

Basic Tools for Critical Thinking about Arguments

1.1 Claims

“Listen to reason!” cried Charlotte, exasperated after an hour of argument with Charles. And Charlotte’s frustration may have been perfectly justified. What is reason? And why should we listen to it? Most basically, reasoning is about advancing *truth claims* by means of special *logical* procedures of *argument* (see 1.2). One of the most basic elements of critical thinking, then, especially when engaged with issues related to logic and science, is to discern whether claims are actually true and to distinguish them from claims that are not true.

In practice, language is our most fundamental tool in this process. Language allows us to articulate what we judge to be true or false, and it allows us to share and communicate those judgments to others. Ultimately, a good critical thinker must develop an acute grasp of language in order to make clear and precise claims about the truth and to assess how well or badly they function in the logic of an argument. Logicians have technical names for the kind of sentences out of which logical arguments are built. They call them *statements* or *propositions*, and they’re simply sentences that can be either true or false (in logical terms, they possess a *truth value*). To really understand statements and their truth values, however, keep the following in mind.

- *Bivalence*. Statements or propositions can *only* have one truth value, and it must only be either true or false. Moreover, statements or propositions can’t be both true and false in the same sense under the same circumstances. Logicians call this the principle *the law of bivalence*. (To be sure, there are multi-valued logics with values besides true and false, but again they’re the subject of a different, more advanced book.)
- *Excluded middle*. There’s no middle ground or gray area between truth values in basic logic – no “truthiness” as the comedian Steven Colbert might say. Statements or propositions can’t be “sort of true” and “sort of false.” Logicians call this

8 BASIC TOOLS FOR CRITICAL THINKING ABOUT ARGUMENTS

requirement the *law of excluded middle*. (Yep, there are *fuzzy logics* that accept gray areas, but we won't be dealing with them here.)

- *Non-statements and propositions*. Keep in mind, too, that sentences that aren't (in logic's technical sense) statements or propositions simply don't have truth value. Neither questions ("Where are you going?") nor commands ("Stop that!") nor exclamations ("Wow!!!") are properly speaking true or false; and so they can't be proper parts of arguments, logically understood.

Now, the idea of a *claim*, in the sense we use the term here, adds for the sake of critical thinking just a bit more to what logicians strictly call statements and propositions. In particular, *claims* are statements that indicate a position has been taken. A claim, in other words, is a statement or proposition that in some meaningful sense sincerely belongs to whomever or whatever asserts it. One of the first judgments a good critical thinker must make, then, is to determine in just what way a statement is presented. Perhaps it's meant sincerely and seriously, but perhaps it's just being used hypothetically, ironically, as a joke, an instructive example, a lie, or perhaps in the recitation of some movie script. Or maybe it is simply being used to provoke an audience, to gain attention, to test someone's response, or perhaps for some other reason entirely. There are countless things one can do with words and other forms of expression. So, while most of the material in this and the next four chapters applies to all claims, and not just to statements or propositions, we will use the language of "claims" to keep the question of claim or non-claim in mind.

Here's the upshot. Since it's often the case that critical thinking involves discerning truth and error, a good critical thinker must learn how to identify claims that are true, or most likely seem true, while at the same time recognizing and avoiding claims that are best judged false. What's more, a good critical thinker will recognize and admit when he or she does not know whether a claim is true or false. Critical thinking sometimes requires reserving judgment as to whether or not a claim is true until, if ever, sufficient reason for determining the truth or falsity of that claim is discovered.

Beliefs and opinions

In the 1989 comedy film, *The Big Lebowski*, a competitor scheduled to face the main character, the Dude, in the next round of a bowling tournament declares that his team is going to crush the Dude's. The Dude, at least pretending to be unfazed, responds, now famously, by remarking, "Well, that's just your opinion, man." It's not uncommon for people to distinguish strong truth claims from those that are weaker by calling the weaker claims opinions. People often make claims such as, "The world is round," implying it's something we definitely *know* to be true, that it's a *fact*. When, on the other hand, people make claims such as, "Pele was a better athlete than Gretzky," we deflate the claim by saying that it's just their "opinion."

Beliefs can obviously often be either true or false, but a misleading though nevertheless common misunderstanding about the difference between strong assertions

BASIC TOOLS FOR CRITICAL THINKING ABOUT ARGUMENTS 9

(such as knowledge claims) and mere opinions is that opinions aren't really true or false. As such, they're often thought to be free from the same scrutiny and justification required by claims to *know*. The result of this mistaken view is that many people believe that one's opinions are somehow insulated from dispute or challenge. Opinions are treated as if they stand alone as islands in our thoughts, entirely disconnected from criticism and critical thinking. In reality, however, our opinions are still very much claims open to criticism. They are, after all, claims, and therefore either true or false. (Matters concerned with knowing are described as *epistemic*, and *epistemology* is the study of knowledge. Matters concerned with belief we'll sometimes call *doxastic*.)

In addition, it's important to understand that opinions are often influenced by what we value. This mixing of beliefs and values sometimes makes it difficult or confusing to assess their truth. But a good critical thinker's toolkit provides the tools for tackling this seemingly tricky task (see 5.5, 7.2, 8.2, and 8.5). In the meantime, just keep in mind that opinions often incorporate judgments and emotions about what is valuable, either subjectively, to the person expressing the opinion, or objectively, to everyone in the world.

Simple and complex claims

A *simple* claim is a claim that, logically speaking, isn't divisible into other, more basic claims. This is usually a single subject-predicate formula, for example, "It is a cat," or "That ball is round." A *complex* or *compound* claim is a claim logically composed of two or more claims (or, minimally, a single claim that's negated) connected by special words or ideas logicians call *logical operators* or *connectives*. (Of course, not all devices to connect one sentence with another do so as a matter of logic – as any poet or lyricist will tell you.)

Simple claims, as some logicians have observed, are kind of like atoms, while complex claims are kind of like molecules. The claim that "Earth exists" is a simple claim. If, however, we add to the claim that the Earth exists another claim, "Humans live on Earth," then we will have created the complex or molecular claim: "Earth exists, and humans live on it." Notice that a complex claim may be expressed in lots of ways, and yet still be composed of the same simple claims:

Humans live on Earth, and Earth exists.

Humans live on Earth, which exists.

Earth exists, and humans live on Earth.

Sometimes, two sentences, whether simple or complex, can be said to possess the same *meaning*. Having the "same meaning" can, however, mean a variety of things. In this context, let's just say that sentences having the same meaning can be used interchangeably, and one reason for this may be that the claims have the same *cognitive* or *material content*. (Another reason, as we'll discover in the next three chapters, may be that they have the same *formal* qualities, which means they have the same logical

10 BASIC TOOLS FOR CRITICAL THINKING ABOUT ARGUMENTS

structure.) The cognitive or material content of most claims determines the conditions that make those claims true or false – or what logicians call the *truth conditions*. In other words, the claim that the Earth exists is true if and only if the Earth really exists. The Earth's existing is the condition that must be met in order for the claim "Earth exists" to be true.

The truth conditions of complex claims, however, are a bit more, well, complex than those of simple claims. The truth conditions of complex claims are determined not only by the simple claims from which they are constructed but also by the *logical operators* or *connectives* used to combine the simple claims and sometimes other properties of the complex. Common logical operators are "and," "or," "if," "if and only if," and "not." (The last of these, "not," is unique and extremely powerful. It's not used to combine multiple simple claims, but rather to change the truth value of a claim, whether simple or complex, to its opposite value. If true, a negated claim becomes false; if false, a negated claim becomes true.)

Earth exists.	simple claim
Earth does not exist.	negation (not)
Earth exists, and humans live on it.	conjunction (and)
Earth exists, or humans live on it.	disjunction (or)
Earth exists, if humans live on it.	conditional (if)
Earth exists, if and only if humans live on it.	biconditional (if and only if)

Of course, each of these claims has a different meaning, and those meanings are derived from the cognitive content of the simple claims – "Earth exists" and "Humans live on it" – as well as from the logical operators that are used to combine or modify those simple claims.

Here's a tricky bit. It's important to remember that despite the number of simple claims composing a complex claim, a complex claim can be viewed as one, big single claim. That's because a complex claim is, as a whole, either true or false, just like a simple claim. The simple claims "Earth exists" and "Martians exist" have truth values (the first is true and the second, we presume, is false). But combine them into a complex claim using a connective and the result has its own truth value: the claim "Earth exists *and* Martians exist" is false; the claim "Earth exists *or* Martians exist" is true. You will see exactly why in Chapter 4. For now, just be aware that complex claims are single if not simple claims, and that each has its own single truth value.

Truth functionality

Here's something even a little trickier. The truth value of different kinds of complex claims must be determined in different ways. For some complex claims, the truth or falsehood of the whole is *completely* determined in a logical sense just by the truth values of the component claims that compose it as well as by the way they relate to one another – that is, by (1) the simple claims plus (2) the logical operators that connect

BASIC TOOLS FOR CRITICAL THINKING ABOUT ARGUMENTS II

and modify them. For other kinds of claims, you can only determine the truth value of the whole claim by considering other features of the claim and perhaps only the claim as a whole.

When the truth or falsehood of the whole is *fully* determined by the truth values of its component simple claims plus their logical relations (the first type), we call the claim a *truth function* or say that the sentence is *truth functional*. There are lots of other simple and complex statements and claims, however (the second type), that don't possess this property. Belief statements, for example, are not truth functional. So, the truth value of the sentence, "Oedipus believes that the husband of Jocasta is not the killer of Laius," does not, tragically for Oedipus, depend upon the truth or falsehood of its component simple claim, "the husband of Jocasta is the killer of Laius." Unfortunately, whether or not we believe a statement is often independent of whether or not it's true. (The distinction between truth functions and non-truth functions may seem a bit arcane at this point, but truth functionality will become especially important later, and we'll elaborate on the concept a bit more when we address propositional logics in Chapter 4.)

SEE ALSO

- 4.1 Propositional vs. Categorical Logics
- 8.1 Knowledge: The Basics
- 9.5 Unfalsifiability and Falsification Resistance

READING

Patrick J. Hurley, *A Concise Introduction to Logic*, 12th edn (2015), Sections 1.1, 2.2, 6.2
 Julian Baggini & Peter S. Fosl, *The Philosopher's Toolkit* (2010), Chapters 1–3
 Anthony Weston, *A Rulebook for Arguments*, 4th edn (2009), I.1
 J. van Benthem, *A Manual of Intensional Logic* (1988), Part I

I.2 Arguments

A well-known Monty Python skit presents two men at an "Argument Clinic," a client and a "professional" arguer. The fun begins when the professional arguer simply contradicts everything the client says ("Yes, I did." "No, you didn't." "Yes, I did." and so on.). Shrewdly, the client isn't impressed: "Look this isn't an argument ... It's just contradiction." Okay, so what *does* count as an argument?

For critical thinkers, the term "argument" means something very specific. Briefly put, an *argument* is a special tool that systematically collects and arranges reasons in support of the truth of a claim. As the client of Monty Python's Argument Clinic

12 BASIC TOOLS FOR CRITICAL THINKING ABOUT ARGUMENTS

puts it, “An argument’s a collected series of statements to establish a definite proposition!” A bit more specifically, arguments are simply sets of claims in which one or more claims are to provide support or justification or proof for the truth of another claim.

Essential to every argument, then, are at least two components: (1) a single *conclusion* and (2) at least one reason or *premise* for the conclusion to be true. Identifying which is which in a given case can sometimes be confusing, though. That premises are intended somehow to support or seem to support a conclusion indicates that a third element is present in logical argument – (3) an *inference* from the premise(s) to the conclusion. It’s in the quality of that inference where things get especially interesting for critical thinkers, as not all inferences are good or strong or legitimate.

Logic vs. eristics

It’s common for people to confuse verbal altercations with arguments, since commonly, the term “argument” refers only to a dispute between two or more people, any kind of dispute. It’s also common for people to confuse *eristics* (the study of *winning disputes*) with *logic* (the study of *reasoning*). Arguments, however, in the technical, *logical* sense discussed here do not require a dispute, disagreement, or even dialogue, and they certainly don’t involve yelling, screaming, fisticuffs, or kerfuffles of any other sort. Furthermore, *debates* are also commonly confused with arguments because they are typically composed of many arguments, and the opposing sides of a debate offer arguments in support of the claims they wish to establish. So, debates include argument, but you needn’t have a debate to argue.

Arguments vs. explanations

Moreover, not all sets of sentences that lead to statements claimed to be true are arguments. For that reason, often a critical thinker will find himself or herself trying to determine whether or not a set of claims is, in fact, an argument. For example, *explanations* often seem like arguments. But there is deep difference between the two. Explanations are sets of claims that function to establish *how* or *why* something is the case. Arguments, in contrast, undertake to establish *that* some claim, normally a claim in question, is actually true. It’s very different, for example, to explain *how* extraterrestrials have made their way to Earth from arguing *that* extraterrestrials have made their way to Earth – though both might involve presenting a flying saucer.

Arguments show that something is the case.

Explanations show how or why something is the case.

Explanations are easily mistaken for arguments because in many respects the two share stylistic similarities. Much like an argument, an explanation will include a single claim upon which all the other claims bear. In an explanation, this claim is called an

BASIC TOOLS FOR CRITICAL THINKING ABOUT ARGUMENTS 13

explanandum, and the remaining claims, called the *explanans*, are used to account for (“explain”) the explanandum. Because an explanandum is a claim like any other, it is true or false. But an explanation is in no way concerned with establishing or supporting the truth of the explanandum. Instead, the truth of the explanandum is already accepted or presupposed. Often, explananda are easily identifiable because they’re not controversial, or we have no obvious reason to doubt that they are true. Take, for example, the following set of claims:

The speed limit on this road is 45 mph, except when school is starting or ending, at which time it drops to 25 mph. That’s *because* during those times it’s especially important to protect the school children.

The truth of the explanandum, “The speed limit on this road is 45 mph, except when school is starting or ending,” is not at issue. The explanans merely attempts to make clear why this is so.

SEE ALSO

- 2.1 Deductive and Inductive Arguments
- 4.1 Propositional vs. Categorical Logics
- 6.2 Analogies and Arguments from Analogy

READING

Arthur Schopenhauer with A. C. Grayling, *The Art of Always Being Right* (2012/1831)
 Ernest Lepore & Sam Cumming, *Meaning and Argument* (2012)
 Miriam Joseph with Marguerite McGlinn, eds., *The Trivium* (2002)
 G. B. Kerferd, *The Sophistic Movement* (1981)
 Ernest Nagel, *The Structure of Science: Problems in the Logic of Scientific Explanation* (1979)

I.3 Premises

One clear difference between proper argument and mere contradiction (as well as most shouting matches) is that an argument depends for its strength upon *premises* functioning as *reasons* to accept the *conclusion*. Premises give an argument its heft, its strength, the ground upon which the conclusion stands. They work together in exacting ways to prove or demonstrate or justify the conclusion. Some arguments enlist only one premise (and every argument must have at least one premise). That seems obvious, since there must be at least one reason to accept the conclusion in order for

14 BASIC TOOLS FOR CRITICAL THINKING ABOUT ARGUMENTS

a set of claims to count as an argument. But that's just the minimum. It may seem odd, but maximally there is no limit on the total number of premises an argument can enlist. An argument may indeed require volumes of text to complete, containing a staggering number of premises, perhaps (though this is something of a matter of dispute) even an uncountable or infinite number.

Enthymemes

Often, an argument will contain implicit or unspoken premises, usually probable claims already accepted by the audience. Arguments of this sort are called *enthymemes*. Enthymemes, then, are informal arguments that rely on premises not explicitly articulated. (We'll see more of them in Chapter 3 when we consider Aristotelian or categorical arguments.) Since enthymemes are not uncommon, in order to assess the merits of arguments properly, a critical thinker will find it very helpful to look for enthymemes or enthymematic arguments and flush out their implicit or assumed claims. In short, sensitivity to enthymemes helps discern assumptions.

Identifying premises

Identifying the premises of an argument is made a lot easier by first identifying the argument's conclusion. Once the conclusion is identified, any remaining claims that are there to support the truth of the conclusion become easier to discern. There are, however, several caveats of which critical thinkers should be mindful.

First, it's not necessarily the case that all of the claims in any given text are used as premises. Many texts contain lots of pieces of information that play no logical role at all in supporting the truth of the conclusion. For example, some claims merely elaborate, highlight, clarify, or give examples in relation to one of the premises. Some sentences are there just for rhetorical purposes. Sentences of those kinds are not relevant to the logic of the argument, though they may be used to clarify or explain a claim or a term, or they may be used to make the argument flow more smoothly. And so the critical thinker will find it useful to set these aside when analyzing and evaluating the argument.

Second, as we've seen, claims may be complex. So critical thinkers will need to consider whether or not compound claims should be untangled and broken up. A complex claim may be easier to work with if it's broken up into separate claims. But be careful if you do this, because sometimes breaking up a complex claim can change its meaning, especially if you lose the effect of the logical operators.

Thankfully, good writers often set off premises and conclusions with indicators. *Indicators* are either single words or phrases that alert the reader or listener to the logic of an argument. (It's good, for that reason, to use logical indicators while writing or speaking. Your audience will thank you.) While it isn't necessary for an argument to contain these words, they do help to clarify an argument's structure. Words or phrases

BASIC TOOLS FOR CRITICAL THINKING ABOUT ARGUMENTS 15

that are specifically useful to indicate that a premise precedes or follows the indicator word are called *premise indicators*. Here are some of the most common:

since	because
given; given that	for; for the reason that
as; insofar as	due to the fact that
in that	it may be concluded from

For example: *It will likely rain today given that it's the rainy season and because the sky is full of thick, dark clouds.* In this argument, two reasons are given for thinking it will likely rain today, and both are preceded by premise indicators: *given that* and *because*.

Be careful, however, because some premise indicators perform other functions in our languages. The premise indicator word “since,” for example, does not always indicate that a premise is nearby, because “since” is also used to indicate that a period of time has passed. (“I’ve lived in this same house since 1965.”) Similarly, the word “because” may indicate a premise, but it may also indicate an explanans in an explanation (just as it does in the previous sentence, and also: “My house collapsed because of termite damage”).

To be sure that the claim is a premise, a critical thinker must determine whether or not it functions as a reason to think another claim (the conclusion) is true. In an argument without indicators, a critical thinker must do this anyway, but the indicators make things easier by offering a shortcut to determining whether a given claim is best understood as a premise.

These two formulations of the same argument demonstrate how the presence of indicators clarifies the relationship of the claims in an argument:

1. Riley is a mammal at the National Zoo. Riley is an elephant at the National Zoo.
2. Riley is a mammal at the National Zoo, given that Riley is an elephant at the National Zoo.

In the first formulation of the argument, it is unclear whether the arguer is attempting to *prove that* Riley is a mammal at the National Zoo or instead perhaps just report that Riley is an elephant and a mammal at the zoo. Without the indicator words or phrases, readers can’t be sure how the text is being used. Context can help, but sometimes context is insufficient. The presence of the indicator phrase in the second formulation of the argument removes this complication by making it clear that one of the two claims is intended as a premise and the other as a conclusion.

SEE ALSO

- 1.1 Claims
- 2.3 Classifying and Comparing Claims
- 3.4 Formal Deduction with Categories: Immediate Inferences

16 BASIC TOOLS FOR CRITICAL THINKING ABOUT ARGUMENTS

READING

Dan Cryan, *Introducing Logic: A Graphic Guide* (2004)

Harry J. Gensler, *Introduction to Logic* (2010)

Stan Baronett, *Logic* (2012)

I.4 Conclusions

The *conclusion* of an argument is the claim that the premises are to support or justify. In large part, the conclusion is the main point of the argument. If an argument were like a treasure hunt, the conclusion would be the treasure, and the premises would be directions presented to get you to that destination. Similarly, every argument has one and only one conclusion. While there may be important points that must be made on the way to establishing a conclusion, ultimately all the important points should work together to support one single claim. Even though a single argument could take a book or more to complete, it would still have only one conclusion.

Argument structure

Now, authors do often claim to draw multiple conclusions from their arguments. Sometimes that means that they draw subconclusions on the way to a final conclusion. It's also possible that the premises of the argument support the truth of multiple claims or a complex claim that can be broken into multiple claims.

In even the terribly simple argument below, a single premise supports two different conclusions.

- P1. I have three buckets of apples.
- C1. Therefore I have three buckets.
- C2. Therefore I have apples.

Given the premises provided, the author could have also concluded that he or she has material objects or simply something rather than nothing. When multiple conclusions can be drawn from a single set of premises, it is best to think of each conclusion as the result of a single argument. This is often the best practice because keeping arguments distinct, even when they share premises, can help prevent confusions that lead us to error.

Simple and complex arguments

Arguments come in all shapes and sizes. One way to describe the form of an argument is, as with premises, in terms of *simple* and *complex*. *Complex arguments* are

BASIC TOOLS FOR CRITICAL THINKING ABOUT ARGUMENTS 17

arguments composed of two or more *simple arguments*. In a complex argument, the conclusions of simple component arguments become subconclusions in relation to the whole complex. As subconclusions in the complex argument, they also function as premises for the conclusion of the complex argument.

Identifying conclusions

As there are indicator words and phrases for premises, there are indicator words for conclusions as well. *Conclusion indicators* are words or phrases that alert the reader to the presence of the conclusion. Below is a list of commonly used conclusion indicator words and phrases:

therefore	it follows that; we may conclude that
hence	so; so that
thus	entails
implies	consequently

Conclusion indicators are fairly reliable indicators of conclusions; but just as it was with premise indicators, it's always important to check the claim indicated by the conclusion indicator to see if that claim is, in fact, the logical, final conclusion of the argument. It is not uncommon for conclusion indicators to mark the presence of a subconclusion in a complex argument. Context and the rules of logic will often clarify things, but it's notoriously difficult, especially in highly complex texts, to discern the arguments. In fact, when we get to Chapter 10 (especially in 10.5), to what's called the "semiological problem," we'll see that the very nature of language and interpretation ensures that this work remains difficult. That difficulty, indeed, is one of the reasons academic philosophers and other scholars remain in business!

Exercises and study questions

1. Determine whether the following claims are simple or complex:
 - Monday Night Football is the most widely watched television program in the United States.
 - If you go to the store, then please purchase some milk and eggs.
 - All the cars are vehicles with bad gasoline mileage.
 - Either the weather is going to improve, or we'll need to cancel the picnic.
2. Identify the premises and conclusion in the following arguments:
 - It's important that we respect the choices of others, and it's important that we help look out for the welfare of others. Consequently, we must ensure that the available choices for others are always ones that will benefit their welfare.

18 BASIC TOOLS FOR CRITICAL THINKING ABOUT ARGUMENTS

- The average age of cars on the road today is around 10 years. Since my car isn't going to last much more than 7 years, its construction is probably inferior to most cars on the road today.
 - Most students haven't discovered what they want to do with their lives, and yet many schools want them to declare a major before setting foot on campus. It follows from this that a student's major should be lenient and flexible with the number of required courses, because inevitably students will take classes in a degree field that they may change after a short time.
3. How many conclusions can an argument have?
 4. How many premises can an argument have?

SEE ALSO

- 3.4 Formal Deduction with Categories: Immediate Inferences
- 3.5 Formal Deduction with Categories: Syllogisms
- 4.2 Common Deductively Valid Forms
- 8.6 Justification: The Basics

READING

Merrilee H. Salmon, *Introduction to Logic and Critical Thinking* (2012)
Paul Herrick, *Introduction to Logic* (2012)
Anthony Weston, *A Rulebook for Arguments* (2009)