

Critical Thinking

A Short Primer



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Analysing the Claim

The Danger of Evasive Language

We have all heard the evasive sophistry of comments such as "Mistakes were made," "Lessons were learned," "Procedures were not followed," emanating from the political, bureaucratic and corporate worlds. What they all have in common is a conspicuous absence of agency. There is no personal or institutional attribution. There is no one or nothing to blame; it is just the way it is.



This takes us directly into the language of Newspeak that George Orwell wrote about in his novel 1984. In the book, Newspeak is the official language used by Big Brother, the figurehead of the Party. It is designed to conceal rather than reveal. It was created and shaped to constrain thought itself by the use of euphemism, circumlocution, and inverted meanings. The aim is to make some ideas literally unsayable and therefore unthinkable. In such an environment, it becomes impossible to test a precise claim. Blur the words, and you blur the world.

In the face of this ocean of obfuscation, we need to use critical thinking to distinguish the real from dangerous misrepresentations that can manipulate us for nefarious purposes while blinding us to the truth.



George Orwell and Hannah Arendt both showed why this matters. Orwell warned that political language has techniques meant to deceive and mislead, and Arendt showed how bureaucratic habits of speech and responsibility-shifting enable evildoers to thrive in an unaccountable fashion.

Arendt observed that atrocity advanced not only through the mad and murderous actions of fanatics but also through ordinary functionaries. She found them just as culpable for evil events, although they hid themselves behind forms, memos, and procedures. In the world of bureaucracy, no one is responsible for anything; there is only process and implementation taking place in a moral void.

Our first step to counteract these tactics is to name an actor, an act, and a standard. The antidote to these incredibly common strategies of self-absolution is to make a rigorous analysis of any given claim.

Determine Clearly What is Being Claimed

- **By whom?**
- **About what?**
- **In what terms?**

Treat any vagueness as a red flag

Vague: Mistakes were made.

Clear: A specific person didn't do their job properly.

These steps serve to establish clarity. Without clarity debate is just a knife fight in thick fog.

Formulate the Claim in Plain, Active English

This rephrasing is very important. In grammar, the active voice has to have an agent. The passive voice can, but only with additional phrasing, so in ordinary use there is no one or nothing accountable for the action. It can give the impression to the unwary that, rather magically, something happened all by itself. Hence, there is a fondness for its use by those who wish to hide responsibility.

Types of Claims

Descriptive (empirical claim): Asserts a fact.

The train arrived at 13:56.

Causal (explanatory claim): Links a cause to an effect.

The train was delayed because of leaves on the track.

Normative (prescriptive claim): Asserts what ought to be done.

Arrive earlier to avoid missing the train.

Predictive (forecast): Something will likely happen.

If it keeps raining, the football match will be cancelled.

Of course, there are plenty of contexts where using the passive voice is perfectly fine, but in the kind of argumentation we are discussing here, it is best to view any occurrence as a warning of possible deception.

Six More Euphemisms

Enhanced Interrogation: Torture.

Economical with the Truth: Lying.

Creative Bookkeeping: Shady financial practices.

Lessons were learned: Platitude; no commitment to corrective action.

Procedures were not followed: Hides who, when, why.

We take this very seriously: This is a posture, not a statement of accountability.

Classify the Claim

How strong is the claim?

Is it certain, likely, or provisional?

What are the best alternative explanations?

Each of these claims demands its own evidence in the form of records, experiments, forecasts, and so forth.

The job in each case is to elicit and determine the appropriate evidence.

This is a necessary effort. Deceit works by giving the impression of substance where none exists.

Define Terms

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Orwellian Newspeak is intended to narrow the range of thought. It works by contracting or inverting meanings, so we have phrases such as enhanced interrogation, collateral damage, friendly fire, and ethnic cleansing. These expressions serve to make appalling actions and events sound innocuous. They hide the true intent and extent of the perpetrators' wrongdoing from scrutiny. Ethnic cleansing is particularly obnoxious, as it is just a variation on a theme coming from the same stable as racial hygiene: an idea of which the Nazis were particularly fond.

Therefore, our job here is to ground these expressions by bringing them back to reality. We do this by using ordinary, straightforward language and definitions whenever possible, unless a technical standard is cited.

Find What Justifies the Claim

Especially in bureaucratic settings, there is an unstated assumption that procedural compliance absolves moral responsibility. This is where responsibility is often laundered. Therefore, watch for false or misleading implications. Make assumptions explicit and check if they are relevant and apply to the case in hand.

This underlying assumption that there was no moral dimension to the bureaucratic process was Adolf Eichmann's get-out clause, according to Hannah Arendt. The names were all correct for the trains to the camps, so he did nothing wrong.

"As for his conscience, he remembered perfectly well that he would have had a bad conscience only if he had not done what he had been ordered to do - to ship millions of men, women, and children to their death with great zeal and the most meticulous care."

Eichmann in Jerusalem - A Report on the Banality of Evil

Hannah Arendt

Set a Standard of Proof That Would Be Acceptable to All Concerned

Answers to most questions are rarely set in stone. Science, according to Karl Popper, requires that a claim be falsifiable. It has to be testable. And if it fails the test, then scientific investigation moves on to the next experiment. But despite the inherent uncertainty, we can carry on living and acting with the confidence of knowing that we have the best available knowledge for our purposes, for the time being.

There may be no absolute proof, but it is still important to set a standard of acceptability for a claim. Minor claims may need very little evidence. Major claims of any kind certainly do.

Simply ask yourself, and then specify, what level of evidence would change your mind. Would a document from a given date suffice to prove or disprove a claim? Would an agreed-upon third-party authority suffice to settle the debate? Would a heavily cited paper or a highly replicated finding be enough?

Qualifying the Claim

These three simple questions will do a great deal of the legwork in your inquiry.

How strong is the claim?

Is it certain, likely, or provisional?

What are the best alternative explanations?

Analyse claims by inquiring about agency in order to determine who or what was responsible, what exactly happened, whether the timeline is clearly determined, and whether the terms are made explicit. Also ask, what are the implicit ideas that warrant the claim? By doing this, you can avoid a lot of traps.

Discourse is then focused on facts and responsibility, which are the preconditions for good judgement and proper accountability.

This approach can help you avoid Newspeak's narrow over-certainty and vacuous hedging.

Why This Matters

Orwell showed that language can be engineered to make dissent inexpressible by the devaluation of the meaning of words. Arendt showed how bureaucratese can make wrongdoing seem a routine matter.

We live in a world dense with information. Much of it is presented in an intentionally manipulative manner that demands that you think and behave in a certain way.

All this activity serves to take our attention away from the germane and important, our money from our accounts, to recruit us through deception into supporting some sort of nefarious cause, and to manipulate us in such a manner that good sense is simply no longer enough to maintain our sanity and our freedom to think accurately and make beneficial assessments for ourselves and the world around us.

Without a doubt, there are people deliberately trying to manipulate us for their own benefit, not ours. They will abuse language to have us believe something or not to believe anything at all. They will hide behind their messaging, accentuating falsehoods and diverting attention by obscuring meaning, while at the same time hiding their true aims through misleading or meaningless words and images.

Bonus

To be able to write clearly is essential for clear thinking. To help avoid becoming trapped by the improper use of language, which is hard to do as it wallpapers our civilisation, then George Orwell's advice for more effective communication from his essay *Politics and the English Language* is a handy thing to remind us that good communication is a simple matter, though not always easy.

i. Never use a metaphor, simile or other figure of speech which you are used to seeing in print.

ii. Never use a long word where a short one will do.

iii. If it is possible to cut a word out, always cut it out.

iv. Never use the passive where you can use the active.

v. Never use a foreign phrase, a scientific word or a jargon word if you can think of an everyday English equivalent

vi. Break any of these rules sooner than say anything outright barbarous.

Analysis, Inference and Evaluation

After identifying the claim, we then analyse it in the context of related information and determine how it fits within a broader argument. We next structure the argument itself as a set of premises and a conclusion, each of which is a claim that can be assessed as true or false. Through inference and evaluation, we then build the bridge from evidence to conclusion.

Premise 1:

Premise 2:

Conclusion:

In a valid argument, one or both of the premises may be false. It is the form of the argument that matters.

Premise 1: All reptiles are warm-blooded. (false)

Premise 2: All snakes are reptiles. (true)

Conclusion: Therefore, all snakes are warm-blooded. (valid but unsound)

Premise 1: All mammals are animals. (true)

Premise 2: All birds are mammals. (false)

Conclusion: Therefore, all birds are animals. (valid but unsound)

Premise 1: All cats are reptiles. (false)

Premise 2: All dogs are cats. (false)

Conclusion: Therefore, all dogs are reptiles. (valid but unsound)

Valid arguments can have more than two premises.

A **sound** deductive argument is a valid argument whose premises are all true; therefore, its conclusion must also be true.

Premise 1: All mammals are animals. (true)

Premise 2: All dogs are mammals. (true)

Conclusion: Therefore, all dogs are animals.

After using analysis to break down information into usable premises, we then move on to inference and evaluation.

Inference is what can be derived from evidence.

Evaluation is how you judge the quality of that inference.

There are three main types of inference: Deductive, Inductive, and Abductive

Deductive: If the premises are true and the reasoning is valid, then the conclusion must be true.

Validity: The form of the argument guarantees that if the premises are true, the conclusion cannot be false. This is why we have to clearly define the claim first.

Soundness: The argument is valid and its premises are actually true.

Bear in mind that with a valid argument is that validity concerns form. A valid argument may still yield a false conclusion if a premise is false. Only a sound argument guarantees a true conclusion. (At the end of this ebook many more examples will be given plus handy ways of using notation to help with clarity.)

Inductive: Reaches conclusions from samples and patterns.

A Classic Example: Since the Sun has risen every morning so far, it can be inferred that it will rise again tomorrow.

Inductive arguments are assessed for **strength** and **cogency**. A cogent argument is strong with true premises. Its conclusion is probable, not certain.

Strength: Given true premises, how strongly do they support the conclusion?

Cogency: An inductive argument that is strong, has all true premises, and there is no known unrefuted counter-evidence or objection.

Abductive: Finds the explanation or hypothesis that best fits the facts.

These are assessed by:

Explanatory Power/Scope: Accounts for all the facts in a comprehensive manner.

Plausibility: Fits with established knowledge.

Parsimony: The introduction of the fewest new assumptions that are consistent with the data.

Causal: 'X causes Y' is credible when Y follows X, varies with X, and no better explanation fits.

A Claim Can Be Examined in a Number of Ways

Evidence quality is key: it outweighs quantity. Many weak studies do not beat one well-designed study.

Primary vs Secondary Sources: It is preferable to use primary sources for original evidence. High-quality secondary sources can then be used for synthesis, context, and developing broader conclusions.

Replication: Results should be independently replicated. A single study is usually not enough.

Data Availability: Are the raw data and code available for others to audit, rerun, and extend the analysis?

Things to Consider When Assessing Causality

Time: The cause must precede the effect in time.

Size: The effect changes meaningfully in proportion to changes in the cause

How: A strong association may support causality but does not necessarily prove it.

Counterfactual: If the cause had not occurred (all else equal), the effect would differ.

Confounders: Eliminate alternative factors that could influence both cause and effect.

Quality of Evidence in Order of Precedence

Systematic reviews & meta-analyses: They can provide an estimate of the overall effect and determine the consistency of the evidence base across various studies.

NB: Conclusions may depend on study quality and publication bias.

Randomised controlled trials: These are designed to isolate cause and effect under controlled conditions.

Well-designed observational studies: These can reveal strong associations when trials are impractical, but care must be taken to avoid bias in design and analysis.

Expert analysis with data: Well-documented case evidence and analysis may suggest a real signal yet often lack controls, so care must be taken when establishing causation.

Anecdotes, testimonials, and intuition: Personal stories are highly prone to bias. They are useful for generating hypotheses but are not suitable to support general conclusions.

Biases and Fallacies

Metacognition is simply thinking about and regulating your thinking. You can do this by asking yourself questions such as:

What assumptions might I be making?

What am I basing my judgement upon?

How am I rating the evidence?

These kinds of questions can help to highlight personal biases, which you may not have been previously aware of, and which could influence your judgement.

Why This Matters

Our brains are highly adept at pattern recognition and to save precious energy, they will run on habits, heuristics, and default modes of thinking unless consciously challenged.

These rules of thumb save us time in daily life, as we cannot resort to first-principles thinking with every single thing we do. However, they can also tamper with our judgement.

In a noisy, demanding information environment, these mental shortcuts can mislead us and leave us open to manipulation by others.

Making the effort to use and apply our metacognition when needed can slow our automatic responses long enough to allow us to engage our own powers of deliberate appraisal. This conscious engagement gives us the opportunity to use our discernment and our critical faculties.

A bias is a systematic disposition in how we attend to, recall, and evaluate information. It is about how the evidence gets selected, weighted, and framed.

Here is a short list of 10 common biases, although there are many more:

1.) Confirmation bias: The tendency to seek, interpret, and remember information that supports your existing beliefs while discounting contradictory evidence.

Counter Move: The most annoying thing about confirmation bias is that just knowing it is at play in every decision is not enough. No one is hyper-rational enough to act without confirmation bias. But you can build well-thought-out checklists, develop systems, and outsource analysis to trusted collaborators.

Building frameworks and relationships such as these will give you an arm's-length view of the situation that can be very helpful in making sensible decisions.

2.) Availability heuristic: The tendency to overweight examples or events that easily come to mind.

Counter Move: Look deeper and consider contrary perspectives.

3.) Anchoring: Relying too heavily on the first number or piece of information encountered when making decisions.

Counter Move: This can be a major hazard when in a high-intensity situation. The way to counter this is to deliberately carve out time, take a deep breath, and reflect and assess. Avoid falling into the trap of believing that the most salient piece of information, particularly if it appears early on, is the most important. It might be, but review alternatives first.

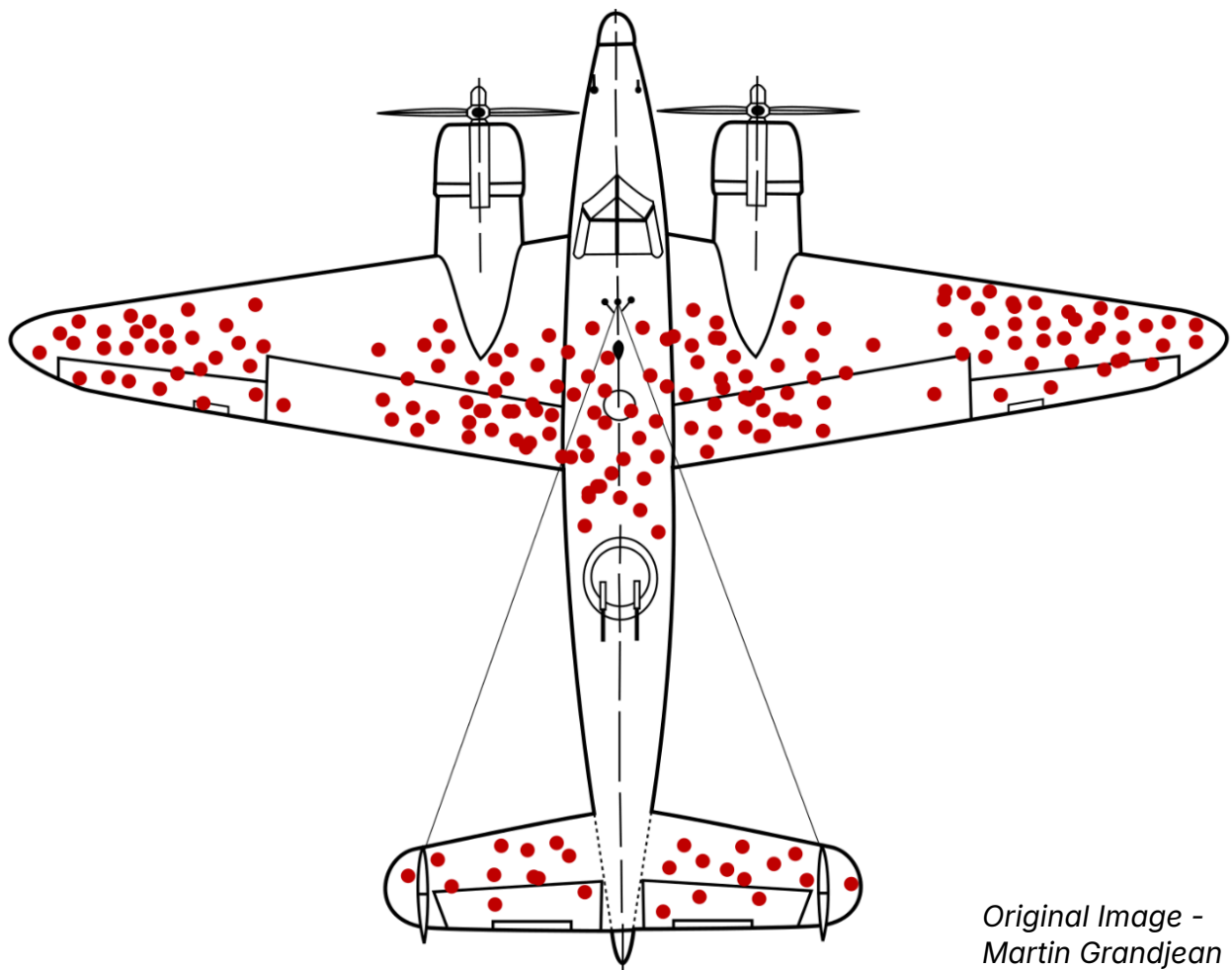
4.) Hindsight bias: Believing after the fact that an outcome was obvious or predictable. The converse of this is the enjoyment of having been right all along. This self-satisfaction is a hindrance in obtaining an accurate assessment of an event and prevents both learning and creating a reliable platform for future decisions.

Counter Move: Keep a decision diary. For every decision make a record of what you chose to do and why, and very importantly, what you decided not to do as a consequence. Looking back from some time later it can sometimes be very surprising to see what your thinking consisted of at the time of the decision.

5.) Overconfidence Effect: Overestimating the accuracy of your knowledge, judgements, or forecasts.

Counter Move: This is the time to develop a little humility. As humans, we love to revel in the glow of our own perceived intelligence, and that is a marvellous thing. But in the great scheme of things we know so very little. The lifetime of a single human is never going to be long enough to assimilate even a tiny fraction of all the knowledge that we have available now.

Be humble. That we can know anything at all is so amazing in itself, and knowing that there will always be so much more to learn is a great reason to get out of bed in the morning. Focus on continuous learning and development.



6.) Survivorship Bias: Focusing on people or things that survived a process and overlooking those that did not, skewing conclusions.

In World War II, a statistician by the name of Abraham Wald, was involved in the discussion on how to increase the survivability of bomber aircraft and their crews. The inclination from the military was to add extra protection to the patterns of bullet and shrapnel holes where they could be seen. But Abraham noticed that the bombers that returned had very little or no damage in key areas of the aircraft such as the engines. He realised that armour should go where returning planes show no holes, because planes hit there didn't return.

Counter Move: Try to invert your assumptions. Ask what if the opposite were true? Question the prevailing authority by providing alternative viewpoints. The point is not to be a mindless contrarian but to find out if looking through the other end of a telescope would yield something useful.

7.) Selection or Sampling Bias: Drawing conclusions from a non-representative sample so results don't generalise.

Counter Move: Be mindful of engaging in any kind of cherry-picking activities. It is always tempting to go for the low-hanging fruit or the most accessible data to save time and energy. However, it is always worth the effort to take time to step back and review the context to make sure it is properly representative or if it needs to be weighted.

8.) Sunk Cost Fallacy: Continuing a course of action because of past investment rather than current costs and benefits. It is the clinging to an idea or strategy because you have invested so much time, energy, or money already.

Counter Move: Swallow your pride, be firm if not ruthless, and cut your losses.

9.) Status Quo Bias: Preferring the current state of affairs simply because it is familiar. This one is particularly pernicious. We are comfort-seeking creatures and we are not at all keen on change. But we can smother the best of ourselves through self-indulgent pain avoidance. Not just personally, but through our social and civic lives, leading ultimately to planet-wide neglect.

Counter Move: Take the risk of taking risks. Break old routines and create new habits. The beauty of this is that you do not have to do it all at once. Tiny steps trick the brain into not resisting and before long tiny steps turn into very big steps indeed. You do not have to suffer to make a major life change. In fact it is counter-productive and your brain will fight you all the way. But you do have to be consistent. Consistency beats motivation every time, even at the smallest, tiniest steps. Those initial teeny-weeny steps will eventually turn into the wanted habits soon enough.

10.) Dunning–Kruger effect: This describes how people with low skill sets tend to overestimate their ability, while experts may underestimate theirs. We are very ready to see this effect in others. Certainty of opinion and stupidity often walk hand in hand. Not all of us can be above-average drivers. Most of us, by definition, are average drivers, and this applies in every field of endeavour.

Counter Move: Just remember no one is expert-level at everything. Even the most talented individuals achieve superior performance only within a narrow domain of excellence. So, accept your averageness at most things and focus your energy on the very few things that you really care about doing well.

As far as anything else goes, it is very unlikely you will be exceptional in more than a very few ways, so just relax. Also, the real joy is found in the work of developing expertise. That will bring the never-ending excitement that comes from knowing there is always so much more to learn.

NB: The point that can never be overstated with biases is that while it can be fun and illuminating to witness them in others, they absolutely apply to us as well.

Even with constant mindfulness and vigilance, we will still be susceptible. But knowing that they exist can go a long way towards ameliorating their effects on our thinking and decision-making processes.

Fallacies

A fallacy is an error in reasoning. They fall into two groups: formal (structural) and informal (relevance, ambiguity, etc.)

Formal Fallacies

Affirming the Consequent: If it rains, the roads are wet. The roads are wet, so it rained. (Not necessarily. There may be another reason for the roads being wet.)

Denying the Antecedent: If it rains, the roads are wet. It didn't rain, so the roads aren't wet. (Not necessarily; the roads could still be wet for other reasons.)

Undistributed Middle: All cats are animals. All dogs are animals. Therefore, all dogs are cats. (The middle term 'animals' is not distributed (doesn't refer to all animals) in either premise.)

Illicit Conversion: All A are B: All poets are dreamers; therefore, all dreamers are poets. (Invalid switch around.)

Informal Fallacies

Straw Man: Misrepresenting an opponent's view. Instead of the claim itself being attacked, through attack is aimed at a weaker, distorted version.

Ad Hominem: Attacking the person rather than addressing the claim.

False Dichotomy: Treats a complex issue as an either/or choice, ignoring other viable alternatives.

Slippery Slope: Asserting without adequate evidence that a small first step will inevitably lead to a particular chain of outcomes.

Circular Reasoning or Begging the Question: An argument that assumes its own conclusion in the premises.

Post Hoc Ergo Propter Hoc: The assumption that because B follows A, A must have caused B.

Appeal to Authority: Treats a claim as true without support, just because it came from an authority.

Appeal to Emotion: This technique plays on fear, pity, or sentiment instead of reason.

Red Herring: Attempts to divert attention to something irrelevant to avoid the real issue.

An interesting book to read and learn more about how deeply we are affected by biases and fallacies is **Thinking, Fast and Slow** by the late Daniel Kahneman.

In the introduction he says this: *"Systematic errors are known as biases, and they recur predictably in particular circumstances."* This is good news for us as biases and fallacies are not the products of the fickleness of fate. They are patterns within our thinking processes that, once we are aware of them, can be factored into our analysis of a claim.

Challenging a Claim

Challenging a claim is a disciplined approach to establish what would count as evidence for or against the claim, and how you would know either way. A good challenge sharpens ideas, maintains honesty, and prevents indulgence in dishonest narratives.

Before you challenge a claim, it is best to set clear criteria:

State the claim in one clear, everyday sentence.

State what you would expect to see if it were true: what could you see, count, or measure?

Set the limits: when and where it applies, who and what it applies to, and by how much.

State the nature of the evidence in terms of its quality and origin. The bigger the claim, the stronger the evidence should be.

Decide in advance what would make you change your mind.

Steel-Manning: State the claim in its best form. Compose the fairest version of the other side's argument, using their best evidence. This allows both parties to focus on the key points of their positions.

Alternative Explanations: List other plausible rival reasons that could also explain the facts. These can be simple or complex, but stay away from the far-fetched and the unlikely.

Evidence Quality: Check how solid the evidence is. Start with a preference for a current, high-quality systematic review. Look at well-run, well-designed studies. Look at anecdotal evidence last. While not much use for supporting a claim, they can be useful for generating hypotheses.

Causal Discipline: Correlation isn't causation. Remember to ask counterfactual questions while other factors remain fixed: "Would Y still have happened if X had not?" Rule out confounding or reverse causation.

Falsification: A good empirical claim is testable and should withstand scrutiny, experiment, and independent replication.

Recognising Bias: Bias is a natural feature of human cognition. Once recognised, safeguards can be put in place to limit its influence.

Effective Argumentation

Charity and Precision: Be kind to your opponents. They are people and have feelings too. However, be rigorous and ruthless with ideas.

Transparency: Declare conflicts of interest.

Traceability: Each claim should be backed by accessible sources and, where relevant, data and methods that either side can readily inspect.

Proportionality: Confidence in the claim should match the quality of the evidence.

When challenging a claim, be courteous but still insist on clarity. Focus your attention on the work at hand, where it belongs.

When both sides adopt these standards of charity in tone and severity in testing, arguments stop being status games and ego battles, and become what they should be: a shared journey to try and establish what is true.

Remember the words that Richard Feynman wrote in his essay '**Cargo Cult Science**'.

'The first principle is that you must not fool yourself—and you are the easiest person to fool.'

Practical Tools

Frameworks for Reasoning

The point of creating or developing a framework for inquiry is to create a way for your thinking to be inspected. It helps us to take a step back to get a better view of a claim or argument and to ensure we are approaching it in the correct way, using the appropriate methodology.

Socratic Questioning

One of the best ways to demonstrate the methodology of inquiry is by using the Socratic method.

This works by engaging in a specific kind of structured dialogue of asking and answering questions to stimulate critical thinking and draw out ideas and presuppositions for closer examination.

Persistence, aligned with constant questioning, is key to this method's ability to properly examine a claim.

As the layers of misinformation and mistaken assumptions are peeled away, the truth, if there is one, will become clearer.

Crito and the Priority of Wisdom and the Rule of Law

Plato was a student of Socrates and wrote a great many dialogues, demonstrating his mentor's skill in identifying and destroying various assumptions and claims.

In **Crito**, Socrates is in his cell awaiting execution, after having been found guilty of corrupting the youth of Athens and of impiety. Crito urges him to escape the will of the many with the following argument.

"But surely you see, Socrates, that we must pay attention to the opinion of the many, too. The present circumstances make it clear that the many can inflict not just the least of evils but practically the greatest, when one has been slandered amongst them." (44d)

To which Socrates replies:

"So, best of men, we must not pay much heed to what the many will say to us, but to what the one who knows about just and unjust things will say, to that one person, and to the truth itself." (47a-48b)

In other words, it is better to stay with what is true and just than to kowtow to the authority of the many. Also, in another section, he upholds the rule of law because of its value to civic society.

This enhances his moral stance by extending the importance of the situation beyond himself. By rejecting the argument from authority of the many, Socrates also loses the opportunity to escape and save himself from imminent execution.

For Socrates, to do anything else would be to betray the truth.

Attempting to discover the truth, or as much as we can about the truth, has to be the purpose of any philosophical endeavour, and this is where critical thinking plays a key role in providing a methodology and framework for this task.

Hopefully, for most of us, for most of the time, truth-seeking arguments and discussions will not lead to our demise, but as Socrates demonstrated by his own example, that there can be considerable consequences that come with the effort of establishing what is true.

This makes working in this field and engaging with these ideas in a thoughtful and methodical way, a serious and important endeavour.



Death of Socrates - Jacques-Louis David

The Value of Philosophical Inquiry

First, a brief digression to answer those who dismiss philosophy as not being of much use. These detractors are hugely mistaken. In the West, science, mathematics, law, economics, ethics, and politics were spawned by philosophical inquiry. Philosophy remains key to setting many of the standards for framing questions and justifying claims.

From Aristotle's logic through to Turing, these intellectual frameworks and traditions span across time into the modern world of computing, science and engineering. Philosophical methods of inquiry lie behind the scientific method.

Descartes' rationalism and analytic geometry reshaped mathematics, and scepticism sharpened empirical inquiry. Ethics informed human-rights law and helped shape liberal democracy.

Today, philosophical analysis still guides medicine, AI ethics, and environmental policy. Remove philosophy's habit of questioning assumptions and knowledge dies, innovation stops, and institutions crumble.

Beyond making sense of the world, philosophy helps us discover the new by sharpening concepts, exposing assumptions, and setting standards for good inference.

We face tremendous challenges in the world today. Science and engineering can design and build but philosophy clarifies aims, concepts, and standards of evidence, helping to decide what ought to be done.

I mention all this because perpetuating ignorance is a tried and tested tactic of those who intend ill-will for the rest of us. Remove philosophy from public debate by claiming it has no value or use and it will inevitably benefit the ignorant, the stupid, and the malevolent.

Meno asks, *"And how will you enquire, Socrates, into that which you do not know?"* (80d)

Of course, we don't know what we don't know, but we still do know some things and by building on what we already know with careful observation, experimentation, and explanation, we can bring new knowledge into the world. By asking precise questions, then observing, testing, and attempting to explain. Step by step, inquiry turns unknowns into knowledge.

One of the claims by philosophy's detractors is that there is no value in discussing or pontificating on what we do not know. These sorts of questions are designed to deter investigation and maintain the status quo. They attempt to silence debate by suggesting that further inquiry is futile because we can't know the answer.

Cross-examining an Accuser

When accusations are couched as sweeping statements, then the only response is to ground the discussion by being more specific. At his trial, Socrates was accused of corrupting the youth of Athens by Meletus. This is how he countered:

"Tell the judges, then, who is their improver; for you must know, as you have taken the pains to discover their corrupter, and are citing and accusing me before them. Speak, then, and tell the judges who their improver is."

The Apology (24c)

This response forces precision by asking your critic to create an agent in the matter rather than something general and anonymous.

If Socrates is corrupting the youth of Athens with his method of philosophical inquiry, then there is an implication that someone may be improving them. Who might that be?

This reveals an inconsistency in the accusation, of mixing the general with the specific (everyone improves but only Socrates corrupts?) This logical inversion demonstrates that the charge against him is, at best, confused.

Generalisations can be a very convincing tactic. We see it in the media all the time. But demanding that the underlying assumptions and presumptions be made explicit and specific makes the discussion more equitable and easier to manage.

These are just three examples of argumentation from the works of Plato. There are many more. Reading the dialogues of Socrates is a very good way to learn how to examine claims and is well worth the time.

The key to Socratic inquiry is to keep asking questions that seek clarity, and to keep on drilling down to the conclusion. It is probably the ultimate investigative technique.



The School of Athens - Raphael

Argument Mapping

Sometimes, when there is a lot of complicated verbiage or vague sentiments being expressed, it is very handy to draw an argument map. Instead of a stream of words, a graphical image may help to reveal strengths, weaknesses, and true meaning and intent.

Reasons: These are the main supporting points that back up why the claim should be believed.

Evidence: The concrete facts, data, or examples that back up each reason.

Objections: A challenge that attacks the claim or a reason.

Rebuttals: Responses that answer the objections and restore support for the claim.

Critical Thinking Argument Map

Claim:_____

Reasons	Evidence	Objections	Rebuttals
R1:	E1:	O1:	R1:
R2:	E2:	O2:	R2:
R3:	E3:	O3:	R3:
R4:	E4:	O4:	R4:
R5:	E5:	O5:	R5:

Logic Checklist

Use this chart as a short audit of the chain from evidence to conclusion.

	Ask	Red Flag
Clarity	What exactly is the claim? Is it quantifiable?	Vagueness, moving of goalposts
Relevance	Is there enough quality evidence to justify the conclusion?	Anecdotes, tiny samples
Sufficiency	Are the premises and evidence pertinent to the claim?	Red herrings, appeals to emotion
Alternatives	Is the evidence correct and contextualised?	Cherry-picking, misquoting
Accuracy	Have plausible alternatives been considered?	Single-cause thinking
Logic	Does the conclusion follow the premises?	Equivocation
Uncertainty	Are the limits of discussion explicit?	Unfounded certainty

Sometimes it can be difficult or time-consuming to wade through swathes of verbiage to determine the validity or soundness of a claim.

A very useful technique to enable clarity is to use symbolic notation. It breaks arguments down to their logical skeleton, making it easier to see what follows from what. It can make hidden assumptions visible and expose invalid moves (like smuggling conclusions into the premises).

Because symbols also obey precise inference rules, you can check validity mechanically, compare forms across examples, and avoid being misled by wording or context.

On a more practical level, they save having to write the premises over and over again.

For the main body of this text I have done my best to avoid technical terminology, and I hope I have not misled you by being too general. However, learning just a few technical terms will come in very handy in discerning arguments and claims.

This is especially true if you want to discuss ideas with others without causing unnecessary confusion.

To apply the notation, first restate the claim in propositional form: define simple statements by using letters and their connectives. By convention, the letters **P**, **Q**, and **R** are used and their connectives come in the form of signs such as:

→ Conditional	$P \rightarrow Q$ if P then Q (false only when P is true and Q is false)
⇒ entails	Use this between premises and conclusion. (Sometimes people say 'therefore' but that has its own specific meaning and symbol $\therefore$).
⇔ biconditional	$P \Leftrightarrow Q$ ' P if and only if Q '
¬ not sign	¬P : not P
^	And Symbol
∨	Inclusive 'or'
⊕ also (+)	Exclusive 'or'

There are just a few other symbols but these will suffice for our present purposes.

Method

Identify the argument's structure (e.g., "If P then Q; P; therefore Q" = Modus Ponens). Test the form against known valid rules or known fallacies.

Finally, translate back into ordinary language and note any extra assumptions the symbolism revealed.

Propositional Logic - Quick Reference

P, Q, and R: propositions (statements that are either true (T) or false (F))

$\neg P$: not **P** (the negation of **P**). True when **P** is false.

$P \wedge Q$: **P** and **Q** (conjunction) True only when both **P** and **Q** are true.

$P \vee Q$: **P** or **Q** (inclusive by default) True when at least one of **P** or **Q** is true.

$P \rightarrow Q$: if **P** then **Q** (conditional). False only when **P** is true and **Q** is false.

Some Classic Forms

Modus Ponens (Valid)

Affirming the Antecedent

$P \rightarrow Q: P \Rightarrow Q$

Example: If it rains, the road gets wet. It rains. Therefore, the road gets wet.

Modus Tollens (Valid)

Denying the Consequent

$P \rightarrow Q: \neg Q \Rightarrow \neg P$

Example: If the alarm is set, the light is on.

The light is not on. Therefore, the alarm is not set.

Affirming the Consequent (Invalid)

Formal Fallacy

$P \rightarrow Q; Q \therefore P$ (invalid)

Example: If I am in Dublin, I am in Ireland;
I am in Ireland; therefore, I am in Dublin (not necessarily.)

Why invalid: **Q** may be true for reasons other than **P**

Denying the Antecedent (Invalid)

Formal Fallacy

$P \rightarrow Q, \neg P \Rightarrow \neg Q$ (invalid)

Example: If it rains, the path is wet;
it did not rain; therefore, the path is not wet.
(Not necessarily. It may have been hosed or sprayed by sprinklers.)

Why invalid: **$\neg P$** does not rule out other routes to **Q**

Disjunctive Syllogism (Valid)

Eliminating a disjunct

$P \vee Q; \neg P \Rightarrow Q$

Example: Either the keys are in the drawer or in the bag.
They are not in the drawer. Therefore, they are in the bag.

Hypothetical Syllogism (Valid)

Chaining Conditionals

$P \rightarrow Q; Q \rightarrow R \therefore P \rightarrow R$

Example: If I train, I improve fitness. If I improve fitness, my times drop.
Therefore, if I train, my times drop.

De Morgan's Laws (Equivalences)

Pushing Negations Through $\wedge$ and $\vee$

$$\neg(P \wedge Q) \Leftrightarrow (\neg P \vee \neg Q)$$

$$\neg(P \vee Q) \Leftrightarrow (\neg P \wedge \neg Q)$$

Truth Tables

Truth tables are not just mechanical grids to be filled out mindlessly; they are tools for testing the validity of reasoning. In critical thinking, validity means that if the premises of an argument are true, the conclusion must also be true.

By laying out all of the possible combinations of truth and falsity for the relevant proposition, a truth table can show us whether there is any situation in which the premises are true but the conclusion is false. If no such case exists, then the argument is valid.

For example, consider the pattern: if **P** then **Q**; **P**; therefore **Q**. A truth table shows that in every row where both premises are true, the conclusion is also true. This confirms the argument's validity. Any other result would be invalid, revealing an error in reasoning, or method, or both.

Truth tables serve as a practical check on reasoning, revealing not just how propositions combine, but whether an argument's structure genuinely supports its conclusion.

Depending on the number of variables, truth tables can be quite large. Here are just three examples to demonstrate how they work.

First we take two variables, **P** and **Q**, and create a column for each of them containing four rows. Then in a third column we have the heading **P $\wedge$ Q**.

Use: P and Q are true only when both are true.

AND($\wedge$)

P	Q	$P \wedge Q$	
T	T	T	If both P and Q are true (T), enter T column 3.
T	F	F	If P is T and Q is false (F), enter F column 3.
F	T	F	If P is F and Q is T , enter F column 3.
F	F	F	If P is F and Q is F , enter F column 3.

Use: P or Q is true if at least one is true.

OR ($\vee$) - inclusive 'or'

P	Q	$P \vee Q$	
T	T	T	If both P and Q are T , enter T column 3.
T	F	T	If P is T and Q is F , enter T column 3.
F	T	T	If P is F and Q is T enter T column 3.
F	F	F	If P is F and Q is F enter F column 3.

Use: "If P then Q" is false only when P is true and Q is false.

IF...THEN ($\rightarrow$)

P	Q	$P \rightarrow Q$	
T	T	T	If both P and Q are T , enter T column 3.
T	F	F	If P is T and Q is F , enter F column 3.
F	T	T	If P is F and Q is T , enter T column 3.
F	F	T	If P is F and Q is F , enter T column 3.

Naturally, in a short primer such as this, I am never going to do anything like full justice to the subject of critical thinking. But I do hope that my attempt to reach out in a positive and helpful way may be of some benefit to others.

We live in a world saturated with noise and information. A small fraction is of actual use; most of it is benign, if somewhat distracting, but a substantial amount of it is created with evil intent to manipulate and influence the unwary into holding positions and views that bear no relation to reality or truth.

Critical thinking is really the only systematic method to resist this malign onslaught on our senses.

The ideas and tools presented in this short primer are, I sincerely hope, an aid to sifting through the silt and mud to reveal an accurate understanding of the world around us.

Perhaps it will help us to obtain some kind of insight into the world and lead us to some kind of truth.

As you can see, the ideas behind critical thinking and its methods are neither hard nor difficult, although the symbolic notation may need a little practice at first. Also, you don't have to do this alone. You can, of course, if you choose. But there is a lot of fun and enjoyment to be had in breaking down claims and arguments in the company of others. Either way, it would still be a far better use of your time than doom-scrolling on social media, as addictive as that is.

So, happy assessing claims and analysing arguments.



A special thank you goes to the Philosophy Department of the University of Galway. If I have written anything wrong or misrepresented an idea then that is on me, not them. They did their best, but I was all they had.

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