Helpsheet

CRITICAL THINKING 2

Use this sheet to help you:

- **Understand the key elements of academic arguments**
- **Develop your capacity to analyse and evaluate academic arguments**

5 minute self test

Match the following terms that are used in the helpsheet with their definitions

Terms	Definitions
1. Analysis	a. objections to positions or arguments
2. Premises	b. the distinguishing between the different elements in a text and ability to study them separately and to ascertain relationships between them
3. Contentions	c. statements which are inferred from certain premises - statements you argue to from premises
4. Inferences	d. statements which are used to infer a certain conclusion - statements you argue from to a conclusion
5. Conclusions	e. links between reasons and conclusions

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1. Introduction

You are probably aware that one of the hallmarks of academic study in university is "critical thinking". This is often noted as being particularly important in Western universities. But what is "critical thinking"? How do you do it? This helpsheet will help you understand critical thinking and its importance for higher degree study. A good understanding of critical thinking will help you develop your skills in writing and the academic thinking style needed to succeed in your tertiary studies. Good critical thinking skills will also help you get higher marks for assignments. More importantly, it will equip you with the necessary skills for a future career and for life in general. This is because every employer likes evidence of an employee with good analytical and critical thinking skills.

2. What is Critical Thinking?

Let's look at some definitions first; in particular the words "critical" and "analysis".

1. A Definition of Critical Thinking

One definition of *thinking critically* means: 'Making sense of our world by carefully examining the thinking process in order to clarify and improve our understanding' (Challee, 1994).

Cotterill defines it as 'a complex process of deliberation that involves a wide variety of skills and attitudes'. This includes: identifying other peoples' positions, evaluation evidence, weighing up opposing arguments, being able to read between the lines, recognising techniques to make positions appealing, reflecting on issues, drawing conclusions, and presenting a point of view (Cotterill, 2005). Another definition tells us that critical thinking '... means making careful or exact judgments. The critical thinker therefore is someone who approaches material with the ultimate intention of judging its worth or value, and who arrives at this point through a process of systematic **analysis** and **questioning**' (Ballard & Clanchy, 1988).

Analysis means distinguishing between the different elements in a text and being both able to study them separately and to ascertain the relationships between them. Thus, the student has to try to decide:

- what each element is in a text under consideration
- what evidence there is for its existence or nature
- how it relates to other elements
- how important it is (Ballard & Clanchy, 1988)

Critical thinking thus involves a number of different activities. These are clearly outlined by Challee:

- Thinking actively
- Carefully exploring situations with questions
- Thinking for ourselves
- Viewing situations from different perspectives
- Discussing ideas in an organised way (Challee, 1994).

On *Wikipedia* (not always a very reliable source of information), a critical thinker is described as someone who:

- raises vital questions and problems, formulating them clearly and precisely
- gathers and assesses relevant information, using abstract ideas to interpret it effectively

- comes to well-reasoned conclusions and solutions, testing them against relevant criteria and standards
- thinks open-mindedly within alternative systems of thought, recognising and assessing, as need be, their assumptions, implications, and practical consequences
- communicates effectively with others in figuring out solutions to complex problems.

Here is a broad definition of "critical thinking" which encompasses some of these points. A critical thinker is someone *who has an interest and ability to engage in intellectual arguments*. It is someone who thinks *actively*, and who *investigates* information carefully. He or she does not *accept* things without *analysing* the information and *checking* if it is true or not. The critical thinker looks carefully at *relationships* between ideas and considers whether the relationships are genuine and appropriate. They don't take *assumptions* for granted and weigh them carefully for *evidence*. We shall see a more precise definition shortly, but for now let's look at when critical thinking is needed.

2. When Do you Need to Think Critically?

You will need to think critically when you are doing various things at university. For example:

- reading articles as part of your research
- taking part in a tutorial
- listening to a lecture
- writing assignments

That is, you need to *analyse* and *evaluate* the academic work/contribution of others as well as your own work. Your grades will be influenced by how you demonstrate the skills of critical thinking in everything you do at university.

At this point, having had a brief look at what critical thinking actually means, we are best served by having a look at some simple examples.

3. How to Think Critically

1. Awareness of the Position

When reading academic work, you should first be aware of the author's position. That is, their point of view, their attitude or—most importantly for critical thinking—their argument.

A person's attitude or point of view on some topic usually conceals an argument that they hold that supports their attitude. For example, a person tells you: 'I believe that learning English is important for everyone', the person is not just expressing a belief, but also likely to be concealing an argument behind that statement of belief. If you asked a person to explain why s/he thinks 'English is important for everyone' s/he would probably explain their argument for their belief. . This argument could look like this:

> *English is the world language, and it is necessary for obtaining work in the globalised workplace. Everyone wants to be able to obtain work somewhere in the world, therefore learning English is important for everyone.*

This argument can be expressed very easily in an argument "map" like this showing the premises for the argument leading to the conclusion of the argument ("premises" are the reasons given in an argument that support a conclusion).

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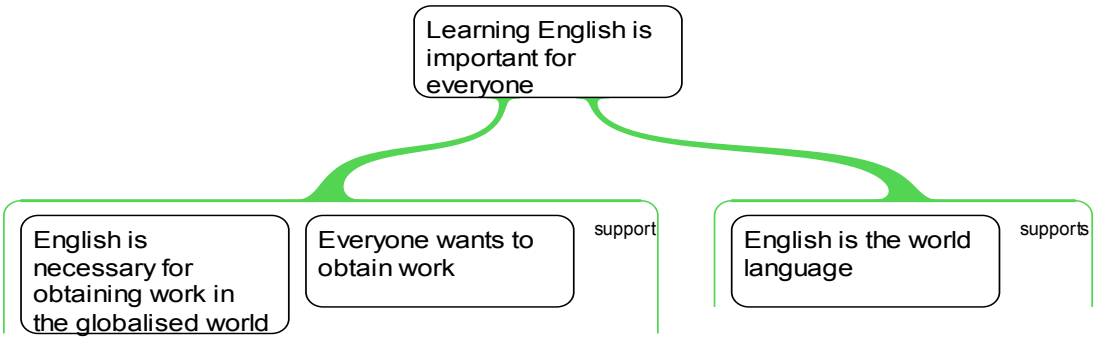
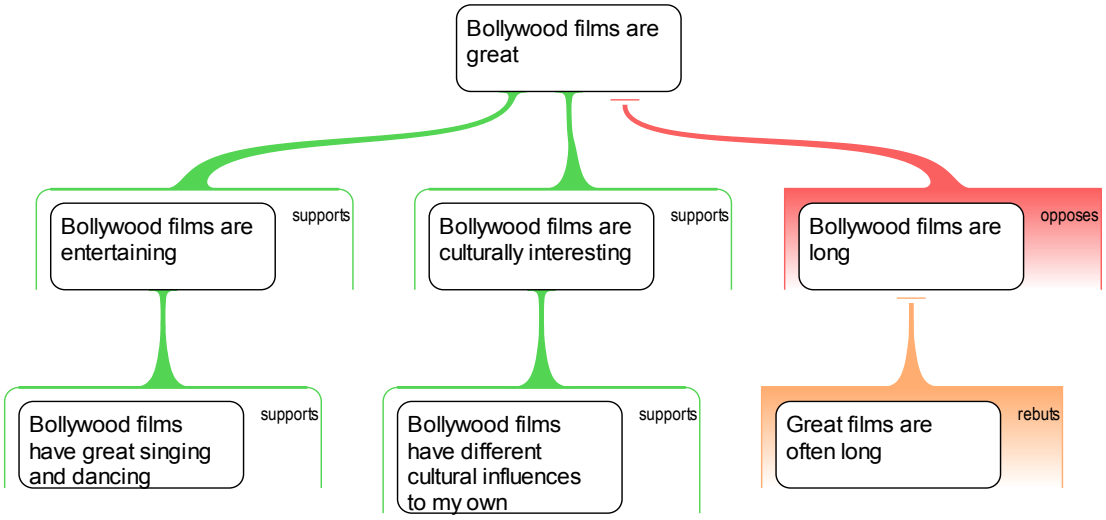


Notice that two of the points given are joined together. When reasons or premises are joined together like this, they are called co-premises. This is to be distinguished from arguments with connected but separate premises, where one reason is clearly different and independent from another reason. An example of an argument with two separate reasons is given below. There is also an "objection" provided to the position in this example. (In this example, notice also the supporting points given for each of the two separate reasons and the rebuttal or point against the objection.)



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2. Making Arguments Explicit

Of course, sometimes reasons and objections for an argument do not need to be stated clearly all the time like they are here. Often the position given is uncontentious (easy to accept) and no argument is needed. However, in academic work, more often than not, the argument needs to be made very clear. That's what the good critical thinker does. This allows the argument to be assessed and evaluated, and if necessary, *criticised*. Once you are clear about the author's position and the reasons given for the position—which may be implicit or explicit—you can begin to think seriously about it, and either agree or disagree with it, or partially agree and disagree with it. If the argument is not *explicit*, you can't do anything with it. So the first point to note is that good critical thinking involves making arguments explicit. And, the first step in doing this involves making the contention or position of the author very clear, as well as the reasons or premises for the contention.

Let's take another, more complex, example. Someone may have the position *that research into genetically modified food (GMF) is a good thing.* (Note that positions or "points of view" are best expressed verbally or in writing with "that" clauses: 'I want to argue *that* research into GMF is a good thing'.)

Someone—let's call him or her Person A—might believe this position because it enables disease-resistant crops to feed more people. By contrast, another person (Person B) may have the opposing position because they feel GMF is untested and unsafe (e.g., 'I want to argue that GMF research is *not* a good thing'.) Someone else's position (Person C) might be *qualified*: that research into GMF is acceptable in certain domains but not others (e.g., 'I want to argue that some GMF research on rice crops is a good thing, but GMF should not apply more widely to other foodcrops'.)

How does one deal with complex points of view like this? Without further information about the exact arguments behind these very different positions nothing more can be done. There is a stalemate. Person A, will of course, disagree with Person B, and Person C will insist his position is distinct from either A or B. What can be done with these very different claims on the same topic?

The answer is that you need to understand not just the positions being expressed, but the *arguments* behind the positions. Sometimes this is clear in someone's writing or presentation, sometimes it isn't. This is where an ability to think critically is tested.

3. Awareness of the Reasons Supporting the Position

As we have seen, the first stage in good critical thinking is being aware of the position(s) an author is expressing. As already suggested, the second stage in good critical thinking is to be aware of the argument that *leads to or supports* the position. This can sometimes be difficult to determine as academic writers often do not make their argument very clear at all.

It is helpful therefore, when doing critical thinking, to think in terms of *argument maps*. An example of two argument maps with the "English" and "Bollywood" examples have just been given.

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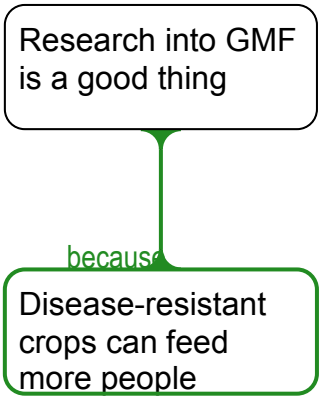
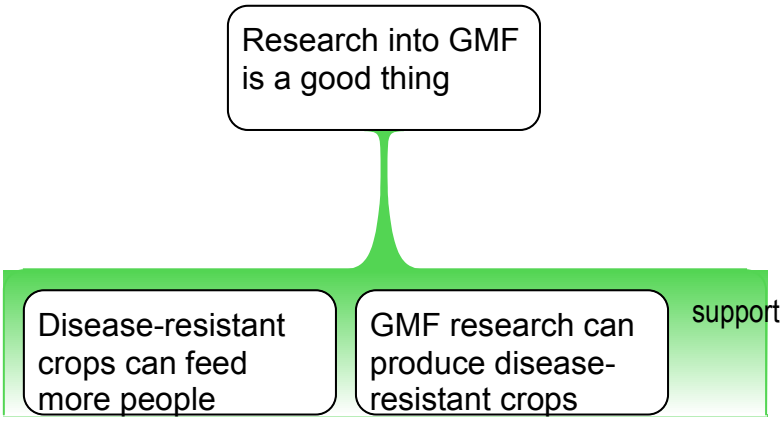
In argument mapping, the position placed at the top of the map is called the position or contention. The branching statements leading to it are called the *reasons* or *premises* (or in some cases of a *negative* reason—i.e., against the contention—an "objection").

Let's take another example to show how this works. In the the GMF example just given, the position or contention is: *Research into GMF is a good thing.* (Note that the "that" word is not needed in an argument map.) This statement, without the "that" clause, goes at the top of the map like this:



What reasons are given for this contention? One is easy to spot. This is: *Disease-resistant crops can feed more people.* However, if you put this as a reason linking to the conclusion it does not look right. Something is missing.

The thing that is missing is the link between the reason: *Disease-resistant crops can feed more people* and the contention: *Research into GMF is a good thing.* This missing link is the unstated **assumption** that *GMF research can produce disease-resistant crops.*



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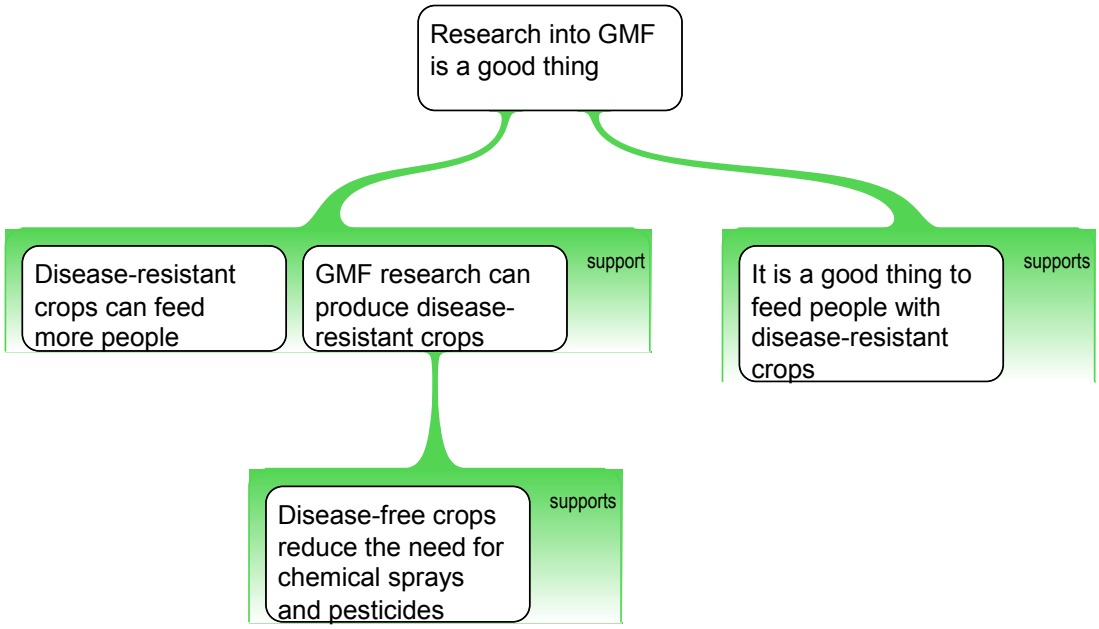
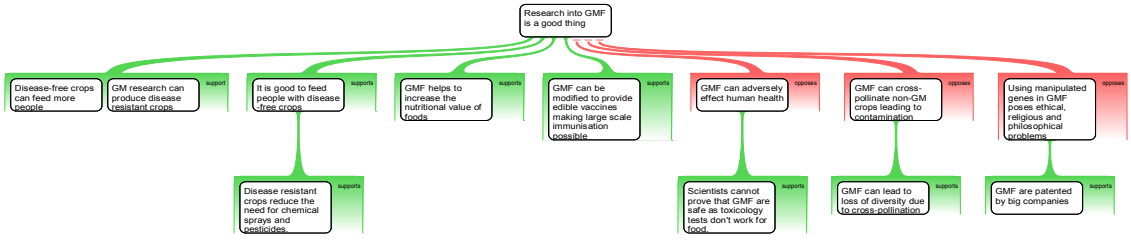
Look at the GMF argument again. Are there other reasons supporting this contention as well? If you think about it, there is another reason that is not stated explicitly. In fact, this reason is so obvious that it does not need to be stated and it is often forgotten and left unstated. However, it is an important part of the argument being made. This is the claim that: *It is a good thing to feed people with disease-resistant crops.* It seems so uncontentious its another unstated assumption. (A supporting point for the reason that it is good to feed people with disease-resilient crops has been added).



When you are creating argument maps, and practising to be a good critical thinker, you need to formally express and state assumptions to arguments as well as the contentions or positions. This is because assumptions often can indicate problems with the argument. Not all assumptions can be taken for granted. Some assumptions are completely false. If you can spot a false or misleading assumption in an argument you are doing well as a critical thinker!

The argument for GMF research has been mapped in more detail with a number of supporting reasons that might be given by someone agreeing with the contention at the top of the map. This map could be made much more detailed with further thinking and further research. Red boxes indicate objections *against* the contention, green indicate supporting points *for* the contention.



What about an argument map for a very different contention? We could produce a totally different map for this argument, or we could add objections to the contention given in the argument above as we have done here. More objections can be made to the supporting reasons given on the right-hand side of the argument as well. We will return to this example later.

4. Awareness of the Objections to the Reasons

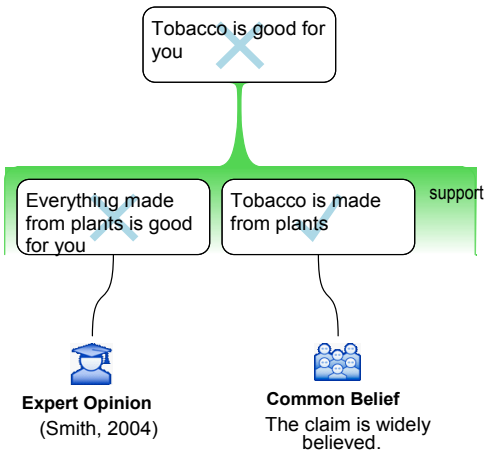
Critical thinking therefore involves first being aware of contentions, and second being aware of all the *reasons* or *assumptions* (or objections) for the contentions. The third thing involved in critical thinking is being aware of the objections to the reasons. This has several stages: 1) Making sure the reasons are accurate or true (or at least believable); 2) Assessing if the person making the argument is biased; 3) Assessing whether the *assumptions* lying behind the reasons are fair and reasonable; 4) Determining if the arguments are valid; 5) Assessing if the premises are relevant; and 6) Deciding if there is enough evidence given for the premises. Let's take these steps in turn.

Are the reasons true and accurate?

Critical thinking involves more than knowing the arguments being made and being able to "map" them, it also involves being sure of the accuracy of the premises. Are they true? An argument with false premises can be questioned. The premises have to be at least plausible or believable. Can other explanations be given for the reasons that are different? It is possible to see that something is wrong with the argument below even though its premises link well to the conclusion:

> *Tobacco is good for you because everything made of plants is good for you and tobacco is a plant.*

The problem with the argument is with one of the reasons or premises. It is false. Not all plants are good for you. This leads to a clearly false contention: *Tobacco is good for you*. This has beeen shown in an argument map along with "basis" boxes providing evidence for the terminal points of the argument. The box with lots of people in it indicates a "commonly accepted view". The other box indicates academic support for the reason, for example, a scholarly paper discussing plants, such as tobacco, that are harmful to human health. Clearly, it is good if grounds for reasoning are based on academic support, and not just "common opinion".



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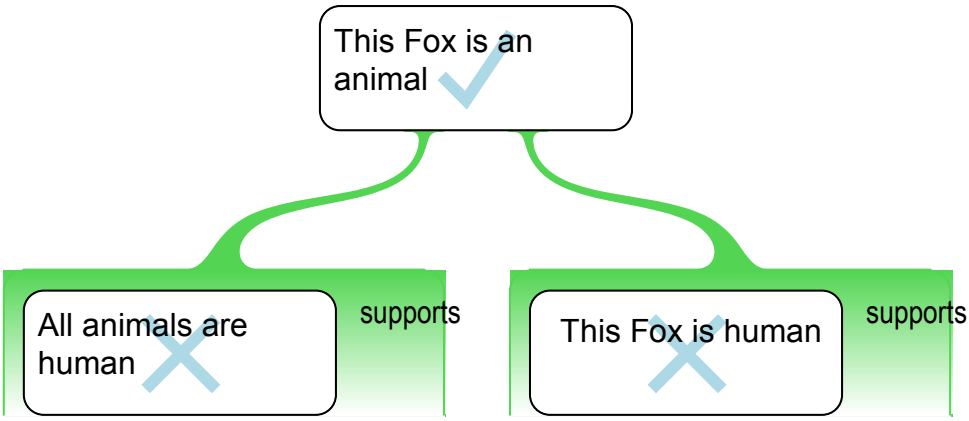
If an argument has one or more false premises its conclusion can be seriously questioned. Notice that one of the supporting reasons above is ticked because it is plausible; another is "crossed" because we have supporting evidence from Smith, 2004, that it is false (we may know it is false without the supporting evidence, but it is better to provide evidence if you can because this makes your opinions much stronger!) On the basis of this, we can reject the contention as well.

Note, however, that the conclusion of an argument is not *necessarily* poor just because one or more of its premises are false. In the following example we have a true conclusion based on false premises.



The contention is clearly true even though the supporting reasons are false. Is this a good argument or not? In one sense it is. The conclusion seems to *follow* logically from the supporting reasons. However, in another sense it is clearly not a good argument because the supporting reasons are false. This simple example shows that the logical structure of an argument (known by logicians as "validity") is quite a different thing from the truth or falsity of the premises of an argument (known by logicians as "soundness"). A good critical thinker will check the validity *and* soundness of arguments.

Is the argument biased?

Having established the truth or believability of the premises or reasons, you also need to assess if the author/speaker had any reason to be predisposed to that position other than as a conclusion of their academic research. In other words, does the author have a *vested interest* or a prior bias to a certain position? For example, a person would have a vested interest in GMF research if s/he was a GMF scientist or a farmer using genetically modified research for making his/her living. Everything s/he said about the subject would need to be scrutinised carefully. You need to keep this in mind as you analyse the work or arguments of others. Sometimes it is difficult to see bias in your own work, so care needs to be taken when presenting your own arguments.

EXAMPLE: You may question the neutrality of a medical researcher who produces an article in a medical journal, claiming the wonders of a new drug if they are being paid to research the drug by the company that is planning to sell the drug.

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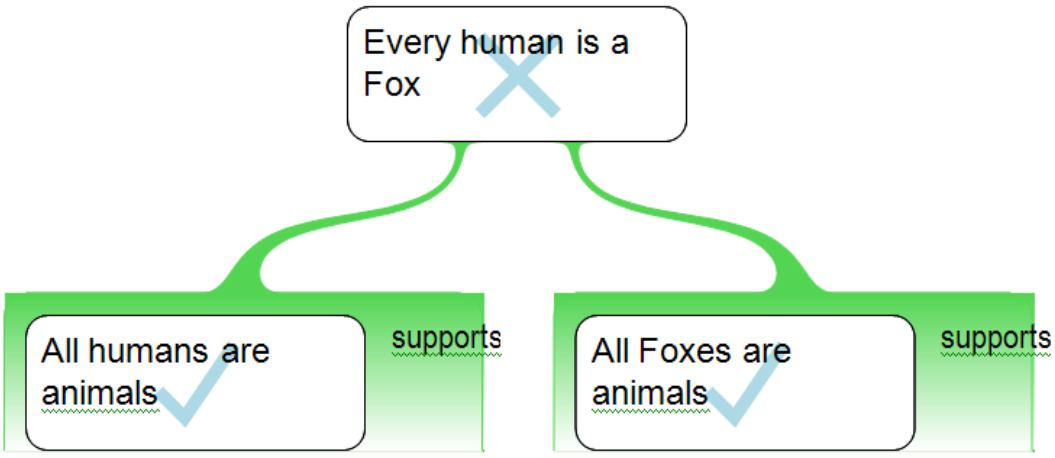
Are the assumptions reasonable?

We looked at assumptions in arguments earlier, now we need to consider whether they are reasonable, plausible or believable. Having mapped and assessed arguments for accuracy and bias, you need to look at the (often unstated) assumptions lying behind the premises on which the position or argument is based. An assumption is something which in an argument, is accepted or taken for granted as being true. We saw earlier than my argument about GMF had a concealed assumption that *it is good to feed people with disease-free crops*. This is a reasonable assumption. However, sometimes authors conceal assumptions that are not reasonable at all (e.g. everything made from plants is *not* good for you). The good critical thinker has to be constantly on guard against faulty or questionable assumptions.

Is the argument valid?

You need to identify these assumptions and assess whether they are *valid*. We just saw an example of this. A valid argument is when the conclusion or contention given in an argument *follows* logically from the reasons or premises given to support it. The argument above about tobacco is valid as the conclusion follows from the premises or reasons given. This is despite the fact that there are false reasons given. There is still a logical link between the premises and the contention. This logical link is called *validity*. Like well-founded assumptions, you have to be on constant guard for *invalid arguments*. If an author wrongly assumes that a conclusion follows logically from reasons given, when it does not, then the rest of the argument falls apart. An example of an invalid argument has been given before:



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An argument, or any piece of reasoning, involves an **inference**, a **link** between reasons and conclusion, as well as the statements given as premises and conclusion. There are thus really two questions involved when we ask: 'Is this a good argument?':

- The first question concerns the basis of the reasoning, that is, it asks whether the *premises are true*.
- The second question is concerned with how rational or *logical* the inference is, that is, it is concerned with whether the conclusion *follows logically* from the premises, or is at least *sufficiently supported* by the premises.

Are the reasons relevant?

If the assumptions are fair and reasonable, and there is no bias, and the argument is valid, then you then need to assess whether the reasons given for an argument are really *relevant* to the position being taken? Is the position/argument being defended reached *as a result* of relevant points being made? Are the reasons relevant to the conclusion? Sometimes arguments are valid (well linked), but the premises are irrelevant.

> EXAMPLE: The statement that males out-perform females on spatial math problems is correct. However, to therefore conclude that only males can solve spatial math problems is not logical, and ignores the many females who are just as capable of solving spatial math problems, and the males that cannot.

Is there enough evidence for the premises?

This helpsheet has identified a number of things you need to check as a good critical thinker. You need to establish that the assumptions in an argument are sound, *and* that the structure of an argument is valid. You also need to be sure that the reasons given are true or at least believable, and that they are not biased. You then need to ensure that the argument is supported with appropriate evidence. Unsupported or insufficiently supported arguments, no matter how good, are unacceptable as they lack academic justification and credibility. Arguments need concrete support, to clearly illustrate and back them up.

This is where academic research comes in. As a student, you will be referring to experts in your field of study to support your arguments. Other authors and speakers will also do this, as any work is only part of a body of knowledge that builds on other people's ideas. Academic research is quite different from other kinds of research (e.g., commercial research) in that the better (and the more) the evidence advanced, the more seriously the arguments are taken to be. No easy guidance can be given on what is acceptable as "research evidence" as to some degree this is discipline specific. In the sciences only empirical and repeatable experimental research is taken seriously. In other disciplines, other criteria are used. In general, the use of peer-reviewed, *refereed* articles citing research work will help you in supporting your arguments and in criticising the arguments of others.

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EXAMPLE: If an author writes that the rapid growth in the Chinese economy is fueling the natural resources boom around the world in the twenty-first century, few people would question it. However, in an academic paper, you would expect such a statement to be backed up by comparative export figures from countries that are rich in natural resources. You would need to show the percentage of natural resources being exported to China, compared to other countries, and present figures that reflected the situation before China's economy boomed. You would also expect a discussion about the consequences of this phenomenon, again backed up by evidence.

Where an argument is supported, you need to assess the *quality* of the evidence. Do this with your own work too. Is the evidence from a reputable source? Are they a recognised authority in this area? Is the information cited up-to-date (i.e., published in the last five years or less)? Is it published in a reputable, peer-reviewed journal? Details like this will matter in terms of the grades you obtain in an assignment. Lecturers are generally not impressed with old information, or non-peer reviewed information (e.g., from newspaper or the internet), or unsupported information (e.g., your own opinion).

NOTE: Supporting an argument with articles from newspapers is not enough. Nor is it good enough to use the opinion of an authority in one area in an unrelated area. Both you, and the authors that you read, need to use evidence that comes from an expert in the area, and which is written up in a reputable journal or academic text.

How Many References?

I am often asked how many references are needed in academic assessment task. 'How long should my reference list be?' This is a bit like asking how long a piece of string should be! This depends on the length of the work and what you are trying to do.

A good piece of well-supported research is not determined by quantity, but the quality of the research cited and how well it is integrated and explained in your own writing. That said, as a very general rule, a page or two of peer reviewed articles is sufficient for most assessment tasks. Some lecturers will stipulate how many articles you need to cite. If they don't tell you, use the "one or two page rule" as a very rough guide.

Let's return to the argument for GMF research given above. Look at each reason given separately. It is hard to think of objections to the premise that: *It is a good thing to feed people with disease-free crops.* This seems sound. However, an objection might be to the premise that *Disease-free crops can feed more people.* What is the evidence for this claim? Who provides the evidence? Is it evidence that is based on well-tested research? Is the evidence biased (for example, is it evidence from GMF scientists with a vested interest?) Is the claim itself reasonable? After all, crops susceptible to disease—potatos, apples, etc—have been feeding humanity very well for thousands of years. Does making a crop disease-free automatically mean that it will be more productive? Seeing the evidence for this is important to establishing the truth of the claim, and therefore the reliability of the argument overall.

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Another objection might be made to the premise *that GMF research can produce disease-free crops.* Are they any other ways in which crops can be made disease-free without modifying their genes (selective breeding, for example)? Is it acceptable to assume that GMF research will *necessarily* produce disease-free crops? What is the evidence for this? Opponents to GMF research argue that a danger of GMF research is not being able to manage the process of genetic manipulation properly and allowing "faulty genes" to escape into the environment. If this is true GMF research might cause more problems than it solves. Care is needed under strictly controlled conditions.

Finally, be aware of poor reasoning. Generalisations, based on limited observations, faulty logic, and over simplification of an issue, are easy traps to fall into.

Answers to Self-Test

1.b, 2.d, 3.a, 4.e, 5.c