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Critical thinking

What is critical thinking?
Structure: organising your thoughts and materials
Generating critical thinking
Critical questions – a linear model
Description, analysis and evaluation
Developing an argument

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What is critical thinking?

This guide to critical thinking stresses the importance of asking and answering questions. In everyday life the term 'critical' is often seen as negative or destructive. Being critical in academic life, however, does not mean questioning things randomly, or for the sake of 'nit-picking'. Instead, academic work aims to get as near as possible to the truth. Critical thinking in any subject or discipline is the way in which this is done, along with the more specialised applications of theory, the methods and techniques, which have been developed for the subject. Critical thinking then, is the attempt to ask and answer questions systematically. This means asking the most useful questions in the most productive sequence in order to yield a coherent and credible 'story'

So thinking critically means asking questions. Instead of accepting 'at face value' what you read or hear, critical thinkers look for evidence and for good reasons before believing something to be true. This is at the heart of what it means to be a scientist, researcher, scholar or professional in any field. Whatever you are studying, critical thinking is the key to learning and to making progress.

The common question words: **what, who, where, when, how,** and **why** will help you to get started; along with the phrases: **what if, what next,** and **so what**. Attempting to answer these questions systematically helps fulfil three vital functions for any serious study – **description, analysis and evaluation.** These are the things you need to do:
Describe ... e.g. to define clearly what you are talking about, say exactly what is involved, where it takes place, or under what circumstances. Fulfilling this function helps you to introduce a topic. More complex **description** will become **analysis**.

Analyse ... e.g. examine and explain how parts fit into a whole; give reasons; compare and contrast different elements; show

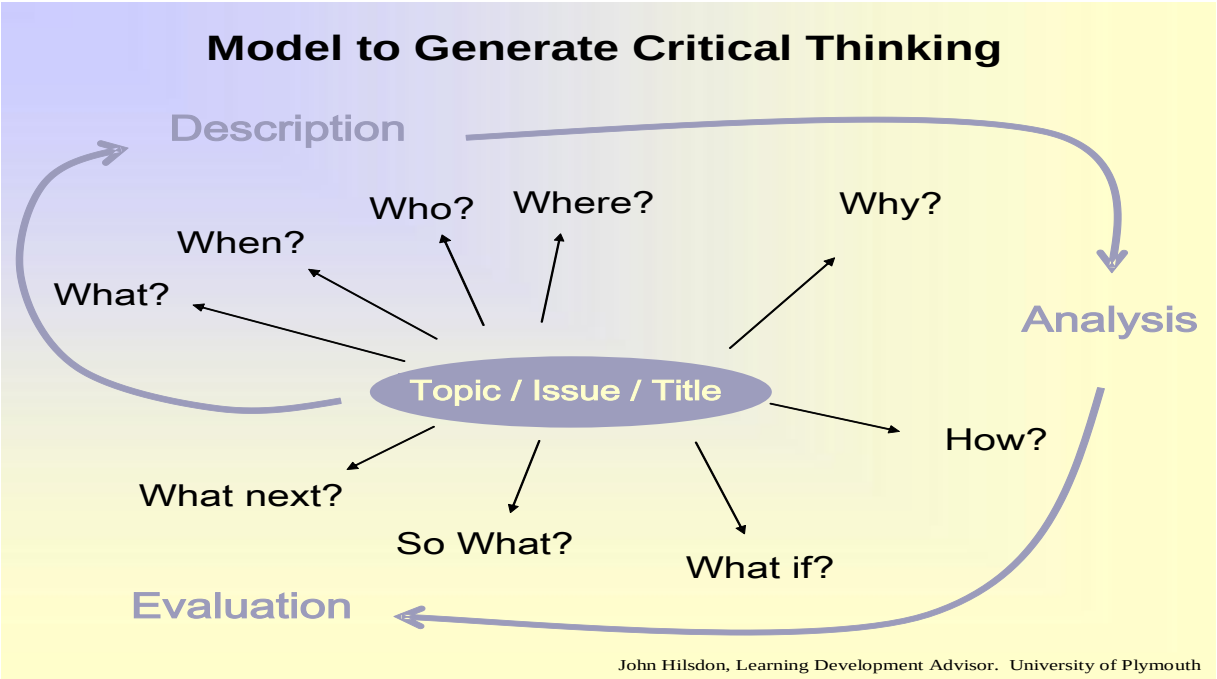
your understanding of relationships. In this way **analysis** forms the main part of any in-depth study.

Evaluate ... e.g. judge the success or failure of something, its implications and/ or value. **Evaluation**s lead us to conclusions or recommendations and are usually found at the end of a piece of academic work, a paper, chapter or other text.

Structure: organising your thoughts and material

To summarise what we have said so far: the diagram below shows how asking and answering questions helps to fulfil the three key connected functions of description, analysis and evaluation. This is a reliable basis for introducing, discussing and drawing conclusions about your topic. Beginning with 'what', this systematic questioning will encourage you to consider every aspect of your topic or question.

Figure 1:



You should aim to address most, but not necessarily all, of these questions for your topic and subtopics. The crucial questions for almost any topic are: '**what'**, which identifies the issue; '**why**', which explores it in depth, addressing causes and using theory; '**how**', which helps you look at the processes at work; and '**so what**', which helps you make judgements or conclusions, showing that you have reflected on implications.

The model can be used in a number of ways at different stages of tackling an assignment. Use it before and during your reading; for planning the structure of a whole assignment; and also to structure each point within it.

Generating critical thinking:

1. Identify a topic. This can be your essay title, a subtopic, or a point you might want to explore in a particular section or paragraph. Write key words in the middle of a sheet of paper, or a blank document screen. This is the 'Topic or Issue' in the diagram above. Or you could do it in a linear way and put these keywords in the place of a title, with the questions that follow spaced out in the margin, or as subheadings (see page 4 below).

2. Try to answer the questions on the diagram starting with **'what'** questions. Your answers may become part of an introduction, defining your terms or identifying issues.

3. Using the **'who'**, **'when'** and **'where'** questions, generate descriptive background information. This will provide context or scene-setting material which is also useful for an introductory section.

4. **'How'** requires consideration of the ways that something operates or works – e.g. processes or procedures. Attempting to answer questions using 'how' takes you from descriptive to more analytical work.

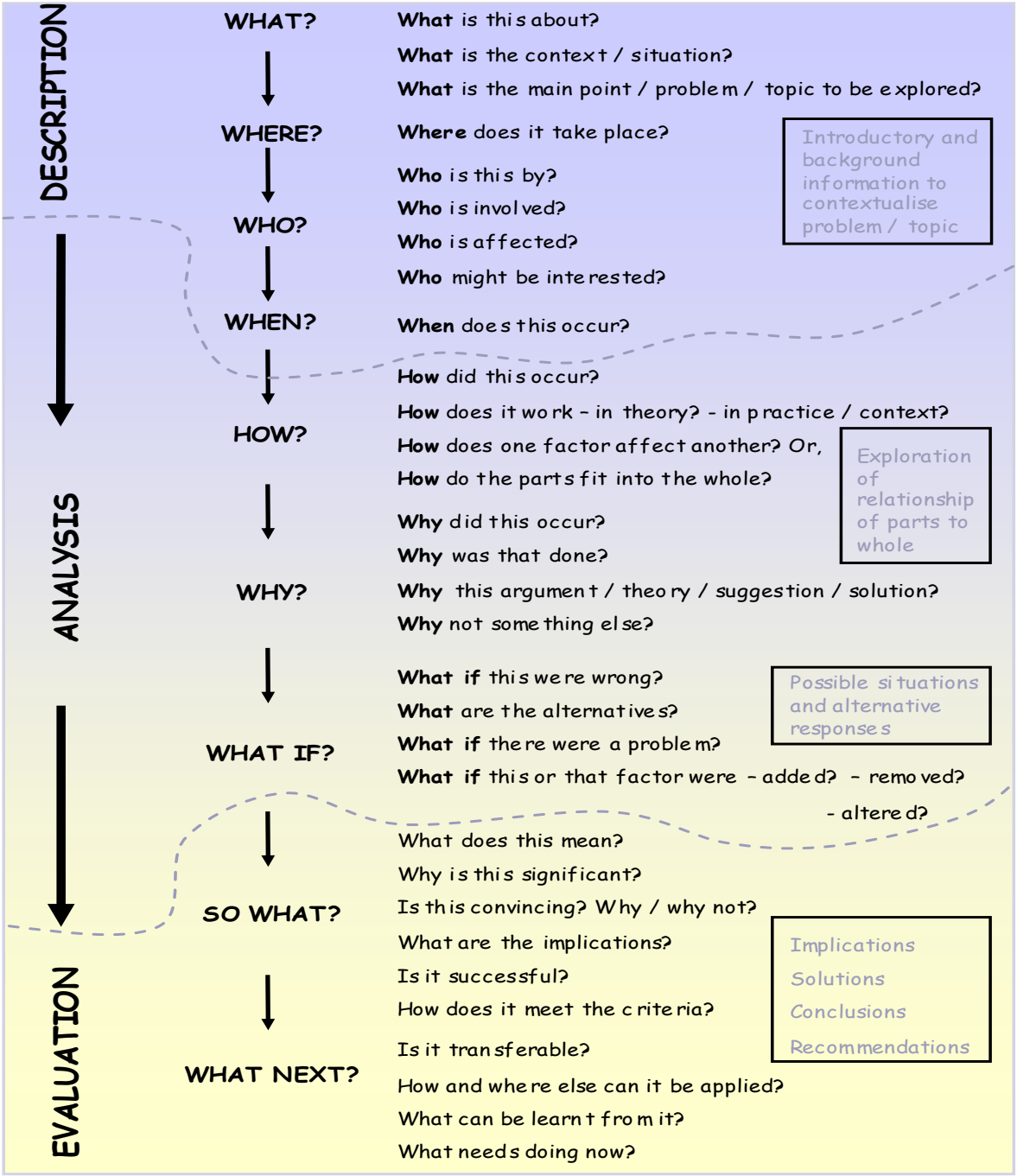
5. **'Why'** also moves you deeper into analytical territory. It gets you to find reasons, explanations or causes. Think about all the possible questions to do with 'why' (see the model below for some suggestions). Answers to such questions are likely to emerge over time from your reading and use of specific theories and findings reported in academic journals; published books and research reports; or from other authoritative sources such as policy documents.

6. Asking questions using **'what if'** moves you into a more evaluative phase of your thinking. It helps you to consider the possible implications or results of a particular action. This question is also useful for considering predictive work done by others, or engaging in forecasting of your own.

7. **'So what?'** is really the key question for an evaluation. It gets you thinking about value or values, meaning and significance. It is also about discriminating between more or less important factors in any situation. It helps you to think through and justify your own position, and discuss its implications.

8. **'What next?'** might refer to recommendations and predictions that your argument has brought to light. It leads you to consider and plan for more specific actions that might be necessary in certain kinds of assignment, such as a project or business report.

Figure 2. Critical questions – a linear model



Developing an argument: from description to analysis and evaluation

Notice how the three functions are not strictly separate but lead into one another (see the dotted lines in the diagram above). Here is a simple example of the model in action: imagine that an archaeology student has discovered something at a Roman site. As the dirt is cleaned away, the object is revealed. The archaeologist asks herself questions to help clarify her understanding:

Description			**Description becoming analysis**	
What is it?	*A small bowl with a handle*		What was its purpose?	*Could have been to contain liquid*
Where was it?	*At the site of a Roman villa (was this the kitchen or dining room?)*		How would it work?	*Bowl shape holds liquid and prevents spillage*
When?	*Roman period – approx 300 AD?*		Why this size and shape?	*Easy to drink from*
Who used it?	*Big house - maybe a wealthy family?*		Why the handle?	*Can be held and carried*

The archaeology student could develop her answers to these questions in a written report or assignment by reference to academic texts. This would help in building an 'argument' – e.g. to justify her view that what she has found is a drinking cup. In one of her books she might find:

"Containers for food and drink are found in every part of the world and have been used by humans over several millennia. Cups and other drinking vessels have evolved from naturally occurring structures such as seed pods and gourds (still used by some tribal peoples) through to handmade ceramic and metal objects and, more recently, industrially manufactured items. The essential characteristics of drinking vessels are their ability to hold liquid and to be held. Some may have handles and spouts, or may be enclosed with stoppered tops … "

Notice how this text functions to **describe** by answering mostly **what, who where** and **when** type questions.

Now let's see how the student might also use the critical thinking model for analysis and evaluation of her find:

Analysis			**Analysis becoming evaluation**	
How is it made?	*Rings are evidence it was made on a wheel*		What next?	*Need to compare the design and decoration with similar objects to verify its age*
How was it decorated?	*Burnished (polished) with wavy lines typical of Roman period?*			
Why is it here?	*Kitchen or dining area?*		So what?	*Very rare to find intact pot – highly significant and valuable find!*
Why intact?	*Preserved in soft soil. Durable*			

In building her argument, the student might use her own reasoning prompted by the model, in combination with material she has read. She might find the following extract useful:

"Romano-British Pottery: AD43 410. Most (but not all) pottery was wheelmade and very standardised. Locally made coarseware jars and bowls were used for cooking, food preparation and storage. Finewares, mainly used for dining, included bowls, dishes, cups and beakers. During the late Roman period numerous British industries produced finewares. Decoration was varied and included burnished zones, wavy lines or lattice patterns.

Reference: Harris, J. (2008) Pottery Identification Sheet ONLINE: http://www.scribd.com/doc/3888712/Pottery-identification-sheet accessed 30.05.2010

Using her notes from a variety of sources, she might then produce a text like this:

A small, intact pottery vessel was uncovered at the site of a Roman Villa in Worcester on 12th June 2009. The vessel is a 'fineware' cup which would have been used for drinking at table (Harris, 2004). It has a handle and is decorated by burnishing with a motif of six parallel wavy lines scored into the outside surface. It is thought that the cup may have been used by occupants of the villa, who were likely to have been members of a wealthy merchant family. Other evidence suggests that the villa was occupied between 100 and 300 AD (Smith, 2008)

There are regular symmetrical ridged rings visible on the inside of the cup, suggesting that the construction of the vessel was by turning on a pottery wheel. It is known that this method for producing pots was common throughout Gaul and Britain from the middle of the Roman period. The decoration is also typical of the period and confirms it as 'fineware' as opposed to 'coarseware' (Harris, 2008; Smith, 2004). The location of the find is not surprising since it is an item which would have been in common domestic use. The precise spot, in the corner of a ground floor room, could possibly suggest that this was a dining or a pottery storage area; although without further information from the surroundings it is not possible to be sure of this. Recent investigations of the site have resulted in an outline plan and findings (Diggings and Tinker, 2008) which speculate that this part of the villa with its mosaic floor could have been an area used for dining.

Although this vessel is not a particularly unusual pot in terms of its size and pattern, it is nonetheless a significant find because it was found intact. It is also valuable in that there is only a slight amount of damage to the patterned surface. This is rare because of the fragility of pottery and the likelihood of it being crushed under the weight of falling masonry or being trodden upon by human or animals. This pot seems to have survived whole because of the soft earth which surrounded it. It was further protected at some later stage when, luckily, an arched piece of stone fell or was placed above the pot, enclosing it within the space below the arch. In order to discover more about the vessel it will be necessary to make comparisons between it and others found from similar sites and periods. From a comparison of the decoration, style and construction of the vessel it may be possible to be more precise about its age, where it was produced and its use.

References

Diggings, I. and Tinker, B. 2008 "Findings from recent examinations at the site of a Roman Villa near Worcester". Journal of Imaginary Archaeology, Vol 26. 3. 34-50

Harris, J. 2008 Pottery Identification Sheet ONLINE: http://www.scribd.com/doc/3888712/Pottery-identification-sheet accessed 30.05.2010

Smith, D. 2004 Comparing Roman Pottery. London: Shovel Press

Try going through the example above and deciding what the function of each sentence is. Ask yourself: is it description, analysis or evaluation – or is it a combination of one or more function? If you go through, sentence by sentence, you will

probably find it easy to see that most of the description happens in the first paragraph; the analysis in the second; and the evaluation in the third. There will always be instances where it is hard to say whether part of a text fulfils one or another function – and often two or more functions are being undertaken together. This is because using language and writing is not an exact or purely mathematical activity. People use words in different combinations and attempt to do things in various ways and for various reasons.

In order to be considered sufficiently 'critical', (academic) university level writing must go beyond being merely descriptive. Use the following table to compare the functions of writing in terms of being descriptive on the one hand, or analytical and evaluative on the other.

Descriptive writing (mostly 'd')	**Analytical and evaluative writing** (mostly 'a' and 'e')
States what happened (d)	Identifies the significance (e)
States what something is like (d and a)	Judge strengths and weaknesses (e)
Gives the story so far (d)	Weighs one piece of information against another (a and e)
States the order in which things happened (d)	Makes reasoned judgments (a and e)
Says how to do something (d and a)	Argues a case according to evidence (a and e)
Explains what a theory says (d)	Shows why something is relevant or suitable (a)
Explains how something works (d and a)	Indicates why something will work (best) (a and e)
Notes the method used (d)	Indicates whether something is appropriate or suitable (a)
Says when something occurred (d)	Identifies why the timing is important (a)
States the different components (d)	Weighs up the importance of component parts (a and e)
States options (d and a)	Gives reasons for selecting each option (a)
Lists details (d)	Evaluates the relative significance of details (e)
Lists in any order (d)	Structures information in order of importance [etc.] (a and e)
States links between items (d and a)	Shows relevance of links between pieces of information (a)
Gives information (d)	Draws conclusions (e)

(Adapted from Cottrell, 2005)

The way academic writing follows this pattern, from description, to analysis, to evaluation', tells us something important about academic work – whether it is in the sciences, arts or humanities. All subjects, when studied at advanced levels, require these three things (description, analysis and evaluation) to be done,

and in largely that order, to tell a coherent story which is supported by critical reasoning and evidence.

Academic work is intended to be 'scholarly'. This means it should be of a high standard and appropriate to the particular level of study it represents. It is usually assessed by a lecturer – who will be a critical reader. So far we have used the critical questions model to think about generating material; but it can equally be used to ask questions about, and assess other people's writing. You could try asking questions about a text to see how scholarly or scientific it is. What does it claim to be true? Can you believe its claims? Does it provide you with good reasons, evidence, or both to support its claims? And how 'good' are the reasons, or is it 'good' evidence? An important way to demonstrate the quality of your arguments, or evidence in your academic writing is by referring to work by others. The status of this work depends on how authoritative it is. If you are a critical reader, you look for 'authority' in the form of references to relevant supporting work which has been published in academic journals, or text books. In these kinds of publications the content has been 'peer-reviewed'. This means that it should have been independently evaluated by another qualified academic who will have read it critically to ensure that the material it contains is factually accurate and that the reasoning behind it is sound. This is unlike the material which may often be found in newspapers, magazines or from many online sources, where the content may not have been checked by anyone else, or where the work simply puts forward one person's opinion.

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