CHAPTER FOUR

ARGUMENTS & INFERENCES

THE CONTENT AND PURPOSE OF CHAPTER FOUR

When doing philosophy, we define terms and analyze arguments. We've seen why it's so important to define our terms—because doing so helps us avoid a number of fallacies and enables us to think more clearly about issues and concepts that are important to us. We've also seen *why* we need to analyze arguments—because claims aren't always credible, because sources aren't always reliable, and because we often need just to slow down to avoid careening off into crazyland because of our own tendencies towards cognitive biases. We've seen that although heuristics are often useful shortcuts, they can also easily enough lead us into cognitive danger. So to avoid biases and manage heuristics, we need to learn what an argument is and how to determine whether it's any good.

In this chapter, we're going to plunge headfirst into arguments. We're going *very quickly* to overview the whole of argument analysis by presenting a methodology of argument analysis that we'll practice not only in this section of the textbook, but also throughout our philosophical exploration in metaphysics, epistemology, and ethics.

The Basics of Argument Analysis

Argument analysis is a careful methodological process. There are, roughly, five steps we take when determining whether an argument is any good. This chapter overviews the key elements of any good argument and the process of argument analysis. The following are some key definitions and principles:

- *X is an **argument** iff x is a set of statements (i.e., propositions, claims), at least one of which is a claim supported by the others, and the rest of which are offered as evidence for that claim.*

- Every argument is composed only of *claims* (that is, truth-evaluable sentences) that have a specific relation to each other called an **inference**. (If there's no inference indicated, then there's no argument.)

- All arguments have three basic elements — premises, conclusions, and inferences.

- There are generally two kinds of arguments:

  - those which imply that the premises offer enough evidence to *guarantee* the

READING QUESTIONS

This chapter is short, but intense. It covers a *lot* of ground. I *strongly* recommend you take notes in the margins, prepare to bring questions to class, and mark this chapter especially for repeated returns, as you learn how to analyze, then make good arguments for yourself.

So hang onto your hat as we blitz through a quick overview of what will be the content of the rest of this part of the textbook.

As you study this chapter, keep these questions in mind for critical thinking and analysis.

- How do people generally use the word *argument*? What is the difference between our stipulated use and how you might have understood this term before?

- What are the three elements of any argument? What is *not* (strictly speaking) a part of an argument?

- Of those three elements, which one tells you what *kind* of argument it is? And how can you tell whether the argument is any good?

- Why is it important to put an argument into standard form before you do anything else?

- Compile a list of every premise indicator word and conclusion indicator word you can think of. Some are included in this chapter, but you'll run into more as you analyze and build arguments. Keep this list handy for reference and to strengthen your ability to spot patterns.

continued…

conclusion (if the premises are true the conclusion *must* be true), and

o those which imply that the premises offer enough evidence to *probabilify* the conclusion (if the premises are true the conclusion is very probably true).

That is, the kind of an argument is determined by the kind of *inference* it has (and **not** by whether every claim is true).

- *X is a **deductive** argument iff x is an argument where the inference is that of necessity.*

- *X is an **inductive** argument iff x is an argument where the inference is that of probability.*

- Terminology when analyzing arguments is *exact* and should be used very carefully, in order to ensure clear communication.

- Arguments often have **indicator words** that give key information *about* the argument, such as whether a certain sentence is a premise or conclusion, whether the inference is necessity or probability, and (seen later) what operations or category relations are in effect. Oftentimes, the indicator word is not a part of the actual claim or argument, and will be replaced by line number or other mark when the argument is put into standard form.

- Some arguments have **unstated** premises (or even

unstated conclusions). These are claims that are perceived by the writer/speaker to be obvious. The argument *requires* them, and in argument analysis, they *must* be made explicit. Put them into the argument's standard form (convention is to put these unstated but required claims in parentheses).

- A deductive argument is conserved valid if, on the assumption that all the premises are true and with no other evidence, the conclusion is *forced* or *guaranteed* to be true, without exception.

- An inductive argument is considered probable (strong) if the set of conditions that would make its conclusion true are more likely to obtain than the set of conditions that would make its conclusion false.

There are five steps in argument analysis:

1. Put the argument into standard form.

2. Determine what kind of inference the argument is supposed to have.

3. Determine whether that inference is any good.

4. Determine whether all the premises are true.

5. Determine whether the argument is compelling.

Other than a lot of new terminology and a process of analysis, you need to become familiar with this principle:

The Principle of Charity: When interpreting any claim or argument, always consider it to be rational, understanding it in its best possible construal.

Tasks & Critical Questions

This chapter contains **five tasks** and **no critical questions**.

STIPULATING THE MEANING OF "ARGUMENT"
What Counts as an Argument in Philosophical Discourse

An argument is a tool we use to evaluate whether certain things are true or not. In our use of the term, it is *not*

1. a heated disagreement about personal opinions,

2. a discussion between two people who have opposing viewpoints, or

3. the content of a scientific or mathematical proof.

The kind of argument we deal with in philosophy is rather defined as follows:

X is an **argument** *iff x is a set of statements (i.e., propositions, claims), at least one of which is a claim supported by the others, and the rest of which are offered as evidence for that claim.*

This means that each argument has *three* parts:

(1) premises
(2) conclusion
(3) inference

And, of course, we'll define these terms:

X is a **premise** *iff x is a claim (that is, a truth-evaluable statement) offered as evidence in an argument for the truth of some claim.*

X is a **conclusion** *iff x is a claim (that is, a truth-evaluable statement), the truth of which is argued for by use of premises.*

X is an **inference** *iff x is a logical connection between premises and conclusions, such that somebody S can reasonably accept the truth of the conclusion on the basis of the premises.*

KINDS OF ARGUMENTS

There are different kinds of arguments, defined according to what kind of inferences they have. An inference tells us what kind of acceptance we should have for the conclusion, given the premises. Imagine, for example, that somebody tells you that you aced an exam. You'd ask for evidence, right? Suppose this person then told you that everyone who answered every question carefully aced the exam, and that you answered every question carefully. Well, if *everyone* who answered exactly as you did aced the exam, then you would have reason to accept their conclusion completely.

On the other hand, suppose that person's evidence were more on these lines: you studied for that exam with person P, and you have been getting As on every other exam in that course. Furthermore, P took the course last quarter, and not only aced all the exams you've already aced, but also aced the current exam (the one you just took and studied for with P). So you have a *very good reason* to accept the conclusion that you aced the exam. But it's not certain. It's *probable*. This gives us some insight into the different kinds of arguments.

We can say either

1. if the premises are (all) true, then the conclusion *must* be true, or

2. if the premises are (all) true, then the conclusion is *very probably* true.

The former kind of inference is called *necessity*, and the latter *probability*. That gives us these definitions:

X is a **deductive** *argument iff x is an argument where the inference is that of necessity.*

X is an **inductive** *argument iff x is an argument where the inference is that of probability.*

This means that in deductive arguments, the premises are offered as a **guarantee** for the conclusion: *If the premises are true, then the conclusion has to be true, no exceptions, period.* And in inductive arguments, the premises are offered as **probabilifying** evidence for the conclusion: *if the premises are true, then the conclusion is very probably true (though there might be some odd but unlikely exceptions).*

Another way we might remember this important distinction between arguments is by understanding the definition of *valid* and *strong*, which, we'll soon see, are the traits of good arguments. Just like we define *dollar bill* by the traits of a good (not counterfeit) bill, we can define a deductive or inductive argument by the traits of a good argument of that kind. I'll return to these more specific definitions once the relevant concepts are explained. But to get to that place, we're going to go by means of the order of analysis.

THE ORDER OF ANALYSIS

Of course it's methodological. Of course it has to be carefully done. When you're trying to find the truth, the best way to proceed is with regularity and care. Thus, there's a sure-fire approach towards determining whether an argument is any good or not. One could certainly evaluate an argument by looking first to see whether everything somebody said in the premises is true. But that might be very long and arduous work. A *better* and much quicker way is to begin by looking to the inference, which will show us right away whether the argument itself is a good one or not, regardless the truth of the premises. We follow a strict order:

First, put the argument in *Standard Form* (if it isn't already).

The *standard form* of an argument in ordinary language looks like this:*

1. Premise

2. Premise

3. [for however many premises]

4. Conclusion

In short, the *standard form* of an argument is a very orderly arrangement that helps us see how the argument works. And there are certain *requirements* (standards!) for standard form.

First, each statement (premise or conclusion) is given its own line.

Second, each statement *must* be numbered.

Third, premises come before the conclusion in a logically-ordered way.

And **finally**, a line is drawn between the premises and conclusion.

Here's an example:

THE ARGUMENT FROM EVIL (AE)
Let's first just present it the way one might hear it on the street.

So you say that God exists? Well, horrible things happen. I mean, what about all the torture and dying, and tsunamis and genocide? I mean, if God knows about all this and doesn't do anything, then he's not exactly God, right? I mean, God's supposed to be good, right? So I just can't accept that God exists.

Believe it or not, there's a *lot* packed into that. And this is why standard form helps us to analyze arguments, better to see whether they're good. So let's unpack that argument and put it into standard form. It's actually a very respectable argument, called the *Argument from Evil* (or AE, for short). It looks like this:

AE

1. X is God iff x is (at least) an omniscient, omnipotent, and perfectly good Being.
2. If God is omniscient, then God knows about all evil in the world.
3. If God is omnipotent, then God is able to eradicate all evil from the world.
4. If God is perfectly good, then God wants to eradicate all evil from the world.
5. But there is evil in the world.
6. So God is either not omniscient, not omnipotent, or not perfectly good.
7. So God must not exist.

Standard form helps us see exactly what it is that is being argued, and it aids us in finding the inference and,

eventually, in determining the truth of the premises. It also saves us from making sloppy mistakes that can come from not realizing that something is in fact not a part of the actual argument at all. (Many thinkers offer a lot of commentary that is incidental, not integral, to the claims they are making, and as such, can be set aside.)

Task 21 requires you to take an argument as it appears in ordinary language and to shape it into standard form. To do that, take a note at the box on the next page that gives you a list of common *indicator words*. There are a number of different kinds of indicator words—some tell you "hey, this is a premise coming up!" Others tell you "that was a conclusion back there!" or "This is another premise!" Or even, "that was a premise I just gave you!" These are called **premise indicators** and **conclusion indicators**, and they are <u>never</u> actually a part of a premise or a conclusion. So when you put an argument into standard form, you leave them out— although we often keep 'so' or 'therefore' as a matter of custom to make the standard form argument easier to read. For now, those on the given list are the only kind indicator words we care about. However, you'll find out soon enough that there are also words that indicate *operators*, *quantity terms,* and *quality terms* as well as terms that tell you what *kind of argument* you have.

---

* Remember, *many* things have standard forms, like tax forms, job applications, and essays. Don't confuse the standard form of an ordinary language argument with the standard form of an analytic definition!

Indicator words are best understood as "heads up!" cues. If it helps, think of the number that you give the proposition as a replacement for the indicator words. So instead of writing "because blah blah blah," write the premise number (the number is the replacement for the "because" part), then "blah blah blah." That premise indicator word is present in the number.

Here's an example:

> *Bill and Susan are going to hook up, I'm sure of it. People only hang out as often as they do if they like each other a lot. And neither can stop talking about the other!*

First, I think about this, and I see that "Bill and Susan are going to hook up" is the conclusion: it's what all the rest is being offered as evidence for. So I mark that as a conclusion, and I look to the rest as premises. Since "and" is a premise indicator, I know the last sentence is also a premise. So I present it thus:

1. People only hang out as often as Bill and Susan do if they like each other a lot.
2. Bill and Susan cannot stop talking about each other.
3. So Bill and Susan are going to hook up.

Notice how I've left out all the indicator words—sort of. They're

COMMON INDICATOR WORDS

PREMISE:

BECAUSE   GIVEN THAT   SINCE   OWING TO   INASMUCH AS   AS (INDICATED BY)   FOR (THE REASON THAT)   SEEING AS   AND   MAY BE INFERRED FROM   ALSO   THE REASON THAT

CONCLUSION:

THEREFORE   SO   ACCORDINGLY   THUS   CONSEQUENTLY   HENCE   ENTAILS THAT   WHEREFORE   WE MUST INFER IT   MUST BE THAT   IT FOLLOWS THAT   WE CAN INFER

present in the numbering. And they're present in that line, which we read as "therefore" or "so." If we read this, we can see that it's exactly the argument as stated.

Unstated Premises or Conclusions

Of course, we'll quickly note that this argument has a number of *unstated* premises, so as it stands, the presented argument isn't that great. But if we think carefully, we can put those assumed premises in the argument's presentation:*

1. People only hang out as often as Bill and Susan do if they like each other a lot.
1b. (People who like each other a lot tend to hook up.)
2. Bill and Susan cannot stop talking about each other.
2b. (People who cannot stop talking about each other tend to like each other a lot.)
3. So Bill and Susan are going to hook up.

Notice how making explicit the unstated assumptions shows the worth of the argument. This gives us an important insight: *not all premises are stated explicitly*. Because we

want to treat the argument that's intended, we will want to include these assumptions in our presentation and analysis of the argument.

Remember that one of the rules of discourse is to imagine and debate against an ideal opponent. One way we keep this rule is to practice what's called the **Principle of Charity**.

> **The Principle of Charity:** When interpreting a claim or argument, always consider it to be rational, understanding it in its best possible construal.

This means that if you see an argument that has gaps, always interpret that argument as *intended* to be rational, and fill the gaps with whatever premises that rationally, logically would make the conclusion follow from the premises that are explicitly offered.

On the other hand, if *you're* the one offering the argument, you want to make sure you *don't* have any gaps. Think of this as doing conceptual long-division. Even though you can skip steps in your head easily enough, when you're presenting an argument, you want

---

* It is the accepted convention to put unstated but required argument elements like missing premises or sub-conclusions in parentheses.

to spell it *all* out. This way is the best way to be certain that your conclusion logically follows from your premises.

Finally, sometimes it's the *conclusion* that's left unsaid. Sometimes, people think that this blank will just fill in itself, that it's so darn obvious what is being implied that it literally *goes without saying*. Still, we need to make that conclusion explicit when presenting the argument, or we can't properly test it. So if you are analyzing or presenting an argument, always be sure to state everything that is a necessary part of that argument.

So. For Task 21, use the indicator terms as a tool, (and add to the list as you get the gist of how they work). Take the following arguments and present *each one* in standard form. That means numbered sentences, premises first, then a line indicating the inference, then the conclusion (numbered) last. Oh, and remember: sometimes arguments don't give you indicator words at all; you have to infer what claim is taking which role in an argument. Use your gut. Think carefully about *the role* of each statement in the argument. Is this evidence? Is this the thing being defended? If the former, you've got a premise. If the latter, you've got the conclusion. And if any arguments have any unstated premises (or conclusions), make sure you make them explicit!

Here are the arguments:

A. None of the people who arrived late got seats, so none of the good seats were occupied by latecomers.

B. North Korea is a great threat to its neighbors. It has a million-person army ready to be unleashed at a moment's notice, and it also has nuclear weapons.

C. These shrubs have shiny green leaves, and so does privet, so I bet these shrubs keep their leaves in winter, too.

D. When Sarah bought the mower from Mike, she promised to pay another $50 on the first of the month. Today's the first, so she should pay Mike the money.

E. All men are mortal and Socrates is a man, so Socrates is mortal.

F. We should ban all GMO crops because GMO crops aren't natural.

G. If you drive too fast, you're more likely to get a ticket, and the more likely you are to get a ticket, the more likely you are to have your insurance premiums raised. So, if you drive too fast, you are more likely to have your insurance premiums raised.

H. Your chances at winning the lottery are slim to none, and slim just left town.

I. Historically, the market goes up when the employment situation worsens and goes down when it gets better. Right now, there's bad news on employment, and the latest statistics show unemployment is getting worse. This could be a good time to buy stocks.

J. If it snows, then it's cold, and if it's cold I stay at home. So I'm at home.

K. All musicians are instructors, since lot of musicians are teachers, and all college instructors are teachers.

L. The survey says that four out of five dentists recommend Brand X toothpaste. Bill is a dentist, so he probably recommends Brand X.

Sub-conclusions

Sometimes arguments pile on top of each other. That is, sometimes you'll be organizing an argument, and you'll find out that the conclusion is doing double duty: acting as a conclusion here, and then being used as a premise there. This gives us a couple concepts that we need to understand:

*X is a **sub-conclusion** iff x is a conclusion of one argument that is itself part of a larger argument (i.e., x is working as both a conclusion in one argument and a premise in another argument).*

*X is a **nested argument** iff x is a set of at least two arguments in which the conclusion of one argument works as a premise in another argument.*

Nested arguments are quite common. We often wish to make a case for some claim, and then when that claim is accepted, we use it to make a case for another claim. When we do this, we're making a nested argument, and that first claim is called a *sub-conclusion* for the larger argument. Here's an example of a nested argument:

1. All cats are mammals.
2. No mammals are birds.
3. So no birds are cats. (sub-conclusion)
4. All birds are things that can fly.
5. So no things that can fly are cats.

We won't be doing much with nested arguments just yet, but make sure you understand them, because they'll be coming up again soon.

Let's look at the next step in argument analysis:

Second, determine what kind of inference the argument is supposed to have.

Let's return to the Argument from Evil (AE). In **AE**, we can see that the premises are offered as a *guarantee* for the conclusion. If they are all true, then the conclusion *must* be true. So this tells us that the inference is **necessity**.

In contrast, if the argument has any prediction in it (causal, statistical, or even an inference to the best explanation), no matter *how* likely the conclusion, the premises offer no guarantee, but *probabilification*. That is, they make the truth of the conclusion *probable* (though not certain—no matter *how highly probable*). Thus, even an argument that concludes that "the sun will rise in the east tomorrow" is still not giving us a *necessary* inference since its conclusion is a prediction.

If our inference is *necessity* (the conclusion's certain to be true, if the premises are true), then the argument is called **deductive**. If it is *probability* (the conclusion's likely to be true, if the premises are true), then the argument is called **inductive**. We can restate our definitions to capture the essence of their respective inferences:

> *X is a **deductive** argument iff x is an argument whose structure and content implies that if all the premises are true, then the conclusion cannot possibly be false (or is guaranteed to be true).*

> *X is an **inductive** argument iff x is an argument whose structure and content implies that if all the premises are true, then the conclusion is probably true (or is unlikely to be false).*

For Task 22, go back to the arguments you put into standard form for Task 21. (Please number this separately, as 'Task 22': don't just add more info to Task 21.) For Task 22, *label* each argument: which arguments are inductive, which deductive? How do you know? Explain what tips you off to the argument kind for each one.

So what next in our analytic process?

Third, determine whether the inference is any good.

To determine whether an inference is any good, we have to see, so to speak, if its money is where its mouth is. If the argument is inductive, then do the premises make the conclusion probable? If deductive, do the premises make the conclusion necessary?

Let's look again to **AE**.

AE

1. X is God iff x is (at least) an omniscient, omnipotent, and perfectly good Being.
2. If God is omniscient, then God knows about all evil in the world.
3. If God is omnipotent, then God is able to eradicate all evil from the world.
4. If God is perfectly good, then God wants to eradicate all evil from the world.
5. But there is evil in the world.
6. So God is either not omniscient, not omnipotent, or not perfectly good.
7. So God must not exist.

This is a deductive argument. It's claiming that if 1-6 are true, then 7 is guaranteed. As a deductive argument, it's easy easy to test. All we have to do is see if we can come up with what's called a

counterexample, or a case wherein all the premises *are* true and the conclusion is false. If we can, then the guarantee the inference is offering is faked (at least, there's no follow through), and the argument is a bad one.

Turns out, though, on the *assumption* that all the premises are true in this argument, the conclusion *is* guaranteed. So **AE**'s inference is a good one. That means it's a *valid* argument.

Note that we don't (yet) care whether the premises are *in fact* true. We just want to test the inference—the relationship between the premises and conclusion. So we *assume* the premises are true and see what happens. If the inference is *bad*—and many arguments do have bad inferences—then our work here is through. We can throw the argument away without ever

> I FIND I AM MUCH PROUDER OF THE VICTORY I OBTAIN OVER MYSELF, WHEN, IN THE VERY ARDOR OF DISPUTE, I MAKE MYSELF SUBMIT TO MY ADVERSARY'S FORCE OF REASON, THAN I AM PLEASED WITH THE VICTORY I OBTAIN OVER HIM THROUGH HIS WEAKNESS.
>
> (MICHEL DE MONTAIGNE)

worrying about the truth of the premises, because it won't matter, anyway.[*] But if the argument is a

---

[*] Of course, if we want to test whether the conclusion is true or not, we will probably

want either to repair this bad argument so that it *does* make a reasonable case for the

conclusion or find a totally different and good argument with that conclusion.

good one, then the truth of the premises matters very much, so we move to the next step.

For Task 23 (numbered separately as a distinct assignment), look at your arguments from Tasks 21 & 22. Are the inferences good? That is, assume every statement is true. Do the premises *guarantee* the conclusions (if deductive)? Do they *probabilify* the conclusions (if inductive)? Write 'good' or 'bad' for each.

Fourth, determine whether the premises are true.

Now comes the hard part. In evaluating premises, the best way is to test each premise in turn. So we begin with premise 1, and move on down the list. Standard form helps us a) make sure we know what we're testing at any given time, and b) make certain we don't miss anything.

Let's *very quickly* analyze **AE**:

Premise 1 is not contestable, since it's the definition of God the theist wants to defend. (Notice how we defined our terms, first!)

2 is not something a contemporary theist will refute, since the meaning of 'omniscience' just is that God knows everything knowable.[*]

A theist won't deny 3 either, since this just means God can do anything possible, and it's certainly possible for the world to have been without evil.

And it seems theists wouldn't want to deny 4, since they believe God wants the world to be a good place.

5 is clearly true.

And 6 just says that if 2 and 5, God can't be omniscient, if 3 and 5, God can't be omnipotent, if 4 and 5, God can't be perfectly good. 6 just follows from the others.

So if God is *defined* as these three, taking away any one will give us something that is *not* God, since *less* than God (by Leibniz's Law).

It looks as if this argument is *very* compelling indeed. But most theists will, it turns out, deny premise 4. And there are very long and fascinating discussions as to how such might be plausible and consistent with theism. I will leave them for you to explore (although we'll return **AE**, and the different kinds of theistic responses to it, in chapter 10).

Our aim here is to see whether we should either reject our belief in the conclusion or change our belief to accept the conclusion.

If the evidence is irrefutable, then an intellectually honest person will humbly realign her belief set accordingly. If it's compelling, even though there remain important doubts, she will leave that door open for honest investigation. If the argument is compelling but it requires evidence as yet impossible to obtain or know, she will acknowledge her prejudices as such, with hope to later verify them as true when we have the required knowledge. But if the conclusion has been demonstrated either incoherent or false, then she will reject it.

And if she finds that argument faulty, she won't simply race away without first seeing whether there's maybe a way to make that argument *better*—even if that

argument's conclusion is something with which she vehemently disagrees. But fixing that argument into a stronger (or valid) argument is just to make a whole new argument that needs to be assessed on its own terms. (But you can see how doing this is a way we follow the rules of discourse by arguing against an ideal opponent!)

Most of the time, though, we'll find *not* that a conclusion is false, but that the argument defending that conclusion fails to guarantee or probabilify its truth. That is to say, most of the time, we find out we have *bad arguments*, not *false conclusions*. It's quite possible that there's a different argument out there that is much better at defending the conclusion. However, if this is the very best argument you can find for a certain conclusion, and if you find that even this argument fails, then you have a very good reason to reject the conclusion, too.

Fifth, determine whether the argument is compelling.

There are two different ways this is done. In the first case, suppose the argument is a good one and the premises are true. Then we ask ourselves whether this argument has any importance, if it is about anything significant.

Look to **AE**, again. Suppose you're a theist, and you really want the refutation of 4 to work, but you really suspect it doesn't. This means you have reason to worry about your theism, which means this argument is *very* convincing—that is to say, it hits you deeply in your convictions, and if not responded to adequately, could shake your foundations, could force you to

---

[*] Classical theists like Augustine will refute 2, because they define 'evil' as something unknowable. But we're dealing with contemporary thought, so we can't go here.
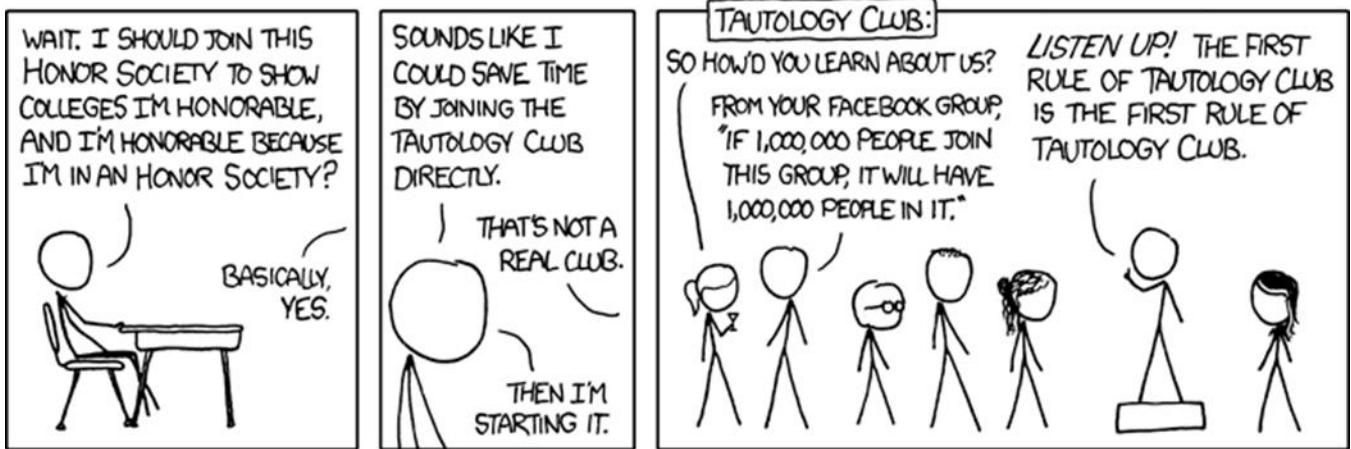
change your beliefs. An *unconvincing* argument would be an argument that is about something trivial or irrelevant, something that doesn't pull at you either to stand firm in your beliefs or to reconsider your beliefs.

In the second case, an argument might turn out to be a good one *formally* (or structurally), which means the inference is good and the premises true, but the argument makes some error in *content*, such that the argument is just plain silly. Here's a (formalized) example of an unconvincing argument:

1. A
2. A

Now it is certainly the case that if A is true, then A is true. But who cares? And does this argument give any good reason for accepting A as true? No. So the argument, though a good one *structurally*, is trivial and unhelpful.*

Another way arguments can be unconvincing is hard to measure. Philosophers talk a lot about *intuitions*—those pre-cognitive senses of things. The gut feelings about reality. A lot of doing philosophy has to do with bringing

those intuitions to the surface to analyze and either verify or discard. Many times arguments that meet the validity and soundness tests still fail to hit the intuition.

For example, I was recently discussing the SCOTUS Obergefell decision with a number of my philosopeeps — my philosopher-friends. We were looking at the claim that defining marriage as a union between consenting adults grants legitimacy also to sibling marriage. They seemed to be considered similarly taboo because both they and same-sex marriage were felt by many to be *disgusting*.

We all found the arguments that any marital union can be deemed immoral because of feelings of ickiness to be unconvincing,† because emotion is not a good grounding for truth or morality (Rule

Three). That is, valid and sound arguments failed to convince us. They seemed wrong — beside the point. However, we also each doubted that this outright granted moral legitimacy to sibling marriage. We were missing something.

Finally, a friend brought up worries about power imbalances, and wondered whether that might be the important disanalogy between same sex marriages and sibling marriage. In this case, we found valid arguments unconvincing, found the contrary arguments *also* unconvincing, and had to dig deeper to find what was missing from our analysis—a whole new layer of reasoning.

It wasn't the truth of the premises but whether these premises were even the *right ones* — whether the whole string of reasoning was on track — that bothered us. Thus, even

---

* By the way, an argument like this, that says if x is true then x is true, is called a *tautology*, or an obvious truth (technically, an argument that is logically irrefutable).

† Although disgust is a common tool used to make value judgments (moral, legal, aesthetic). There is a whole philosophical debate waging about the legitimacy of

such a measurement, and how far it can reasonably extend.

though the arguments were good,
they were ultimately unconvincing.

DEDUCTIVE ARGUMENTS

There are some terms we need to know about the relevant features of deductive arguments. Taken in the order of analysis, we can say the following.

- **If the inference is a good one** (the truth of the premises guarantees the truth of the conclusion) then we call the argument *valid*.

- **If the inference is not a good one** (the truth of the premises is supposed to, but in fact does not guarantee the truth of the conclusion), then we call the argument *invalid*.

It is important here to not make the mistake of calling a statement valid or invalid. Statements are *true or false*, **only deductive arguments can be called valid or invalid**, depending on their inference. Don't fall into the mistake of saying "you have a valid point," or "that's a valid thought." They're not. *Only* deductive arguments can be valid, and then only if they have good inferences.
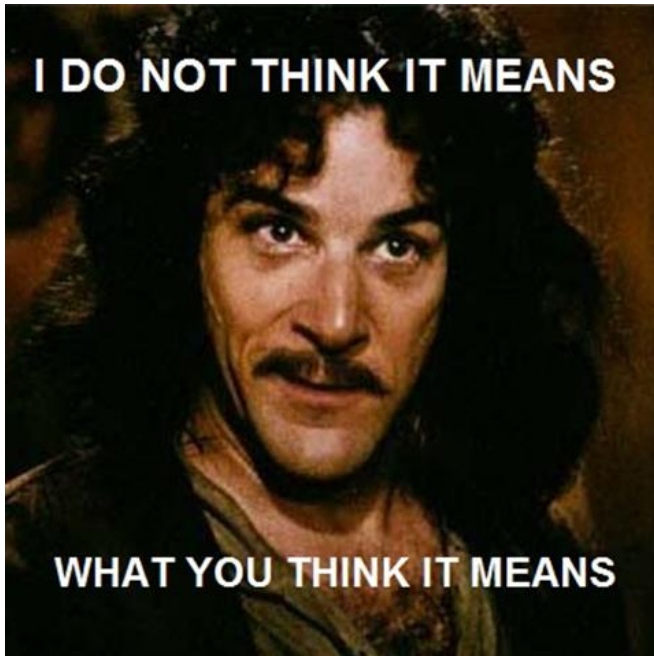
Stated formally,

X is a **valid** argument iff x is a deductive argument wherein if all the premises are true, then the conclusion cannot possibly be false.

That is, a valid deductive argument is the one that pays off on the promise. It promises that *if all the premises are true, then the conclusion is guaranteed to be true*. A valid argument keeps that promise. In contrast,

INDUCTIVE ARGUMENTS

If an argument is inductive, then the inference is one of probability. We determine whether it is a good argument by evaluating how probable the truth of the conclusion is. Since there is no guarantee here, we cannot ever call a good inductive argument valid. Instead, we talk about how strong it is. Inductive arguments can be better or worse, depending on how probable the conclusion is, given the premises. Deductive arguments are *all or nothing*. Inductive arguments are *more or less*. So we use different terminology when talking about inductive arguments.

X is a **strong argument** iff x is an inductive argument wherein if all the premises are true, then the conclusion is very probable.

A good inductive argument makes it more likely, given the evidence in the premises, that the conclusion is true than not.

Stated differently, consider two states of affairs, C1 and C2. C1 and C2 cannot both obtain: if C1 happens, it makes it impossible for C2 to happen, and vice versa.

For example, suppose C1 is the state of affairs described by the claim "it's going to rain" and C2 is the state of affairs described by the claim "it's not going to rain." A strong argument for C1 will offer evidence that it's more likely that C1 will happen than that C2 will happen. Using our example, a strong argument that concludes "it's going to rain" will offer evidence that makes it more likely that it *is* going to rain than things will happen such that it *isn't* going to rain.

X is a **weak** argument iff x is an inductive argument wherein if all the premises are true, the conclusion remains improbable.

A weak argument is one where either

a) it's more likely that the contrary of the conclusion is true (in our example, above, it's more likely that it's *not* going to rain) than the conclusion itself is, or

continued…

*X is an **invalid** argument iff x is a deductive argument wherein if all the premises are true, the conclusion can possibly be false.*

In short, the invalid argument promises a guarantee, but doesn't pay off. It's implying that that *if all the premises are true, then the conclusion is guaranteed to be true*, but it turns out there's fine print somewhere, and that guarantee is void.

It is *very* important you avoid the error of thinking an argument is valid if the premises and the conclusion are all true. It might very well be the case that everything is true, but the premises are irrelevant or do not guarantee the conclusion. If you can ever think of a situation where all the premises of a deductive argument are true and the conclusion *might* be false, then you have an invalid argument. The important part here is the inference, the guarantee. If you can find a 'loophole', then the argument is invalid, since the guarantee is not absolute.

Here's a (trivial) example of a deductive argument where everything is true, but the argument is invalid:

1. BJ is a coffee fiend, who makes her own espresso drinks every morning.
2. BJ roasts and grinds her own coffee beans.
3. BJ roasted and ground the coffee she used in her espresso drink this morning.

Test it: *is it possible for 1 and 2 to be true, yet 3 to be false?* Well, sure. I might roast my own coffee, but sometimes buy roasted beans, too. Or maybe I used beans somebody gave me for Christmas. Or maybe somebody ground my roasted beans for me. So even though 1 and 2 are true, and even though 3 happens to be true, 3 isn't guaranteed by 1 and 2, and it's the guarantee that makes a deductive argument valid. So even though everything here is true, the argument is invalid.

Remember that argument from the last chapter that showed us the problem of belief bias? It's also a deductive argument in which *every* claim is true, but the argument is invalid:

1. All cats are mammals.
2. Some mammals have long hair.
3. So some cats have long hair.

Don't fall prey to belief bias or too-quick thinking. Validity has nothing to do with whether **in fact** all the claims are true, but everything to do with whether the truth of the premises **forces** the conclusion to be true. If they don't, if there's even the *slightest* chance that the conclusion might be false on the evidence of the premises alone (no assumptions), then the argument is invalid.

Inductive Arguments

continued.

b) the likelihood of the conclusion is not measurably higher than the likelihood of its contrary.

Notice this is somewhat fuzzy. There are varying degrees of strength. Here's a strong argument:

1. The sun has risen in the east as far back as humans have recorded it.
2. The sun will probably rise in the east tomorrow.

It is certainly *possible* that the sun doesn't rise in the east tomorrow. Consider a case where some comet hits the planet, either banging it such that the axis angle and rotation reverses, or such that the planet is obliterated. In either case, the sun won't 'rise' in the east tomorrow. So though the conclusion could be false (unlike in a good deductive argument), it is *highly unlikely* that it would be false. The probability of the conclusion being false is less than the probability of it being true. So this is very probably true, and we call this argument a strong one.

Here's another argument.

1. Whenever BJ goes to the store, she tries to buy fresh fruit to eat for breakfast.
2. BJ will go to the store today.
3. So BJ will buy fresh fruit today.

If the premises are true, then the conclusion is certainly probable. But notice that the probability isn't as strong as that of the sun rising in the east tomorrow. My not having enough money to get fresh fruit today, or the store's selection of fruit being poor or unappealing are not as unlikely as a cosmic earth-moving event.

However, in both cases, the conclusion's being true is more probable than the happening of some event that would make the conclusion false.

continued…

That means that, strictly speaking, any deductive argument with an unstated premise is—as is—invalid. This is why it is so important to make explicit any assumptions you might need for your argument to work. However, remember that sometimes even the unstated premises (the assumptions that seem most likely to lead one from the stated premises to the stated conclusion) fail to make the argument valid.

PENGUINS ARE BLACK AND WHITE.
SOME OLD TV SHOWS ARE BLACK AND WHITE.
THEREFORE, SOME PENGUINS ARE OLD TV SHOWS.

Logic: another thing that penguins aren't very good at.

Task 24 requires you to look at the following arguments. First, put them into standard form. Then, determine whether they seem valid or invalid. Explain your thinking behind your determination. If it is invalid because something is unstated, make that assumption explicit, and then re-assess the argument. That is to say, some arguments might be missing premises or conclusions. So add them. And remember that some of these might be *nested* arguments with sub-conclusions.

A. You'll have to budget for less entertainment next month if you go to the movies tonight. You have only $100 to spend on entertainment and gasoline each month. It costs you $80 a month for gas. If you go to the movies tonight, you will use up two gallons of gasoline you wouldn't normally use, and you'll blow at least $25 for the show. And if you use up two gallons of gasoline you wouldn't normally use and blow $25 for the show, you will go over your monthly budget.

B. Witches are made of wood because witches burn and wood burns.

C. Anything that weighs the same as a duck floats, and anything that floats is made of wood. Anything

Inductive Arguments

continued.

If an inductive argument has an improbable conclusion, or a conclusion that is just barely more probable than its denial, then we call that argument *weak*.

Certainly, not all inductive arguments deal with strict numerical probability. Sometimes the reasoning isn't weighted at all (we can't say the conclusion C is 20% or 99.9% probable, just that C seems for all the world to be likely). Such arguments we call **ceteris paribus** arguments. *Ceteris paribus* just means 'all things considered'.

> *X is a **ceteris paribus argument** iff x is an inductive argument whose probability cannot be numerically determined.*

So I might have an argument that I can't put a probability on, but, all things considered, it's more likely than not that my conclusion is true. Such arguments are even fuzzier than those that can have weighted probability, but that doesn't make them any less arguments. And as inductive arguments, we still refer to them as strong or weak, depending upon the inference.

Probability Conditions

One final note on inductive reasoning: different kinds of arguments have different kinds of probability conditions.

Here's one way to think of probability conditions. Let's discuss a placeholder conclusion C. Now when we consider whether an argument is strong, what we're saying is that C is more probable than not-C (that is, "C happens" or "C is true" is more probably true than "C doesn't happen" or "C is false"). More carefully, let's suppose that we have a set of conditions (S) that would make not-C true. When we say that an argument that concludes C is strong, we're saying that the probability of C is stronger than the probability of S.

continued…

made of wood is to be burned, so if a witch weighs as much as a duck, she should be burned.

D. A clever man would put the poison into his own goblet because he would know that only a great fool would reach for what he was given. I am not a great fool, so I can clearly not choose the wine in front of you. But you must have known I am not a great fool—you would have counted on it, so I can clearly not choose the wine in front of me.

E. Iocane (the poison in the wine) comes from Australia, and Australia is entirely peopled with criminals. And criminals are used to having people not trust them, as you are not trusted by me. So I can clearly not chose the wine in front of you.

F. If there is thinking, there must something that exists that does the thinking. I am a thinking. So I must exist.

A valid argument is just a deductive argument with a good inference. And notice that the inference says nothing about the fact of the matter regarding the truth of the premises. It just says that **IF** the premises are true, **THEN** the conclusion must also be true. However, once we've analyzed a deductive argument and found it valid, we look to see whether the premises are in fact true.

*X is a **sound argument** iff x is a valid argument with all true premises.*

*X is an **unsound argument** iff x is a valid argument with at least one false premise.*

Much (if not most) of what we do in philosophy is 'test for soundness', or try to see whether deductively valid arguments have true premises. And we often find that very good arguments (good insofar as being valid) turn out to be unsound.

If your argument is sound, then we check to see whether it's compelling. Generally, we find this out when we see

Inductive Arguments

continued.

Here's an example:

C: the sun will rise in the east tomorrow.

Now suppose we have an argument for *this* C. What would make not-C (that is, what would make "the sun will rise in the east tomorrow" false)? We can think of a set of conditions S, which includes (but is not limited to)

(a) the planet Earth explodes,

(b) the rotation of the earth suddenly reverses so that the sun will 'rise' in the west tomorrow, and

(c) the sun extinguishes in a rapid black hole-like phenomenon.

Now what is the likelihood of any member of this set S obtaining (that is, how probable is it that (a), (b), *or* (c) would happen)? Well, it's really unlikely that *anything* in S will obtain. Sure, they can. They even might. But the probability of C being true is much higher than the probability of anything that could happen to make not-C true. The probability of the sun rising is higher than the earth exploding, its rotation suddenly reversing, or the sun extinguishing. So we say that this argument is very strong.

Notice, however, that the probability of the argument given above that I will buy fruit has a *different* set of falsifying conditions. And what we have to use to determine whether *this* argument is strong or weak are only the probability of its conclusion and the set of conditions that might falsify *this* conclusion.

*An argument is considered **probable** if the set of conditions that would make the conclusion true are more likely to obtain* than a set of conditions that would make the conclusion false.*

continued…

its validity. If it's like **AE**, then the very content of the argument makes it so.

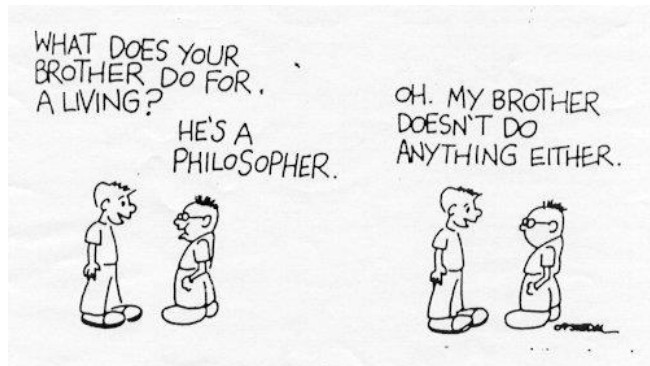*X is a **convincing** argument iff x is a sound argument that is compelling.*

*X is an **unconvincing** argument iff x is a sound argument that is tautological, unimportant, or so obscure as to be irrelevant.*

Unconvincing arguments are not therefore bad arguments. They just don't have that last little kick it takes for you to buy them. They're valid. Their premises are all true. But they just don't seem important. They don't make you reconsider your beliefs, or they don't give you that evidence that supports your beliefs all the better than they were before. What makes for a *good* (or bad) deductive argument is whether it's *valid* or *invalid*. Anything after that is determining whether we should do something about it or not.

Final Introductory Thoughts

Remember that we said there are *four* kinds of conclusions.* Notice now that *only deductive arguments can grant **certainty***. And any argument that denies the PNC (Principle of Non-Contradiction) or falls into amphiboly or equivocates or other such fallacies gives us **incoherence**.

The remainder of questioning—the experimental sciences and much of medicine—gives us **probability**. And a lot of physics and the other theoretical sciences (including attempts to find cures and new technologies) must admit of **impossibility**, which recall, only means that we cannot do or know the answer now, though in principle it can be answered, and someday we hope to have it.

WHAT DOES YOUR BROTHER DO FOR A LIVING?
HE'S A PHILOSOPHER.
OH. MY BROTHER DOESN'T DO ANYTHING EITHER.

* In chapter 1.

Inductive Arguments

continued.

And we've reached Task 25. For this one, you need to

- put the following arguments into standard form,
- state if each seems strong or weak, and
- explain why your determinations are what they are.

(Remember not to confuse the probability conditions of one kind of argument with the probability conditions of another.) There are six arguments, with increasing complexity. *Don't procrastinate doing these—you need some time to complete Argument D.*

A. Bill has pneumonia, with a high fever, dizziness, fatigue, and muscle aches. Will also has a high fever, dizziness, fatigue, and muscle aches. Will probably has pneumonia, too.

B. After I made brownies, I took a shower, and when I came back to the kitchen, they were missing. But there was a trail of brownie crumbs on the kitchen floor, chocolate smudges on the counter, and the kitchen chair was pushed up next to the counter where I had put the tray of brownies. There was also chocolatey handprints on the back door, and my five-year-old kid was outside, sitting on the swing, covered in chocolatey smears. It's pretty obvious that my kid ate the brownies when I was upstairs in the shower.

C. Twenty percent of the voters turned out for the last election, and they voted for candidate X. Candidate X is up for re-election this time, and if the same percentage of voters show, he'll easily win again.

continued…

* In logic, only statements are true or false. Events *obtain* or do not obtain. To 'obtain' simply means that they happen, such that statements *about* them are true.

Inductive Arguments

continued.

D. If you give a mouse a cookie, he's going to ask for a glass of milk. When you give him the milk, he'll probably ask you for a straw. ... Then he'll want to look in a mirror to make sure he doesn't have a milk mustache. When he looks into the mirror, he might notice his hair needs a trim, so he'll probably ask for a pair of nail scissors. When he's finished giving himself a trim, he'll want a broom to sweep up. He'll start sweeping, and he might get so carried away he'll sweep every room in the house. ... When he's done, he'll probably want to take a nap. You'll have to fix up a little box for him with a blanket and pillow. [After he gets comfortable], he'll probably ask you to read him a story, [and] he'll ask to see the pictures. When he sees the pictures, he'll get so excited he'll want to draw one of his own, and will ask for paper and crayons. He'll draw a picture, and when he's finished, he'll want to sign his name with a pen. Then he'll want to hang his picture on your fridge, which means he'll need Scotch tape. He'll hang his drawing and stand back to look at it. Looking at the fridge will remind him that he's thirsty. So, he'll ask for a glass of milk; and chances are, if he asks for a glass of milk, he's going to want a cookie to go with it.

E. Ryan took my Critical Reasoning course last quarter, and he got a really good grade. Before he took my course, he had aced a number of mathematics classes, and he has a love of mind-bending logic puzzles. Hannah is taking my Critical Reasoning course this quarter, and she has also already aced a number of math classes. She also loves logic puzzles, so I bet she'll also get a really good grade in my course.

F. The survey looked at middle aged men in North America. Of 20,000 participants, half were white or Latino, and the other half were either Asian, African-American, or Native American. Sixty percent of all the men were found to respond favorably to the conditions we tested, though we didn't really keep from them who was in the control group and who was in the test group. Still, we can conclude that sixty percent of the whole male population in North America will probably respond favorably to the conditions, too.

Inductive arguments are analyzed in a *slightly* different way than deductive arguments are. You might notice that in the process of determining argument strength, you are simultaneously determining whether the premises describing probability conditions are true.

In deductive arguments, we look at the inference, and only later look for actual truth. But in inductive arguments, the truth of the premises are a part of the strength of the inference. So we collapse these two steps together.

Like with deductive arguments, though, our final step is to determine whether the argument is compelling. Thus, we get our last relevant term:

> *X is a* **cogent** *argument iff x is a strong argument that is convincing.*

A USEFUL CHART

On the next page, I have drawn a flow chart that demonstrates for you the order of analysis, as we've discussed it in this chapter. Notice how each step is illustrated. After putting the argument into standard form, you ask the following questions:

1. What kind of inference is there?
2. Is the inference any good?
3. Are the premises true (if deductive)
4. Is the argument compelling?

These questions not only get us through the order of analysis, they also show us the *meaning* of the terms we use in the process of argument analysis.

Drill yourself. Is it possible for an inductive argument to be valid? Are deductive arguments ever weak? What is a compelling argument called, if it's sound? What are the two different kinds of good arguments called? Which is which? What is the difference between an invalid argument and an unsound argument?