Fundamentals of Critical Thinking

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Critical Thinking Involves:

a. **Analyzing others' arguments**

    i. Identify the argument

        1. Identify premises (explicit and implicit)

        2. Identify conclusion(s) (explicit and implicit)

        3. Discard extraneous statements

        4. Diagram the argument

    ii. Examine its internal logic

        1. Valid? Strong? Weak?

    iii. Check the plausibility of its premises

        1. Likely to be true? *How* likely?

> *If an argument has valid or strong internal logic, and plausible premises, we have good reason to believe its conclusion.*

b. **Constructing arguments of our own**

    i. Conjoin plausible premises with valid or strong reasoning to support a conclusion

    ii. Analyze it as you would any other

        1. Identify the argument

        2. Examine its internal logic

        3. Check the plausibility of its premises

c. **Repairing arguments (both our own and others')**

    i. Discard or alter implausible premises

    ii. Rework logical connections to make argument valid or strong

    iii. Analyze as above

Step 1: How to Identify an Argument

Argument: a series of claims, called _premises,_ intended to logically support another claim, called the _conclusion_ (note how this technical definition differs from how "argument" is usually used in everyday conversation)

| Premise Indicators: since, because, for, given that, suppose that, it follows from | Conclusion Indicators: therefore, thus, hence, consequently, so |

Example: "**Because** this patient has a fever, a high white blood cell count, and green discharge from her sinuses, she **therefore** probably has a sinus infection."
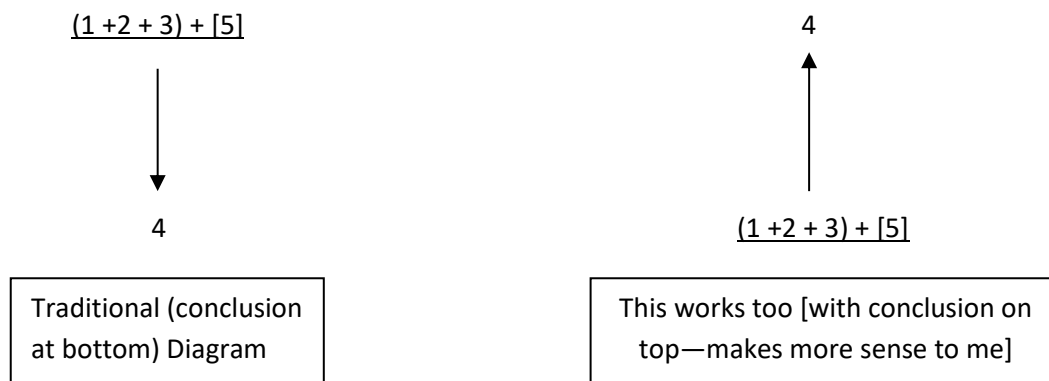
Argument Diagramming

By assigning claims numbers we can visually represent arguments with a diagram, making them easier to understand, analyze, critique and repair. Sometimes premises (or even conclusions) are implied rather than stated directly, which we should reveal in the diagram. Here's the above example argument with the claims numbered:

> _Because (1) this patient has a fever, (2) [this patient has] a high white blood cell count, and (3) [this patient has] green discharge from her nose, she (4) therefore probably has a sinus infection._

> Claims 1, 2 and 3 are all premises. Claim 4 is the conclusion, or the statement the other statements are supposed to give us reason to believe.

> There's also one Implicit (hidden) premise: [5] Any patient who has a fever, a high white blood cell count, and green discharge from their nose probably has a sinus infection.

(1 +2 + 3) + [5]   4

↓   ↑

4   (1 +2 + 3) + [5]

| Traditional (conclusion at bottom) Diagram | This works too [with conclusion on top—makes more sense to me] |

Step 2: How to Analyze an Argument's Internal Logic

An argument's internal logic is the glue that makes its conclusion worth believing, assuming we have good reason to believe the premises. (If the premises are crummy, no amount of logic can redeem the argument.) ***Valid arguments are welded together, strong arguments use super glue, but weak arguments are held together with peanut butter, if anything at all.***

Valid argument: an argument where IF the premises were true, the conclusion would HAVE to be true

Strong argument: an argument where IF the premises were true, it would be very likely that the conclusion would be true too, but not necessarily true (as with a valid argument)
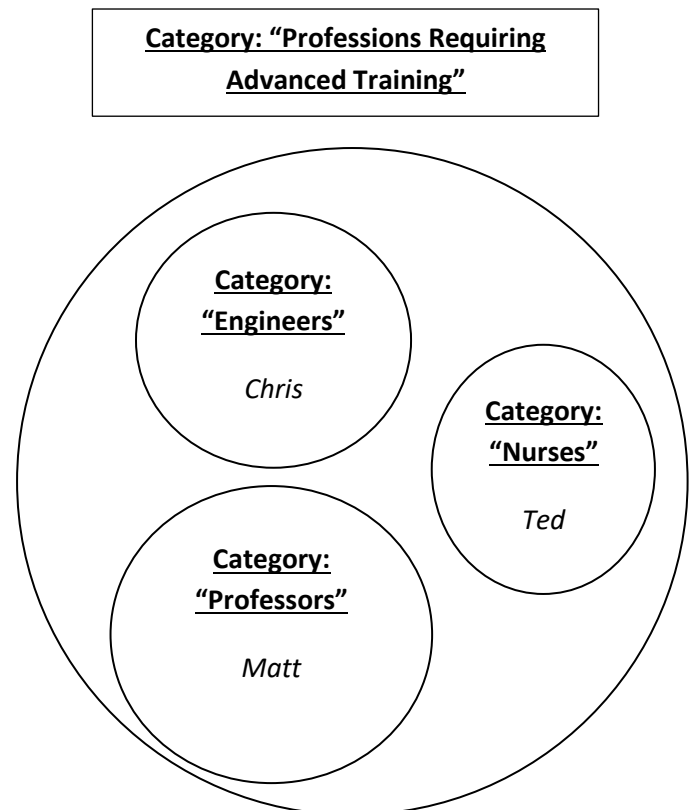
Weak argument: an argument where EVEN IF the premises were true, there would be little reason to think the conclusion would necessarily be true

We need to ask ourselves, IF an argument's premises were true, would the conclusion HAVE to be true? Is it likely it would be true? How likely?

 "Sure, Ted has advanced training. He's a nurse, right?"

Same argument formalized:

1) All nurses have advanced training. (premise)
2) Ted is a nurse. (premise)
3) Therefore, Ted has advanced training. (conclusion)

Analysis: We can recognize in our minds, and *see* with our eyes (thanks to the diagram), that IF the premises were true, the conclusion would HAVE to be true. *If* all members of the category "Nurses" have advanced training, and Ted is a nurse, Ted MUST have advanced training. So this argument is VALID, though ultimately not *SOUND* (a valid argument with true premises) since the first premise is dubious (maybe there are nurses in some foreign country lacking advanced training).

Category: "Professions Requiring Advanced Training"

Category: "Engineers"

Chris

Category: "Nurses"

Ted

Category: "Professors"

Matt

(Argument visually represented with a diagram)

Step 3: Are the Argument's Premises Likely to be True? How Likely?

If an argument's logic is respectable (valid or strong), ask yourself:

- o Do the premises confirm or are they contrary to your personal experience?
  - Either way, *trust your judgment*
- o If in an unfamiliar area, are the claims backed by a reputable source?
  - Even if reputable, does the source have any motive to mislead?

Are these premises plausible? Why? Why not? Does their author make a difference?

Physician: "Any patient who has a fever, a high white blood cell count, and green discharge from their sinuses probably has a sinus infection."

Surgeon General: "All nurses have advanced degrees."

Matt the Philosophy Professor: "We have good reason to believe the conclusion of an argument with plausible premises and valid or strong internal logic."

Howard Stern: "We have good reason to believe the conclusion of an argument with plausible premises and valid or strong internal logic."

Known pill addict: "My neck really hurts. My symptoms warrant an Oxycontin prescription."

Physician: "My neck really hurts. My symptoms warrant an Oxycontin prescription."

Public Relations Officer for Exxon: "There's no credible scientific evidence that global warming is true."

Harvard climatologist: "There's no credible scientific evidence that global warming is true."

Disturbed homeless man: "I saw a UFO last night!"

Your mom: "I saw a UFO last night!"

Preacher Bob: "Holy book X says if you dance, you'll go to hell."

Religious scholar: "Holy book X says if you dance, you'll go to hell."

Constructing Arguments

Constructing arguments is a lot like doing a science experiment, except the experimentation happens inside your head (or on the page/screen), rather than a lab.

Scientific Method:

1. State hypothesis
2. Design experiment
3. Test
4. Analyze results
5. Draw conclusions
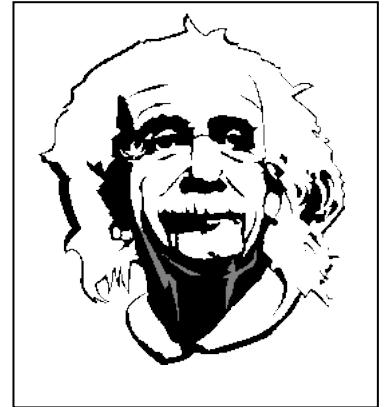
Philosopher's Argument Construction Method:

1. State candidate argument
2. Clarify (unpack concepts, identify premises and conclusion(s), reword statements more clearly, discard extraneous stuff, diagram argument)
3. Judge
   a. Examine internal logic
   b. Determine plausibility of premises
4. Endorse, discard or repair

Goal: Whether we're nurses or businesspeople or college students or philosophers or just regular citizens, keep in mind that *truth* is what we're ultimately after, whatever it may be. We're not lawyers or politicians—we're not out to rationalize what we want to hear or "win" a contest. ***Just as scientists relentlessly pursue empirical truths, we relentlessly pursue non-empirical truths.***

Integrity: And just as we'd criticize a scientist who rigged an experiment to deliver the conclusion she wanted or suppressed results she didn't like, we should criticize the (un)critical thinker who passes off bad arguments as good or gives her own arguments preferential treatment.

Just as scientists need a special character to be successful, successful critical thinkers must be:

1. **brave** enough to pursue the truth
2. **respectful** enough of our fellow reasoners to take them seriously
3. **humble** enough to admit ignorance and failure
4. **honest** enough to acknowledge what seems to be true
5. **open** enough to change our minds when given good reason to do so

BONUS TOOLS OF ANALYSIS AND CONSTRUCTION

Conceptual Analysis

It's often necessary to unpack concepts to fully understand their meaning. Only then can we accurately deploy them in our own arguments or analyze them in the arguments of others.

"Since you said it was going to be sunny, and it's actually raining, you *lied* to me."

1. You said it was going to be sunny. (premise)
2. It's not sunny (it's actually raining). (premise)
3. Therefore, you lied. (conclusion)

How would we unpack the verb "to lie"?

Is it being used accurately here?

> Analysis: *Lying* entails *intentional* deception—conveying something as true one knows (or at least believes) to be false. If the accused had good reason to think it would rain, and purposely said it would be sunny, then they were indeed lying. But if they genuinely thought it was going to be sunny, but were simply wrong, then they didn't *lie*—they were just mistaken. Carefully analyzing the concept of a lie allows us to see that this conclusion is unfounded.

Reasoning Fallacies

Fallacies are common types of reasoning mistakes—*so* common that we've given them their own names.

For example, a reasoner commits the "straw man" fallacy anytime he misrepresents someone else's argument to make it easier to defeat.

> **Actual argument**: "Late term abortions are harder to morally justify since the Unborn Developing Human is sometimes fully viable (can survive on its own outside the womb). This narrows the distinction between it and a fully birthed baby. Since it's usually not morally permissible to kill fully birthed babies, it's at least *less* ok to have a late term abortion than an early term (when the Unborn Developing Human is less like a birthed baby)."

> **Argument misrepresented by manipulative opponent (committing straw man fallacy)**: "So you're saying we should just revert to the 1900s and let men control every aspect of women's lives? I see. Pig!"

> **Analysis**: Maybe the late term abortion argument works, maybe it doesn't. But it needs to be analyzed fairly for us to find out.

> The "false dilemma" fallacy is committed anytime a reasoner forces a choice between only two options when other options are available.

> **Example**: "You're either for the war or against the troops. Since you're against the war, you're against the troops, too."

> **Analysis**: This is fallacious because the author is suppressing other legitimate options. For example, a person could criticize a particular conflict but still support the soldiers fighting it. In fact, a person could themselves *be a soldier*, yet disagree with a war they're obligated under orders to wage.

A "genetic" fallacy (probably the most common type of fallacy) occurs anytime an argument or position is criticized or praised because it is offered by or is associated with a disliked or favored person or group.

> **Example**: "German Shepherds are terrible dogs because Hitler owned them."

> **Example**: "The border wall is a tremendous idea because Trump supports it."

> **Analysis**: German Shepherds are good or bad dogs independent of whether Hitler owned them. A border wall is a good or bad idea independent of whether Trump supports it. Ideas and arguments must be evaluated on their own merits.

There are dozens of fallacies, all worth learning to identify, analyze and explain to others why they're such terrible ways to reason. For a decent taxonomy, visit FallacyFiles.org/taxonnew.htm

Reasoning with Numbers

People often use numbers in their arguments to impress their audience. Sometimes doing so is legit; sometimes it's all for show. When it's for show, the numbers either aren't supported with evidence, are overly precise (more precise than the supporting evidence warrants), don't have anything to do with the topic at hand, or maybe they involve percentage increases or decreases, but no baseline is supplied.

Graphs are used quite often to mislead. Take the two below, for example. Anything misleading about either?
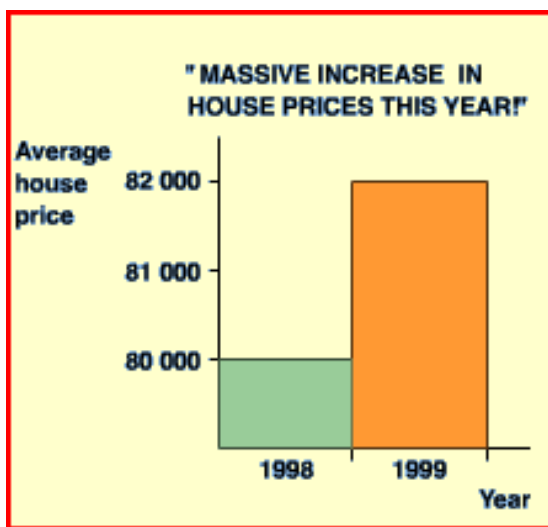
At a glance, the graph on the left suggests that house prices have almost tripled. The graph on the right is a far more forthcoming representation of the exact same data, clearly illustrating that prices have only risen a small fraction.

Always be skeptical of the use of numbers in arguments, and be sure to only use them in an honest, open way in your own arguments.

Understanding Cause and Effect

One thing *causes* another only if the second wouldn't have happened without the first. Just because one event *precedes* another doesn't mean the first *causes* the second. Just because events *happen at the same time* doesn't mean one *causes* the other.

Example: "I ate a pickle right before I bombed that physiology exam, therefore the pickle must have caused me to do so poorly."

Analysis: This is an unwarranted causal assertion because unless the pickle caused indigestion, which was a distraction, it probably had no effect on the student's performance. She just happened to eat the pickle right before the exam—nothing more.

Example: "This patient has a rash and a fever, therefore the rash must be causing the fever."

Analysis: The rash certainly *could* have some causal connection with the fever, but based on these observations alone, we can't draw that conclusion. Maybe the fever is causing the rash, or maybe some underlying cause (a virus, perhaps) is causing both. From this, we don't know.

Example: "I wished upon a shooting star that I'd somehow be able to pay my bills, and the next day I got a new job! Therefore, that wish caused me to get a new job."

Analysis: Unless we have other (good) reasons to think wishing upon stars works, we shouldn't think this was anything more than coincidence. (Repeatedly wishing and repeatedly getting what you wished for, however, would indeed be reason to assert a causal relation! No such reliability is implied here—the speaker is actually surprised they found work.)

Reasoning by Analogy

Reasoning by analogy entails treating like cases alike. If two things are relevantly similar, then as a matter of logical consistency or fairness, whatever principles or judgments that govern one should also govern the other.

> **Example**: "I work a 40 hour week just like Fred the banker. Therefore, I should make just as much as Fred does."
>
> > **Similarities**—both speaker and Fred work a 40 hour week
> >
> > *Relevant* **Similarities**—NA (known)
> >
> > **Relevant *Dissimilarities***—Fred is a banker, while the speaker's occupation is unknown; Fred and the speaker presumably negotiated different terms of employment with their boss; maybe Fred is integral to his bank's success while the speaker only contributes marginally to his company (unknown)
> >
> > > **Analysis**: The two cases aren't relevantly similar enough for the analogy to work. (Or at least, we can't say that they are from the information given.) So it's OK for Fred the banker to make a different amount than the speaker.

> **Example**: "Women are allowed 3 months of maternity leave after giving birth. Since the father's becoming a parent too, he should get just as much paternity leave."
>
> > **Similarities**—both mother and father become parents
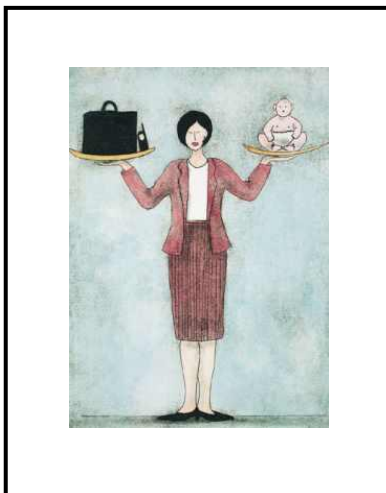
> > *Relevant* **Similarities**--both mother and father contribute to the child's creation; both mother and father (typically) desire to bond with their new baby, and the new baby benefits from their love and presence
> >
> > **Relevant *Dissimilarities***—the mother typically needs time to physically recover after birth, whereas the father typically does not; the mother sometimes needs to breast feed, whereas the father does not; the mother (often) undergoes drastic hormonal changes, sometimes effecting mood and cognition after birth, whereas the father (typically) does not
> >
> > > **Analysis**—maybe fathers deserve *some* time off to spend with their newborn, but just because mothers get three months doesn't mean fathers necessarily should, too

> > See a good video on moral argument by analogy [here](#).

Repairing Arguments

Since we're ultimately after the truth, it's OK (and often beneficial) to repair bad arguments, rather than simply throwing them out. Might be a nugget of truth in that pile of nonsense!

Totally implausible premises should be discarded, but those that make some sense should be recycled.

Original argument: "The National Weather Service has issued a severe thunderstorm warning for Knox County until 10 p.m. Plus, ominous black clouds are visible in the distance, moving this way. And my horoscope said something bad was going to happen today. Therefore, a bad storm is gonna hit soon!"

Formalized:

1) [implied] The NWS is a reputable authority on thunderstorm prediction
2) The NWS issued a severe thunderstorm warning for Knox County until 10 p.m.
3) Ominous black clouds are visible and moving this way
4) [implied] Horoscopes reliably predict bad things
5) My horoscope said something bad was going to happen today
6) [implied] A severe thunderstorm would be a bad thing
7) Therefore, a bad storm is gonna hit soon

DON'T LITTER— RECYCLE PLAUSIBLE PREMISES

> **Implausible premise:** 4 (horoscopes aren't *that* reliable, if at all)
>
> **Plausible but useless premise**: 5 (5 doesn't contribute anything to the argument without 4, which we've found to be implausible)
>
> **Plausible and useful premises**: 1, 2, & 3

New & Improved Argument:

1) The National Weather Service is a reputable authority on thunderstorm prediction
2) The NWS issued a severe thunderstorm warning for Knox County until 10 p.m.
3) Ominous black clouds are visible and moving this way
4) Therefore, a bad storm will hit Knox County before 10 p.m.

The next time you identify a crummy argument, don't throw it out immediately. Maybe it can be repaired and salvaged.