED www.ted.com: offers free audiovisual sources in a wide range of disciplines.

Content over style

When listening to podcasts created by lecturers, such as on iTunesU, listen for the quality of the content – even if the sound quality and production values are not excellent.

Review

Critical analytical thinking is an essential skill for most undergraduate and postgraduate study, and for many course it is the most important single aspect of study.

As a student, you need to read, listen, write, speak, think, create and work with increasing critical approach to every aspect of your study. You will be expected to examine arguments, evidence and conclusions closely, as well as the links between these. You will be asked to evaluate other people's reasoning and evidence, using criteria to guide you.

Tutors often use the terms 'critical analysis' and 'analytical writing interchangeably. Both terms refer to the 'detective-like' approach outlined , and to your ability to explain how people arrived at different conclusions or results.

The more advanced your level of study, the more sophisticated you will need to become in the way you engage critically with the debates in your subject. As you progress through your programme, you will be introduced to further teaching methods and specialist texts that will refine your critical thinking skills.

In the debates that you encounter as a student, in the media or at work, be active. Look for strengths and weaknesses. Take note of how your tutors and peers evaluate evidence and theories, and learn from the way in which they draw on evidence and argue their own case.

This chapter has presented approaches for developing your critical skills that build on what you have learnt from earlier chapters. You should now feel confident that you have a mental toolkit that will allow you to approach new material in a critical manner and to incorporate critical analysis into your writing.