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Critical Thinking

1. Thinking Thoughts

The word critical is derived from a Greek root word (*krinein*) meaning "to separate or choose." It may seem obvious that thinking involves choosing and making distinctions, but in fact much thinking lacks this active, deliberate quality. Such activity is not *critical* thinking but some other mental pursuit: guessing, remembering, daydreaming, or feeling. Some analyses divide thinking into four categories: **ritual**, **random**, **appreciative**, and **critical**. Only the last actually involves reasoning.

Ritual thinking

is associated with habitual activities: dressing, filling a gas tank, eating, driving along a familiar or predictable route, and even talking--about the weather for instance.

Random thinking

is a more formal name for day-dreaming, wool-gathering, musing, or free association. We are often not actively aware of what we are doing with our minds when we engage in random thinking; such awareness is crucial to critical thought.

Appreciative thinking

is the ecstatic, thankful experience of beauty in nature or art (the philosopher Heidegger described it as *das besinnende Nachdenken* in his *Discourse on Thinking*). Critical thinking is sometimes considered the opposite of appreciative thinking. In fact, one can apply critical thought to appreciation, but such deliberation is a separate activity.

Critical thinking

is the use of intelligence in making judgements; that is to say, it is the application of reason to a set of facts.

We have not yet defined reasoning. **Reasoning** is t*he use of supposed truths as evidence in support of other supposed truths*. Critical thinking depends on reasoning; indeed, for most purposes, reasoning and critical thinking are synonymous. Many useful and creative mental activities such as **lateral thinking** and **intuition** lie outside the bounds of critical thinking, and indeed systematic reasoning is not a natural faculty: It is a learned behaviour, although one that is learned at an early age. Even very young children test the reasoning of their parents, often with tremendous formal subtlety.

> **Parent: I told you not to drop crumbs on the carpet.**
> **Child: I didn't *drop* the crumbs; I *threw* them.**

Children are not the only logic-choppers in the game, of course: this is a skill we all learn early in life and use throughout our careers. Fair, honest arguments are rare; some post-modern theories suggest that they are impossible, and that even the claim to pursue them is a deliberate deception! Of course, to enter the debate at all, we have to learn how to evaluate our own arguments and those of others. If we do not analyze arguments, we may be swayed by the arts of persuasion or dissuaded by irrelevant considerations. Worse, we may fail to recognize the value of arguments that counter our own convictions.

2. Argument

Various discursive contests are conducted over ideas (we will ignore the argument of force for now!). **Persuasion** is the general process of leading an audience to accept a position. This may be accomplished by many techniques (including violence); persuasion through an appeal to reason is called **argument**, and the focus of critical thinking is upon this form of dispute.

An argument requires a topic and more particularly a thesis (a clear judgement of a specific matter). If the judgement is not clear or the matter too broad, we do not have a thesis but a tendency. Arguing without a thesis is often a useful strategy in uncertain territory, but it is hardly honest. To support a thesis, a disputant must *define* the key terms, arrange a connected series of propositions based on induction or deduction, and present evidence.

a.) Key definitions

Arguments depend upon definitions of key terms, which in turn define the thesis. Many arguments do not go beyond the stage of establishing definitions; consider the controversy over such terms as "life" and "death." The long and bitter public debates over euthanasia and abortion often become tangled in definitions of the two states common to all humanity.

There are three clearly-recognized approaches to definition: definition by **synonym**, definition by **example**, and definition by **stipulation**.

Synonym uses a substitute term for the one cited in the argument. Thus, for an argument on conduct, one might offer "honest" as a substitute for "moral." In fact, these two terms are neither equivalent nor beyond debate, neatly illustrating two of the problems involved in such definitions. Definition by example is more reliable. In a gun control argument, one might define "machine gun" as "a Uzi automatic carbine, an M16 assault rifle, or any similar fully automatic weapon." This list establishes a range, avoiding the trap of a single unstable term. A stipulative definition attempts to establish a defining condition for membership in some class. Tax forms use stipulative definitions to place one in various categories--student, retired, dependant, and so forth. "Farmer," according to a stipulative definition, might be limited to "any person earning not less than 80% of his or her annual income from agriculture."

Related to this third approach are two ideas important to formal systems of classification: **essence** and **sufficient and necessary conditions**. The former has traditionally been invoked in philosophy and biology; the latter in mathematics. Every species definition is intended to isolate the essential difference of the subject. A classic case is that of humans. That we are the chief *thinking* animal has long been an accepted way of defining the species, but this specific difference is now under attack. Mathematical definitions invoke conditions:

Given an equation in x and y, we say that an ordered pair (a, b) is a solution of the equation if equality is obtained when a is substituted for x and b for y.

b.) Induction and deduction

Most arguments rely upon two basic logical processes: **induction** and **deduction**.

Induction is the basic process behind scientific research: it builds general laws from specific instances. Having observed, for example, that different objects dropped from a window go down, we might conclude that all objects tend to fall to the lowest point they can reach (tossing a helium balloon out the window would urge us to refine our theorem, of course). Inductive logic works with patterns of occurrences and proposes that the pattern is likely to show itself in a further instance. It gains force as the body of evidence it relies upon grows.

Naturally, any new evidence *could* require that an inductively-derived law be revised; however firm the implications of experiment, the laws derived from them are merely theorems, provisional upon the results of experiment. This is why there is such emphasis upon controlled conditions and representative sampling in the sciences. Induction is really based on probability, and most researchers work very deliberately with both logic and statistical probability to test their inductive arguments.

Deduction is the process of applying general laws to a particular case. Deductive reasoning is illustrated by a classic example of a deductive syllogism--a three-part statement consisting of a major premise (the general law), a minor premise (the particular case), and a conclusion:

Major Premise: All humans are mortal.
Minor Premise: Socrates is human.
Conclusion: Socrates is mortal.

In a sense, deductive reasoning is merely a matter of applying established laws--laws derived, in most cases, from induction. In practice, most research and most arguments combine elements of induction and deduction; science itself is an endless process by which induction and deduction lead to increasingly useful models of the world.

c.) Evidence

Argument depends upon **evidence**, and evidence comes in many forms.

Facts are statements whose truth is universally accepted.

Canada is larger than the Czech Republic.

A special class of fact is the numerical statistic. Statistical evidence is widely accepted as the equivalent of fact, although special cautions surround it. Slanted questions, dishonest answers, and inaccurate tests can negate the validity of the data; small, unrepresentative samples can be misleading. A statistical study may not reliably indicate cause and effect (leading to *post hoc ergo propter hoc* fallacies: see QuickNotes on fallacies).

Exemplary evidence consists of specific cases that support a proposition. A wide range of

sources, including personal experience and anecdotal evidence, can be admitted because examples are not definitive. No example can actually prove a point; examples are really illustrative and persuasive evidence. Among the special types of examples may be included **analogies** and **hypothetical** cases. The "lifeboat Earth" analogy has become famous and is the basis of many critical thinking exercises; nevertheless, analogies cannot prove anything. Hypothetical cases are often invoked in legal, philosophical, and religious arguments, such as the famous dilemma surrounding equivocation:

> **If a man is hiding in your house, and murderers come to kill him, and they ask you whether he is in the house, what should you say?** (adapted from the *Catholic Encyclopedia*)

Hypothetical cases are valuable for clarification, but they too fall short of offering proof.

Expert testimony relies on the facts, examples, and statistics that formed the view of the expert in question. In judging expert opinion, be sure that the expert is not only a *bona fide* expert but also an expert in the subject. Advertisers (among others) love invoking "experts" out of context, relying on the fame, rather than the expertise, of the advocate.

3. A Simple System for Critical Analysis

Because few arguments are presented with perfect clarity, the first step in a logical assessment of an argument must be to prepare the material for proper evaluation. The entire process of analyzing an argument critically--for its inherent rational appeal rather than for its style or for fallacious elements--can be approached in many ways. The following six-step plan offers a useful way of breaking the process into stages:

> •**Locate the** conclusion**:**
> Many arguments are constructed after their conclusions have been determined. Starting with the conclusion may reveal not only special assumptions but also the actual motive behind the argument.
> •**Clarify the language:**
> Ambiguities make logical argument impossible. Identify the key definitions upon which the argument rests and recast any dubious language.
> •**Eliminate the excess:**
> Remove anything that may distract from the actual argument; eliminate any prejudicial language in favour of a neutral wording. Remove clutter, such as universally accepted definitions or assumptions (be careful of these).
> •**Identify assumptions:**
> Many statements clearly depend on unstated propositions. Locate such dependent statements and make their foundations explicit.
> •**Classify statements:**
> Statements can be either statements of fact or statements of opinion; distinguish between the two.
> •**Isolate the structure of the argument:**
> Determine which statements serve as premises, and re-state them in logical form. You may find it helpful to symbolize them using standard logical notation. However it is accomplished, you must evaluate the formal structure of the argument to determine whether it is complete and valid.