

# Chapter 1: The Basics of Logic

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Welcome to the study of logic! In this first chapter, we'll start learning about some basic concepts—arguments, premises, and conclusions—that will take us through the rest of the class. These notes are (always) a work in progress, so please don't hesitate to reach out if you notice something that needs fixing!

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## 2 LOGIC: THE STUDY OF ARGUMENTS

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In this lesson, you'll learn to:

1. Define key terms, including logic, argument, premise, conclusion, and statement.
2. Identify sentences that are/are not statements and produce examples of each sort of sentence.
3. Locate the premises and conclusion of simple arguments using indicator words.
4. Put arguments into standard form.

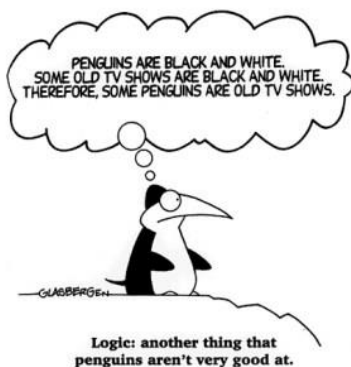
### 2.1 WHAT IS LOGIC?

To get started, we'll need to begin with a few definitions:

- **Logic** is the study of arguments, or forms of reasoning. Logicians try to determine what separates suitable forms of reasoning from flawed ways of reasoning. Studying logic is, in essence, the study of how to reason (i.e., of how to be a **critical thinker**).
- An **argument** is a group of statements, one or more of which (the **premises**) are claimed to provide reasons to believe another (the **conclusion**). Not every collection of statements is an argument, obviously. For example, you are not making an argument when you say, "I disagree with X" or "I believe Y." Making an argument requires that you provide *reasons* (even if these reasons ultimately turn out to be unconvincing).
- Not all arguments are between two people! You are engaging in "argumentation" whenever you weigh the reasons for or against believing in a specific conclusion.
- A **statement** (or **proposition**) is any sentence with a truth value (either "true" or "false"), even if we don't know this truth value. As we will see later, sentences such as questions and commands are NOT statements. However, the premises and the conclusion of any argument must be statements.

[Question: How do these definitions compare with what we usually mean by terms like "logic" or "argument"?]

### 2.2 WHY AM I STUDYING LOGIC?



While most people have heard the words "argument" and "logical" at various points in their life, it isn't always immediately apparent to everyone why they'd want to take a course on this or what it would mean to be "successful" in this sort of course. After all, many of us don't think of ourselves as "big arguers," and perhaps we're even a bit proud of the way we can use our "intuition" or "emotions" as opposed to "cold, hard logic." To a large extent, this seems to be based on a misunderstanding of what logic is actually all about. So, while logic can help you understand disagreements between competing people or groups, it can ALSO help you analyze the (much more numerous) arguments you have with yourself on a day-to-day basis. After, you are making an argument whenever you

decide what you should do or think based on your available evidence. For most of us, this happens every hour of every day. Getting even a *little* bit better at doing this can pay big dividends.

This is a survey course in logic, which means we will be introducing a variety of *different* approaches. With this in mind, here are the main areas of logic that we'll cover:

1. One main area of logic is called **informal logic**. This involves studying the structure of arguments expressed in "ordinary" language. These arguments might concern politics, sports, business, health, finance, etc. We'll be especially interested in learning to recognize *when* arguments are being made, *how* to go about clarifying arguments structure, and what (two) *types* of inferential claims people can make when they argue. All this makes a BIG difference in evaluating the "success" of different arguments. Once we've done this, we can start talking about common **fallacies**, which are ways of arguing/reasoning *badly*. The main goal of learning these fallacies is to (a) avoid being taken in by the bad arguments of others and (b), more importantly, learn to recognize when WE are engaging in this sort of reasoning (and hopefully, start to avoid it).
2. Another type of logic is **formal (deductive) logic**. This is the sort of logic that makes up most upper-level mathematics/computer science/philosophy classes in logic. This sort of logic was (and is) central to designing and understanding things like computer programming languages (and spreadsheets, databases, etc.), mathematical "proofs," and puzzles and paradoxes of various sorts. Even for people who are confident they'll never have to work with any of these things, though, formal deductive logic can help provide a model for what it means to reason *systematically*. Deductive logic requires that we say what we mean with precision and proceed systematically to prove that our conclusion follows from our premises, ensuring there is no possibility for error. We'll be looking at two different versions of formal deductive logic. First is **categorical logic** (as the name suggests, this concerns arguments about categories). Second, we'll look at **propositional/predicate logic** (which examines the relationships between propositions and the "predicates" they include).
3. A final type of logic is **inductive logic**. Where deductive reasoning tries to establish conclusions with 100% certainty, inductive logic deals with arguments where we are simply aiming to discover which beliefs are PROBABLY correct. More generally, any time we try to make predictions about the future based on the experiences we've had in the past, we are reasoning inductively. For this reason, we must do it as well as we can! After all, it includes many important topics about which reason: making predictions, deciding which people/sources to trust, causes and effects, scientific reasoning, statistical reasoning, moral and legal reasoning, etc.

In any case, don't worry too much if you don't understand all of these ideas/concepts right now—I promise you we'll come back and study them in much more detail! And now, on to our study of informal logic...

**[Question: Can you think of a problem involving informal logic? Formal (deductive) logic? Inductive logic?]**

## 2.3 STATEMENTS AND NON-STATEMENTS

Statements are sentences with "truth values" (i.e., that can be either true or false). Some examples of statements include:

- God exists.
- Julie believes in God.
- If Julie believes in God, then her disagreeable boyfriend Jones does not.
- Julie ought to break up with Jones because he is such a jerk.
- I don't like Julie.
- Mahatma Gandhi was a famous general in the American Civil War.

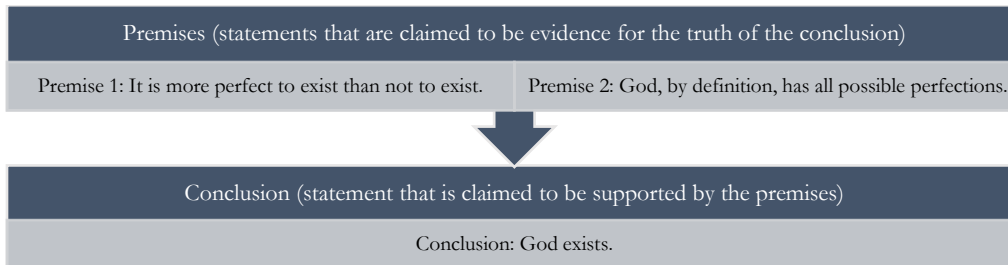
Sentences that cannot be true or false are not statements. Some examples of nonstatements include:

- Hallelujah! (Exclamation)
- Jones, stop being so disagreeable. (Command)
- Do you know anything about the American Civil War? (Question)
- George and Lenny (Not a sentence)

[Question: Give ONE example of a sentence that is a statement and one that is not a statement.]

## 2.4 HOW ARGUMENTS WORK AND WHY THEY MATTER

The following diagram illustrates the basic structure shared by *all* arguments (this is a famous argument called the **ontological argument**—see if you can figure out what is wrong with it...):



**So why do arguments matter?** Every time we engage in *reasoning* from what we know to some new conclusion, we are involved in argumentation (although maybe just with ourselves). Nearly all of us want to be *good* reasoners. For example:

- You are trying to decide whether to buy a new phone. Your premises concern the price of the new phone, the amount of money you have, the status of your old phone, etc. The conclusion is of the form "I should (not) buy the phone."
- You are on a jury for a murder trial. Your premises concern the testimony of witnesses and experiments plus forensic and circumstantial evidence. Your conclusion is of the form "I should (not) vote to convict."
- An evangelist tries to convert you to a new religion. Your premises concern the various things he tells you. Your conclusion is of the form "I should (not) convert to this religion."

[Question: Give an example of an argument you've had with yourself.]

## 2.5 CONCLUSIONS AND PREMISES

**How to find the conclusion.** When determining whether a group of statements constitutes an argument, you should first attempt to locate the conclusion. Every argument has one, though it may be **implicit** (i.e., not stated directly). *If a group of statements does not contain a conclusion, it is not an argument.* No single claim, however controversial, counts as an argument all by itself.

**Conclusion indicators** are words or phrases that sometimes (though not always) signal a conclusion. Some examples of conclusion indicators include:

- therefore C
- consequently C
- hence C
- thus C
- so, C
- implies that C
- we can infer that C
- for this reason, C
- we can conclude that C.

If there are no conclusion indicators, the conclusion is often the first statement (i.e., the topic sentence or thesis sentence).

**How to find the premises.** After you have found the conclusion, locate the premises. Every argument has at least one premise, though some of these may be implicit (or "unstated"). Again, *if there are no premises, there is no argument*. A person cannot make an argument simply by asserting the truth of a given statement (no matter how loudly it is repeated!)—they must also provide *reasons* for thinking that this statement is true.

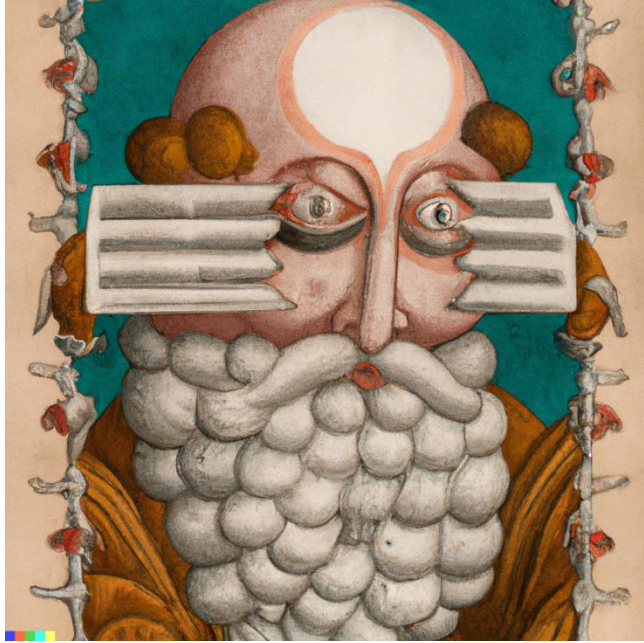


Figure 1 The Mind of God according to Francisco Goya (Brendan Shea x Dall-E).

**Premise indicators** include words and phrases that sometimes (but not always) signal a premise. Some examples include

- since P
- because P
- for P
- inasmuch that P
- given that P
- it follows from P
- seeing that P.

Remember that (1) conditional (if-then) statements are not arguments and (2) that *it* is not a premise indicator. Conditional statements can be premises or conclusions to arguments, however.

**[Question: Think about a topic that interests you and about which you have some opinions (this might be sports, science, a tv show, the**

**way your sibling dresses, or whatever. Now, give an ARGUMENT about this topic with at least two premises and a conclusion. When writing it down, include at least one premise indicator and one conclusion indicator.]**

## 2.6 HOW (AND WHY) TO PUT AN ARGUMENT IN STANDARD FORM

To make the structure of an argument clear, it often helps to put it into **standard form**, where the premises and conclusion can be clearly distinguished. To do this, follow these steps:

1. Identify the conclusion and write it down on its own line. Write down the premises above the conclusion in whatever order is most natural. Include any implicit content (content that the arguer hasn't stated explicitly but is nevertheless part of the argument).
2. Express each premise or conclusion as a simple, declarative sentence. It is often helpful to break complex sentences into multiple simple statements. You might need to replace pronouns (like "it" or "he" or "they") with regular nouns, to make everything perfectly clear.
3. Include all and only that content relevant to the argument. Indicator words should not be included, nor should rhetorical devices (e.g., "Everyone knows that...").
4. It is often helpful to reword for clarity. When doing so, however, be sure to follow the **principle of charity**, which requires that you try and make the argument as convincing as possible. Charity requires that:

5. If the premises or conclusion are ambiguous or unclear, you should generally interpret them in whatever way they are most likely to be true.
  - a. If the structure of the argument is unclear, you should always aim to interpret it as being either deductively valid or inductively strong. (We'll learn more about these ideas later, but the basic idea is that we should aim to interpret the argument in such a way that, if the premises were true, the conclusion would be true as well.).
  - b. A good rule of thumb is as follows. When putting any argument in standard form, you should aim to express it so that the person who initially made it would say something like, "Yes, that's exactly what I think! I couldn't have put it better myself."
  - c. Why do all this? First, doing this makes it much more likely you'll *learn* something about the other person's argument ("Oh, that's why they think the thing they do."). Second, if and when you disagree with the conclusion, it is much more likely that the other person will listen to you (since they'll know that you've made a genuine effort to understand their perspective).

Sample Argument: “**Since** it is January in Minnesota, and **because** most Minnesotans like warm weather, **I can conclude that** most would probably enjoy taking a trip to Costa Rica.”

1. P1: It is January in Minnesota.
2. P2: Most Minnesotans like warm weather.
3. P3 (Implicit): It is cold in Minnesota in January, while it is warm in Costa Rica.
4. C: Most Minnesotans would enjoy a trip to Costa Rica.

### 2.6.1 Activity

Choose a conclusion you are tempted to DISAGREE with from the list below, and then write an argument in FAVOR. (The idea here is to practice charitable interpretation of the arguments of others). Please use at least TWO premises and put your argument in STANDARD FORM. You should make your argument as strong as possible.

- a. Abortion is/is not morally permissible.
- b. COVID vaccines should/should not be required by employers.
- c. Euthanasia should/should not be allowed.
- d. The death penalty should/should not be legal.
- e. The private right to gun ownership should/should not be restricted.
- f. It is/is not immoral to eat animals such as pigs or cows.
- g. Immigration should/should not be restricted.
- h. Children should/should not be required to attend school until age 18.

## 2.7 SOLVED PROBLEMS

### 2.7.1 Sample Problem 1: Identifying Statements

Sentence	Is it a statement? (Or “Does it express a proposition?”)
Emma is 19 years old.	Yes. Simple declarative sentences are statements. This is a claim about the world that might be true (Emma really is 19), or it might be false (she's really 29). Either way, though, it's a statement.
When will Emma turn 20?	No. Questions are not statements since they can't be true or false.
Emma, stop being so rude.	No. Commands (like questions) are not statements since they cannot be true or false.
If you read a book by Jane Austen, you should read <i>Emma</i> .	Yes. If-then statements (conditional statements) are still statements.

<b>I don't like old novels.</b>	Yes. This sometimes confuses people, but claims about how you feel, or what you think/believe/like, ARE statements. They can be true (if you are being honest) or false (you are lying).
<b>Emma went to London last week plans to go again next week; however, if she goes, then she won't go to any parties this time.</b>	Yes. This (complex) sentence is a statement. It also contains subparts that are statements. In general, if A and B are statements, then so are sentences like "A and B", "A or B", and "A but B."
<b>Emma is kind of a gossip.</b>	Yes, this is a statement. It might just be your "opinion" (and you might be wrong about it), but this doesn't change the fact that it is a claim about how the world is.
<b>Emma!</b>	No.
<b>Emma believes that she will someday marry Knightley.</b>	Yes. Claims about what people "believe" or "think" are still statements. After all, you might be wrong about them.
<b>Jane Austen was secretly a robot.</b>	Yes. Even clearly false statements are statements.

## 2.8 SAMPLE PROBLEM: PUTTING ARGUMENTS IN STANDARD FORM.

In real-life arguments, putting arguments in standard form often requires that we rephrase/clarify things, add in **implicit premises** or **conclusions**, and reorder everything to make sense. In many cases, this is one of the more difficult parts of being a "good logician," but it's also crucially important. After all, if you don't know precisely *why* someone believes their conclusion, it's challenging to figure out whether you should agree with them!

Original	Standard Form
<b>All Smurfs are blue. Smurfette is a Smurf. So, Smurfette is blue.</b>	P1: All Smurfs are blue. P2: Smurfette is a Smurf. C: Smurfette is blue.
<b>If squirrels are mammals, they take care of their young. After all, if squirrels are mammals, they give live birth. And if they give live birth, they must take care of their young.</b>	P1: If squirrels are mammals, they give live birth. P2: If squirrels give live birth, they must take care of their young. C: If squirrels are mammals, they take care of their young.
<b>I agree with Candidate A's position on both abortion and education, while I disagree with candidate B's position on these things. Hence, I should probably vote for Candidate A.</b>	P1: I agree with Candidate A... P2: I disagree with Candidate B... P3 [Implicit]: I should vote for the candidate who agrees with me on issues I find important. C: I should vote for Candidate A.
<b>Democracy cannot succeed unless those who express their choice are prepared to choose wisely. The real safeguard of democracy, therefore, is education. (FDR)</b>	P1: Democracy cannot succeed unless voters can make wise choices. P2 [Implicit]: To make wise choices, voters need education. C: Education is necessary for democracy to succeed.
<b>Each victim of suicide gives his act a personal stamp which expresses his temperament, the special conditions in which he is involved, and which, consequently, cannot be explained by the social and general</b>	P1: Each victim of suicide did so for reasons depending on both their temperament (or personality) and the special conditions in which they were involved. P2 [Implicit]: General, sociological accounts of the causes of suicide can't account for these individual differences. C: General, sociological accounts of suicide can't explain why particular individuals killed themselves.



## 2.9 REVIEW QUESTIONS

1. Why are you studying logic? What do you hope to get out of this class?
2. Why does making good arguments matter? How might this change our personal lives? Our society?
3. Putting an argument in standard form often requires some creativity! How would YOU put each of these arguments in standard form?
  - a. Our problems are man-made; therefore, they may be solved by man. (JFK)
  - b. It is strange that men should fear death, seeing that death, a necessary end, will come when it comes. (William Shakespeare)
  - c. It is an acknowledged fact that we find vast amounts of truly horrendous evil in the world. Moreover, one must grant that, if there were a God, we should not find vast amounts of horrendous evil in the world. From this, we can conclude that there is no God. (Peter van Inwagen)
  - d. The happiness of your life depends upon the quality of your thoughts: therefore, guard accordingly, and take care that you entertain no notions unsuitable to virtue and reasonable nature. (Marcus Aurelius)
  - e. If someone avoids and is afraid of everything, standing firm against nothing, he becomes cowardly; if he is scared of nothing at all and goes to face everything, he becomes rash. Similarly, if he gratifies himself with every pleasure and abstains from none, he becomes intemperate [has no self-control]. Finally, if he avoids all pleasure, he becomes a sort of insensible person [without emotion]. Temperance and bravery, then, are ruined by excess and deficiency, but preserved by the mean. (Aristotle)

## 3 RECOGNIZING ARGUMENTS

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In this lesson, you'll learn to:

1. Explain why arguments are characterized by the presence of a claimed **inferential link**.
2. Give examples of common types of non-arguments.
3. Distinguish between **illustrations** and an **argument from example**.
4. Compare and contrast **explanations** and **arguments**.
5. Define **sufficient** and **necessary conditions** and apply these definitions to analyze conditional statements.

### 3.1 A BRIEF REVIEW OF HOW WE GOT HERE, AND WHERE WE ARE GOING

Earlier, we said that **logic** is the study of **arguments**. Arguments, in turn, are collections of **statements** (sentences that are either true or false), one or more of which are claimed to provide reasons to believe one of the others. The statements meant to give the reasons/evidence are called the **premises**, while the statement they support is called the conclusion. Finally, we discussed how to put arguments into **standard form** to help clarify the relationship between premises and conclusions (a necessary first step in figuring out how the argument works and whether it is good or bad). In doing this, the **principle of charity** (basically, when paraphrasing other people's arguments, your goal should be to make them sound as intelligent and well-informed as possible, *especially* if you disagree with them).



One central theme of this lesson is that not everything we hear, read, or think is an argument. Instead, arguments need to involve *premises that support a conclusion* (these premises might provide a good reason, or they might not, but that's for a future lesson). As we mentioned previously, it's important to remember that "arguments" here DO NOT need to be confrontations between different people/groups. Instead, arguments can (and often do) happen within each of us as we try to figure out what to do or believe. In this context, it's imperative to recognize when we are engaged in this sort of argumentation (and, by contrast, when we *don't* have arguments for our beliefs, even though we maybe should have them.)

### 3.2 IS IT AN ARGUMENT? THREE TESTS

In every argument, there must be BOTH a "factual claim" that some statement(s) or other is true AND a **claimed inferential link** that this justifies believing in the conclusion. That is, the person making the argument must claim (either explicitly or implicitly) that the premises provide reasons to believe the conclusion. Here are three "rules of thumb" for determining whether or not a given passage is an argument.

1. If there is an inferential link between the statements, one can safely assume that the passage counts as an argument.
  - a. Ex: "Trees undergo photosynthesis. After all, all trees are plants, and all plants undergo photosynthesis." The first statement *really does follow* from the subsequent two. So, it's safe to assume that this is an argument (i.e., that the person was trying to convince you that the first statement was true.)
2. Conclusion and premise indicators (*so, therefore, for, because*) often indicate the presence of an argument. However, this is not a foolproof test since (a) these indicator words can also indicate causal connections and (b) not every argument will have premise- or conclusion indicators.
  - a. Ex: "It's safe to say that Harry won't be coming to the party because Tom Riddle is here, and Harry dislikes Tom." Here, the word *because* is a premise indicator, and the passage is an argument (with a conclusion of "Harry won't be coming to the party.")
  - b. Ex: "The water started boiling because it was heated" is NOT an argument, even though it has the word "because" (which is often a premise indicator). In this case, "because" denotes a causal connection, not an inferential one.
3. If a passage is recognizable as a common type of non-argument, then it is not an argument. Common types of non-arguments are discussed in the next section.

**Factual and Inferential Claims.** It can sometimes be helpful to think of an argument as consisting of two distinct parts. First, the premises must make some sort of **factual claim** about how the world is. Second, the premises must make an **inferential claim** that the conclusion will be true if the premises are. So, for example:

- Premise: It is Tuesday (factual claim)
- Premise: If it is Tuesday, I eat tacos (inferential claim)
- Conclusion: So, I eat tacos today.

In a more complex argument, the distinction between the factual/inferential claims may always not be this clear-cut. And, of course, in bad arguments, factual or inferential claims or both may be incorrect. Non-arguments, by contrast, lack this distinctive combination of a factual and inferential claim. So, for example, the claim "It is Tuesday" is not an argument by itself, and neither is the claim "If it is Tuesday, then I eat Tacos." Only when these claims are *combined* can we advance a conclusion (and remember, you can't have any argument without a conclusion!).

[Question: You and your friends are at the ice cream stand. Write a two-premise argument that somehow involves ice cream (or other frozen desserts) in standard form. Finally, indicate which premise is the “factual” claim and which is the “inferential” claim.]

### 3.3 WHAT ARE COMMON TYPES OF NONARGUMENTS?

Arguments require that there be a claimed inferential link between premises and conclusion. Because of this, not every group of statements someone writes or says counts as an argument. Here are typical examples of things that are NOT arguments:

**Warnings** and **pieces of advice** are not arguments, though these same sorts of statements can serve as premises or conclusions to arguments (for example, if you gave some *reasons* to try and convince someone to follow them).

- Ex: You should not smoke (warning). I recommend Camel cigarettes (advice).

A simple **statement of belief** isn’t an argument, either, since there is no claimed inferential link with anything else. This doesn’t change if the statement of belief is controversial or false. It only changes once you start trying to provide reasons.

- Ex: Smith believes that women should not be allowed to vote. He also believes that alcohol should be outlawed.

**Reports** provide information about an event and often appear in newspapers. They might describe a long series of related events or interview various people to uncover their beliefs. In some cases, they might even have a report *about* an argument. **Expository passages** (of the type commonly found in many textbooks) elaborate upon a topic sentence but don't provide evidence for it.

- Ex: A newspaper article about the outcome of a recent football game is not an argument. By contrast, an "opinion piece" arguing that the football team's coach should be fired IS an argument.
- Ex: A passage from a textbook giving details about the lives of early settlers of Minnesota is not argumentative.

In other cases, it is more challenging to distinguish arguments from non-arguments:

An **illustration** uses examples to clarify what is meant by another, more general statement. Illustrations are NOT arguments, despite their inclusion of indicator words like *thus*, *so*, or *hence*.

- Ex: Irish-style stouts are dark, somewhat bitter beers. Thus, Guinness is stout; so are beers like Murphy's and Beamish.

An **argument from example** uses examples as premises to support a general conclusion. These ARE arguments.

- Ex: The best beer comes from Ireland. For example, Guinness and Smithwick’s are both Irish beers, and both are clearly better than anything brewed in the U.S.

Do you see the difference between the two passages? In the second, but not the first, there is an implicit claim that the specific example provides *a reason to believe* the more general point. There is the claim of an *inferential link*.

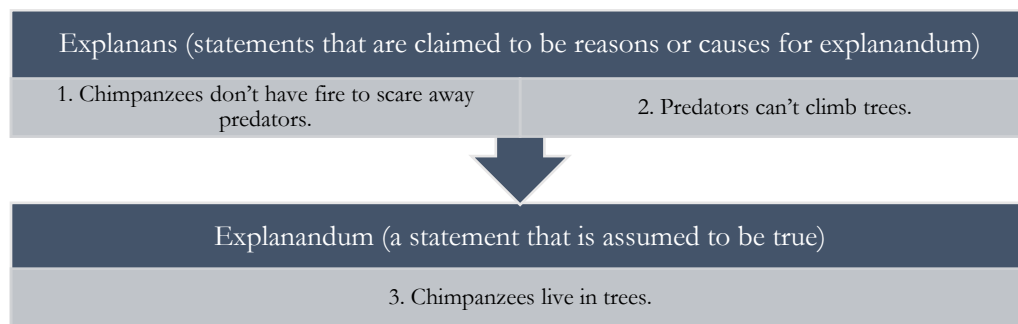
[Question: Suppose you are at the zoo and are discussing wild animals with your friends. Give an example of an “illustration” you might use and an “argument by example.” *Note:* This whole exercise is basically an illustration!].

### 3.4 WHAT IS THE DIFFERENCE BETWEEN AN ARGUMENT AND AN EXPLANATION?

An **explanation** is a group of statements, one of more of which (the **explanans**) are claimed to provide the reason or cause of the other's being true (the **explanandum**). Since the explanans does not offer *reasons to believe* the explanandum, explanations are NOT arguments. However, they share certain structural similarities and may use similar indicator words.

- Ex: Chimpanzees do not have fire to scare away predators. Hence, chimpanzees spend much of their time in trees since this is the only way to avoid being eaten.
- Ex: The moon stays in orbit because of gravitational force.

In an explanation, unlike an argument, it is *assumed* that the explanandum is true. So, if a passage's potential "conclusion" seems so uncontroversial that no one would debate it, consider the possibility that it might be an explanation (and not an argument).



[Question: Write down an explanation of "why you are taking a logic class." Label the explanans and the explanandum.]

### 3.5 WHAT IS A CONDITIONAL STATEMENT? WHY AREN'T THEY ARGUMENTS?

A **conditional statement** has the form *if antecedent A, then consequent C*, or an equivalent form (such as *C if A* or *A only if C*).

- Ex: If  $x > 1$  then  $x > 0$ .
- Ex: The soup will boil if it is left on the stove too long. (If S then B)
- Ex: Mary will bring an umbrella only if it is raining. (If U then R)
- Ex: If Napoleon was short, then he was a famous general.
- Ex: If Abe Lincoln was tall, then he was the King of France.

The antecedent A is a **sufficient condition** for the consequent C. Conversely, the C is a **necessary condition** for A. Conditional statements are NOT arguments. However, they often serve as premises or conclusions. Moreover, whenever an argument of the form *P therefore Q* is deductively valid, the conditional *if P then Q* will be true.

[Question: Write down an argument in standard form with a conditional statement as a premise, conclusion, or both.]

### 3.6 SOLVED PROBLEMS

Identify the following as arguments or non-arguments and explain your answer.

Passage	Is it an argument?
Have you ever read Plato?	No! This isn't even a statement.
I'd recommend reading Plato's <i>Apology</i> . You should stay away from the <i>Laws</i> , though.	No. The first statement appears to be a piece of advice, while the second looks like a warning. The person still hasn't tried to give you any reasons, though.
If Socrates taught Plato, then Plato was influenced by Socrates.	No. This is a conditional statement (and it's almost certainly true, but I haven't given you any reasons to think this). The claim is that Socrates teaching Plato was sufficient for influencing him. Another way of saying the same thing: Socrates' influence on Plato was a necessary consequence of his teaching.
Plato is one of the most influential philosophers of all time. After all, his work inspired everyone from Christian and Islamic theologians to the founders of democracy to the early scientist.	Yes. This is an argument—it's trying to provide <i>reasons</i> for believing a claim about Plato.
I believe that Aristotle is actually a more rigorous thinker than Plato. However, I think Zeno is more innovative than either of them.	Again, we're back to non-arguments here (this looks like a simple statement of belief, not backed up by any premises/evidence).
The unexamined life is not worth living. So, many seemingly successful people are currently leading lives that are not worth living.	Yes, this is an argument (based on a famous claim by Socrates and one which may have led to him being executed).
Plato wrote the <i>Apology</i> partially because he wanted to record Socrates' speech, but also because he wanted to advance his own philosophical views.	While this contains the word "because," it is NOT an argument. Instead, it is a causal explanation ("this happened because that happened."). It might be true, and it might be false, but we don't have any evidence either way right now.
In most areas of life outside of politics, we trust knowledgeable experts more than ignorant laypeople. For example, when I'm sick, I go to the doctor. When I need my car fixed, I go to the mechanic. By analogy, we can conclude that the government should be run by experts, not ignorant lay people (as in a democracy).	Yes, this is a (somewhat complex) argument. The examples are used to clarify a premise (about how we usually trust experts more than laypeople). This premise is then used to argue for a (pretty controversial) conclusion: democracy is an inferior form of government.
Plato believed that every idea and object we had corresponded to something called a Form that existed outside the physical world. For example, he thought there was a Form of "Bed," a Form of "Cat," a Form of "Three" and a Form of "Good."	No, this isn't an argument. Instead, it simply illustrates what Plato means by "Form." We might extend this into an expository passage explaining Plato's ideas.
Plato thought people in power shouldn't have their "own" money, spouses, or even children. He thought this because he saw how these	No. This is a report about an argument Plato made, but it is not itself an argument because no effort is made to convince you that Plato is right/wrong.

things could lead people to become corrupt and behave immorally.	
Plato's arguments against democracy inspired many dictators over the past 2,500 years. Because of this, his books should be banned.	Yes, this is an argument. If you wanted to critique this argument, you'd probably want to spell it out at greater length. So, for example, what implicit premises might you want to include if you expressed it in standard form?

Identify the sufficient and necessary conditions in the following conditional statements:

Conditional Statement	Sufficient	Necessary
If Hopper is a frog, then Hopper is a reptile	Hopper is a frog	Hopper is a reptile
Jane goes to the party only if Jim goes too.	Jane goes to the party	Jim goes to the party
You will get an A if you study hard.	You study hard	You get an A

### 3.7 REVIEW QUESTIONS

Choose a topic that you know something about (and have an interest in!) and write down examples of the following types of non-arguments. I encourage you to be as creative as possible (and it's OK if you need to stretch the truth a bit...) 😊.

1. A statement of belief
2. A warning or piece of advice
3. A report
4. An explanation
5. Argument from example (this one should be an argument)

## 4 READING: PHILOSOPHY TOOLKIT (BY ALAN HAJEK)<sup>1</sup>

[Brendan: This article covers A LOT of ground—much of what we cover in both Logic and Intro to Philosophy classes! So, don't worry about missing some of the "details". However, it should give you a good sense of how a prominent modern logician (the author, Alan Hajek) sees different issues.]

Philosophers pride themselves on thinking clearly by seeing what follows from what, exposing sophisms, spotting fallacies, and generally policing our reasoning. Many have spent years honing their skills, often deploying them on arcane topics. But these skills are not the exclusive property of rarefied sages, accessed only with a secret handshake and insider training, as much as some philosophers wish this were so. Instead, some of these skills can be captured by generalisable, all-purpose techniques for the proper conduct of thought, whatever the topic. Many of these are easily taught and learned. As such, they can be utilised by non-philosophers too. At a time when we are bombarded more than ever with specious claims and spurious inferences, clear thinking provides a much-needed safeguard that we should all strive towards.

Philosophers place a premium on certain tools for regimenting our thinking, especially logic and probability theory. However, there is a far richer toolbox at our disposal. Over the years, I have observed philosophers

<sup>1</sup> Alan Hájek, "With the Use of Heuristics, Anybody Can Think like a Philosopher | Aeon Essays," Aeon, 2017, <https://aeon.co/essays/with-the-use-of-heuristics-anybody-can-think-like-a-philosopher>.

repeatedly using various argumentative moves or strategies, which can be encapsulated in rules of thumb that make their tasks easier. These are what might be called *philosophical heuristics*. This should come as no surprise: pretty much every complex activity has its heuristics, which experts teach and beginners learn – photography, calligraphy, diving, driving, football, foosball, judo, Cluedo, curling, hurling, climbing, rhyming, and so on. Such heuristics are especially well-documented for chess: 'castle early and often, 'check every check', and what have you.

There are also common heuristics for intellectual activities such as mathematics and creative writing. Here's a good one for mathematics: if you are not making headway on a problem, modify it slightly to make it easier, and solve that one. A good heuristic for creative writing is to juxtapose familiar words and phrases in unfamiliar ways. One might use the 'cut-up technique', popularised by William S Burroughs and by David Bowie, in which written text is cut up and rearranged to create a new text.

**[Brendan: Can you give an example of a “heuristic” for an activity that you are good at?]**

Yet philosophy might be thought to be especially unsuitable for such heuristics. The word 'philosopher' comes from the Ancient Greek *philosophos*, meaning 'lover of wisdom. And wisdom, a skeptic might insist, cannot be so easily achieved. Philosophy strives for deep, profound insights, yet heuristics might by their nature be regarded as superficial. I don't pretend that philosophical heuristics provide shortcuts to profundity – any more than chess heuristics provide shortcuts to becoming a grandmaster. That said, grandmasters *do* typically castle early and often, and check every check, consciously or not; a chess textbook that ignored these heuristics would be remiss. Likewise, good philosophers *do* use the heuristics I identify, consciously or not, often in the service of deep insights. Indeed, philosophy textbooks have been remiss in ignoring these heuristics.

If we think of logic and probability theory as all-purpose tools for checking for the consistency and coherence of our claims at a high level of abstraction, then the philosophical heuristics collectively form more of a Swiss army knife. Some of these heuristics have a broad application, like an LED light. Others have a narrower application, but are perfect for the occasions on which they apply, like a corkscrew. There is something of a trade-off between how frequently a particular heuristic might be used, and how specific its advice is. Too general, and the heuristic doesn't provide an applicable strategy – for example: 'Say something insightful!' Too specific, and it can never be used in another context – for example, 'the reply to *Pascal's wager* (that you should believe in God because doing so is the best bet) is that it leaves open which God you should believe in'. The best heuristics find 'sweet spots' in this trade-off.

I work in the Western 'analytic' tradition of philosophy. Much of analytic philosophy involves arguing for positions. So some terminology will be needed here. For our purposes, an *argument* is a number of premises followed by a conclusion, where the premises are intended to lend support to the conclusion.

A *valid* argument is one in which the support is as strong as can be: the truth of the premises *guarantees* the truth of the conclusion. A *sound* argument is one that is valid and whose premises are true (and so its conclusion is true, too). An *unsound* argument is one that is either invalid or that has at least one false premise.

Let's begin with a heuristic that is easy to use, but quite fertile. The word 'the' is the most common word in English. A locution of the form '... the X ...' – what philosophers call a *definite description* – typically comes with an assumption that there is *exactly one* X. We might be able to challenge that assumption, in two ways: perhaps there is *more than one* X; perhaps there are *no* Xs. So the heuristic here is to see the word 'the' in neon lights, as it were – by italicising it, underlining it, or otherwise mentally highlighting it – and to try each challenge.

**[Brendan: Try to give a “definite description” of a famous person WITHOUT mentioning their name. So, “The person who....”]**

Here's an example that is not philosophical, and certainly not profound, but of considerable interest nonetheless. In his Inauguration speech, Donald Trump said: 'January 20th 2017 will be remembered as the day the people became the rulers of this nation again.' There are three occurrences of 'the' here; let's focus on the first (the other two have plural nouns – 'people', 'rulers', but even they have a uniqueness presupposition – a unique set of people, and of rulers). 'The day' presupposes that there is exactly one such day. Some champions of the power of democracy will insist that there are many such days – namely, every day on which the people vote. Some skeptics of the power of democracy will deny that there is ever such a day, and that includes 20 January 2017. Either way, the definite description faces a challenge.

Turning to a more philosophical example, we often speak of 'doing the right thing'. Sometimes, there is exactly one such action. However, there can be different senses of 'right' – for example, what is rational, and what is moral. And even fixing on one of those senses, there might be more than one candidate for the right thing to do: multiple actions that are equally good. Or there might not be any such candidate. Think of moral dilemmas, such as the unspeakable one depicted in William Styron's novel *Sophie's Choice* (1979), or Jean-Paul Sartre's one of a student who is torn between avenging the death of his brother in the Second World War, and looking after his mother.

Relatedly, and more generally, when evaluating some claim, mentally highlight *each* key term, and run through its *contrast class*, the set of relevant alternatives. It is helpful to stress the term and to intone the words '... as opposed to ...', to bring out that class. For example, one hears claims to the effect that 'the human visual system is poor'. Well, let's see: 'the *human* visual system is poor'. Human, as opposed to what? An eagle's visual system? Yes, the human visual system compares unfavourably. But what about a bear's visual system? A bat's? Now the human's doesn't seem so bad. Let's continue: 'the human *visual* system is poor'. Our visual system, as opposed to what? Our olfactory system? Surely not – we are better seers than we are smellers. Our auditory system? Even that doesn't sound right.

**[Brendan: Think of something that you think that you are especially good (or bad) at. What is the "contrast class" that you use when making this judgement? Do you think that this is an appropriate contrast class to use?]**

Philosophers use contrastive stress to reveal the logical form of various concepts. For example, causation seems to be a two-place relation: smoking a pack of cigarettes a day causes lung cancer – so far, so good. But consider: smoking *a* pack of cigarettes a day, as opposed to *three* or *four*, causes lung cancer? That doesn't sound so good. If anything, relative to those alternatives, smoking (only) *one* pack a day seems to help *prevent* lung cancer. So it seems that [causation](#) is at least a three-place relation: C causes E *relative to C'*. Similar [reasoning](#) suggests that it is even four-place: C *rather than C'* causes E *rather than E'*.

The contrastive-stress heuristic also helps one detect false dichotomies, a favourite strategy among philosophers. It is also a good corrective to certain cognitive biases to which we are prone:

- **confirmation bias**, the tendency to look for and to recall evidence that confirms, but not that disconfirms, one's beliefs and hypotheses; and
- **congruence bias**, the tendency to accept a belief or hypothesis without adequately testing alternative hypotheses.

Indeed, one of the most common fallacies is simply a failure to [consider](#) contrary cases. For example, a racial stereotype can all too easily be 'confirmed' in one's mind if one attends exclusively to instances of it, as opposed to counter-instances.

Now let's turn to a heuristic that is useful in various fields. Start with a potentially hard problem: someone makes a claim that is supposed to cover a wide range of cases, and you want to check whether it has any



counterexamples. You might be facing a huge search space. Where should you look first? Here's an easier sub-problem: check *extreme* cases to see whether any counterexamples lurk there – the first case, or the last, or the biggest, or the smallest, or the smelliest, or any similar superlative (always being aware of the definite descriptions!) Does the claim still hold there? This should drastically reduce your search space, as it now just involves the 'corners' or 'edges' of the original space.

**[Brendan: Can you come up with an “edge case” that disproves the generalization “parents know better than teenage children?”]**

For example, some philosophers are fond of making grandiose claims, such as: 'Every event has a cause.' Well, is that true? At first, you might be overwhelmed by its grandiosity – there are lots of events out there! But start by considering an *extreme* event – the first event, the Big Bang. There was no prior event to cause it, it did not cause itself, and it was not retro-caused by some later event, so we have our counterexample. To be sure, this assumes that there was exactly one Big Bang, but as far as I know, this is a respectable assumption. Or consider the extreme event that is *the entire history of the Universe*. There are many instances of causation *within* this entire history, but arguably *it* was not caused by anything. Any putative cause is just part of the entire history.

Well, perhaps it did have a cause – namely, God? Hold that thought; we will return to it soon.

Suppose a politician tells you: 'You should not follow any advice given to you by a politician.' What should you do with this advice? *Follow* it? That's not following the advice, since it was the exact opposite. *Not follow* it? That's exactly what the advice was, so you would thereby be following it. Self-referential paradoxes have kept philosophers employed since the ancient Greeks. Georg Cantor, Bertrand Russell and Kurt Gödel shook the foundations of mathematics by exploiting self-reference in various ways. We might set our sights rather lower, but still employ self-reference fruitfully.

For example, philosophers perennially debate *realism* about various subject matters – ethics, aesthetics, mathematical entities, the meanings of our words, the unobservable entities posited by science, and even ordinary macroscopic objects. A popular definition is that realism about Xs is the thesis that Xs exists independently of observers (for instance, realism about electrons is the thesis that electrons exist independently of observers). But wait – what about realism about *observers*? Observers do not exist independently of observers. How about: 'Xs exist independently of minds'? That won't do either – what about realism about *minds*? Minds do not exist independently of minds. So the self-referential heuristic here is to give a claim a taste of its own medicine.

**[Brendan: Are you a “realist” about ethical claims, such as “murder is wrong”? What about scientific claims about unobservable entities, such as “quarks exist”?**

Somewhat related is the time-honoured philosopher's technique of showing that a view (or an argument) faces an *infinite regress* – its truth (or validity) depends on the truth of some proposition, whose truth in turn depends on the truth of some *other* proposition, whose truth depends on... The sequence of dependencies has no end.

Think again of the claim that every event has a cause. Focus on some event. According to the claim, it has a cause, which had a cause, which had a cause, which..., *ad infinitum*. This is at least puzzling, and perhaps worse. Another classic example is the regress of justification. In order to have justified belief in something, one must have justified belief in something else; but that requires having justified belief in something *else*; and this chain of justifications never terminates. (There are various replies – for example, that the chain *does* terminate in some foundational belief.)

An infinite regress is not necessarily absurd – some regresses are said to be ‘virtuous’ rather than ‘vicious’. But some positions lead to the ultimate absurdity: contradiction. These positions must be contradictory themselves, and therefore false. Here’s another good heuristic in mathematics: if you are not sure how to prove some claim, perhaps because it seems so obvious, try *reductio ad absurdum* reasoning. That is, suppose that the claim is false, and show that this leads to a contradiction. This provides a *proof* of the claim, one in which the claim is established conclusively by that reasoning.

Philosophers often employ *reductio ad absurdum* reasoning too. They also employ a related, but less conclusive, technique in order to show that an argument is unsound: ‘proves too much.’ (‘Proves’ is tongue-in-cheek.) Start with some argument *A* that you think is unsound, but you cannot pinpoint exactly what is wrong with it – that’s a hard problem. Parody it with another argument, *P*, that has the same structure as *A*, but whose conclusion is obviously false; thus *P* is obviously unsound. Then argue that since *A* resembles *P* in important respects, it too must be unsound. This is not a proof, but rather an instance of analogical reasoning. The reasoning goes that, by parity of reasoning, *A* must have the same status as *P*; and by *parody* of reasoning – a turn of phrase, albeit used slightly differently, that I owe to Daniel Dennett’s *Intuition Pumps and Other Tools for Thinking* (2013) – that status is an unhappy one.

**[Brendan: Can you give an example of "reductio ad absurdum"? Also, Dennett's book is a fun one—I'd recommend it!]**

This strategy also resembles the mathematics heuristic that I mentioned earlier, of modifying a hard problem to make it easier. Here, we modify *A* to *P* and, in doing so, modify the hard problem of seeing that *A* is unsound to the easier problem of seeing that *P* is unsound, which it obviously is. However, unlike the mathematics heuristic, the ‘proves too much’ strategy typically does not involve going *back* to the original argument *A*, and diagnosing exactly what was wrong with *it*. It is tarred with *P*’s brush, and that’s supposed to be that. It’s rather like solving the easier mathematics problem, and resting content. To that extent, the strategy can be unsatisfying.

Perhaps the most famous instance of the ‘proves too much’ technique is the 11th-century Benedictine monk Gaunilo’s parody of St Anselm’s ontological argument for the existence of God. According to the concept of God, a greater being cannot be conceived. Now, suppose that God does not exist. Then a greater being *could* be conceived – namely, one with God’s greatness *and who does exist*. But this is a contradiction: a greater being than God is both inconceivable and conceivable. So we must reject the supposition – that is, we must conclude that God exists. There’s an instance of *reductio ad absurdum* reasoning for you. Gaunilo then parodies it: consider the concept of *the perfect island*. A greater island cannot be conceived. Now, suppose that this island does not exist. Then a greater island *could* be conceived – namely, one with the island’s greatness *and that exists*. Contradiction. So the island exists. But this is absurd. So we should reject the ontological argument, which employs parallel reasoning – it ‘proves too much’.

‘Proves too much’ reasoning is a form of analogical reasoning. Now let’s generalise – itself an exercise in such reasoning. Roughly, such reasoning begins by citing similarities between some entity and another one; moreover, the latter entity has a further feature; one concludes that the former entity also has that feature. Schematically:

Entity X has properties F, G, H, ...

Entity Y also has properties F, G, H, and also *I*.

Therefore, (plausibly) entity X also has property *I*.

The entities might be physical objects, such as planets, or even abstract objects, such as arguments. The properties can be similarly diverse: for example, having water and supporting life, or being unsound. The

‘therefore’ should be understood to flag an *inductive* inference, one in which the premises are thought to lend support to the conclusion, without guaranteeing it (hence the ‘plausibly’). In a nutshell: likeness in certain respects supports likeness in further respects.

**[Brendan: Can you give an example of an “analogical argument” that fits the form given above?]**

Analogical reasoning has played an important role in the history of philosophy. Indeed, in *Philosophical Essays Concerning Human Understanding* (1748), David Hume said (perhaps overreaching): ‘All our reasonings concerning matters of fact are founded on a species of analogy.’ From Plato’s allegory of the cave in the *Republic* to Peter Singer’s ‘drowning child’ [argument](#), analogical reasoning pervades philosophical thinking. But the most famous analogical argument of them all is a classic argument for the existence of God.

Philosophers speak of *the* argument from design but, attentive reader that you are, you are questioning the presupposition that there is exactly one. And indeed, there are many such arguments. I will present one, without claiming that it is the best version, but it does showcase the [various heuristics](#) that I have presented.

Look at a watch. You see that it is intricate, aesthetically pleasing, and behaves in a regular way. You also know that it had an intelligent designer. Now look at the world. You see that it is intricate, aesthetically pleasing, and behaves in a regular way. By analogical reasoning, you should conclude that (plausibly) it too had an intelligent designer – namely, God. Or so the argument goes. Its spirit is captured by the old hymn that begins:

All things bright and beautiful,

All creatures great and small,

All things wise and wonderful,

The Lord God made them all...

However, both the argument and the hymn are easily parodied. Look again at the watch. Despite its agreeable properties, it also has flaws – it keeps time imperfectly, its batteries occasionally need replacing, it is easily scratched. So you should conclude that it had a *flawed* designer. Now look again at the world. It too has its flaws. Monty Python began cataloguing them:

All things dull and ugly,

All creatures short and squat,

All things rude and nasty,

The Lord God made the lot ...

You should conclude that the world too had a *flawed* designer, which is not how God is normally conceived. Hang on! The argument from design is in danger of 'proving too much.

In *Dialogues Concerning Natural Religion* (1779), Hume powerfully parodied a version of the argument from design. He also questioned the alleged similarity between human artefacts, of which we have experience, and the Universe; and we have no experience of other universes. Indeed, the Universe might be regarded as an *extreme* case of an entity, and as such quite unlike entities such as watches – we can question whether it could even enter into causal relations, like being created, at all. Finally, Hume contended that the argument of design involves an infinite regress: the intelligent designer, God, whose existence the argument purports to support, himself demands explanation, requiring a prior intelligent designer. And away we go.

**[Brendan: Have you ever heard of the “argument from design” for God? What do you think of the author’s critique of it?]**

One of the main arguments *against* the existence of God is *the problem of evil*. (Neon lights!) Consider this version of it:

1. If God existed, he would have created the best of all possible worlds.
2. Our world is not the best of all possible worlds.

Therefore,

Conclusion: God does not exist.

Here, ‘worlds’ are entire universes, and ‘possible worlds’ are ways that a universe could be – we might think of them as instances of what is sometimes called the ‘multiverse’.

Premise 1 is meant to be plausible on many of the leading conceptions of God – in particular, ones that portray him as being omnibenevolent, omnipotent and omniscient. (All three qualities are necessary for the premise to be plausible – to see why, mentally highlight each of them, and run through the alternatives to which they are opposed.) The premise invites us to imagine various possible worlds, and to imagine God choosing which of these worlds to create. Premise 2 then compares our world to some of these alternatives. It seems we should grant it, since we can easily imagine our world being better – more happy people, less suffering. (One is reminded of the old joke: an optimist thinks that this is the best of all possible worlds; a pessimist fears that this is true.)

There are some problems with this argument that our heuristics help to tease out. With the first premise, I hope you saw ‘the’ in neon lights. Is there exactly one best of all possible worlds? It seems that there could be many. For example, start with a candidate for the best world, and imagine tweaking it in a way that makes no difference to its goodness – say, moving one insignificant particle by a nanometer, or mirror-reversing everything. Offhand, the result is equally a candidate for the best world. However, the argument in turn could be tweaked accordingly. Just make this premise ‘... he would have created *a* best possible world’ – *one* of the candidates. And the similarly tweaked premise 2 looks equally secure: this is not (even) *a* best possible world.

But there seems to be more of a problem on the other side: perhaps there is *no* best of all possible worlds. Rather, worlds can keep getting better and better without end – perhaps just keep adding another happy person, or another happy cow. Never mind the details of how God could create these better worlds. Any limitation on his ability to do so would seem to impugn his omnipotence.

The form of premise 1 is that if God existed, he would have *created* something. But a relevant alternative is that he might not have created anything. Perhaps God exists, but did not create anything?

Yet one might insist that he must have, perhaps regarding that as a part of the meaning of ‘God’. This brings us to the second premise. Again, note the contrast: *our* world, as opposed to *other* worlds. This prompts a different response: God did not create our world, but he created the best of all possible worlds (instead). This suggests that the argument is invalid: we can imagine premises 1 and 2 being true, without being committed to the conclusion. Or imagine that God *did* create the best of all possible worlds; and the second best; and the third best... Eventually, we get to our world, which is way down the list, but he created it nonetheless – perhaps because there is still a net balance of good over evil. Again, this suggests that the argument is invalid – only ‘suggests’, mind; perhaps it is impossible for one God to create multiple worlds, for reasons given by David Lewis in *On the Plurality of Worlds* (1986). It presupposes that God faces a world limit.

Where does this leave us? Well, we did not manage to prove the existence of God, nor prove his non-existence. (I hope you are not too disappointed!) But that's par for the course in philosophy – it rarely proves *anything* conclusively. Instead, I hope I have given you some sense of what philosophical reasoning is like, and how that reasoning can be stimulated and enhanced by the use of various heuristics. Along the way, we saw some instances of what followed from what (or not), exposed some sophisms, spotted some fallacies, and policed some of our reasoning.

**[Brendan: What do you think of the “Problem of Evil” argument against God’s existence? What about the author’s critique of it?]**

To be sure, the heuristics have their limits. There are many distinct abilities that go into making a good philosopher, and I do not pretend to give heuristics for all that philosophers do, or even a tenth of what they do. In particular, there are no short-cuts to profundity, and I should add that there will always be a role for good judgment and insight – just as there is in mathematics and chess. That said, heuristics can make difficult reasoning tasks easier, as much in philosophy as in mathematics and chess.