Here, you’ll learn
• What symbolic logic is, sort of.
• What arguments are.
• How symbolic logic represents arguments.
• The essentials of argument evaluation.

Welcome to symbolic logic! I’m confident that you’ll find symbolic logic to be useful (because it will help you to identify good and bad reasoning) and lots of fun (because you’ll be doing something called “proofs,” which are basically little puzzles).

This introduction will acquaint you with some of the “big ideas” in symbolic logic. Don’t worry about learning anything here because all of the essential concepts will be covered in much greater detail in subsequent chapters. As you read this introduction, imagine that you’re being shown around a party by the host, who is introducing you to lots of different people. You’re supposed to engage in short little conversations with each person – you’re expected to not “tune out,” in other words - but you’re not expected to remember everything about everyone; you’re not even expected to remember all the names. It’s enough if you recognize the faces later on, and don’t feel like everyone is a total stranger. The same principle applies here. (And, by the way, if you can abstract from the content of that analogy and understand how the general principle applies to this introduction, you’re already doing symbolic logic, in a way, because symbolic logic is all about that sort of abstraction.)

What’s Symbolic Logic?

Basically speaking, symbolic logic is the study of argument forms, or “shapes.” These argument forms are of interest because some are good and others are bad, in yet-to-be-discussed ways. Of course, to really understand this, we’ll need to know what arguments are all about and we’ll need to understand how an argument can have something like a shape. In this part of the introduction, we’ll talk about what arguments are. In part two of the introduction, we’ll learn about argument shapes.
What’s an Argument?

For our purposes, an argument is most definitely not a fight or a dispute. Instead,

- An **argument** is a unit of reasoning that attempts to prove that a certain idea is true by citing other ideas as evidence.

- The main idea that the argument tries to prove true is called the **“ultimate conclusion.”**
  Each argument has only one ultimate conclusion because there can be only one “main idea.”

- Ideas that the argument uses as evidence for the ultimate conclusion, but that the argument assumes to be true without providing us with reason to believe them, are called **“premises.”**
  Every argument must have at least one premise (because, after all, a chain of reasoning has to start somewhere) and it may have any number of them.

- Intermediate ideas on the way from the premises to the ultimate conclusion are called **“subconclusions.”** Subconclusions aren’t premises, because the argument gives us reason to believe them, but they aren’t the ultimate conclusion either, because they stand as reason to believe the ultimate conclusion.
  An argument doesn’t need to have any subconclusions, although most arguments do. If an argument has subconclusions, it can have any number of them.

- An **inference** is the connection that holds between a set of ideas, call it “R” for “reason,” and another idea, call it “C” for “conclusion,” when the truth of the ideas in R is supposed to establish the truth of idea C.
  It’s important to note that although the ultimate conclusion, premises are subconclusions are all **ideas,** or claims that someone can make, an inference is **not** an idea. An inference is the **connection** that sometimes obtains between ideas. It’s almost like a magnetic pull between ideas.

So, for example, let’s consider the following argument:

**Argument 1**

“Symbolic logic enjoys a high degree of mathematical rigor. Therefore, it’s the most important subdiscipline within philosophy.”

- What is the ultimate conclusion of this argument?¹ (The answer to this and to all other questions can be found in the endnotes.)
- What are the premises in this argument?²
- Are there any subconclusions in this argument? If so, what are they?³
- Where are the inferences in this argument?⁴
As we’ve seen, the argument is written as follows in normal English:

“Symbolic logic enjoys a high degree of mathematical rigor. Therefore, it’s the most important subdiscipline within philosophy.”

We’ll represent the argument like this:

1. Symbolic logic enjoys a high degree of mathematical rigor. premise
2. Symbolic logic is the most important subdiscipline within philosophy. from 1

Note that –

- We started with the premise.
- We ended with the ultimate conclusion.
- We numbered every sentence.
- We justified every sentence in what we’ll call “the justification column” to the right.
  • All sentences in an argument must be either premises, subconclusions or the ultimate conclusion.
  • Both subconclusions and the ultimate conclusion are supposed to follow (i.e. be derived) from other lines, and so…
  • Every line in an argument is either a premise (justification “premise”) or a derived line (justification “from….”).

Now let’s take a look at another argument:

**Argument 2**

“Symbolic logic deals with idealized arguments. If symbolic logic deals with idealized arguments then it can’t help us to reason better in the real world. It follows from this that symbolic logic can’t help us to reason better in the real world. But if symbolic logic can’t help us to reason better in the real world then it isn’t an important subject. Therefore symbolic logic isn’t an important subject.”

- What is the ultimate conclusion of this argument?
- What are the premises in this argument?
- Are there any subconclusions in this argument? If so, what are they?
- What are the inferences in this argument?
As we’ve seen, the argument is written as follows in normal English:

“Symbolic logic deals with idealized arguments. If symbolic logic deals with idealized arguments then it can’t help us to reason better in the real world. It follows from this that symbolic logic can’t help us to reason better in the real world. But if symbolic logic can’t help us to reason better in the real world then it isn’t an important subject. Therefore symbolic logic isn’t an important subject.”

We’ll represent the argument like this:

1. Symbolic logic deals with idealized arguments. premise
2. If symbolic logic deals with idealized arguments then it can’t help us to reason better in the real world. premise
3. If symbolic logic can’t help us to reason better in the real world then it isn’t an important subject. premise
4. Symbolic logic can’t help us to reason better in the real world. from 1 and 2
5. Symbolic logic isn’t an important subject. from 3 and 4

Note that -

- We started with the premises, on lines 1, 2, and 3.
- We followed with the subconclusion, on line 4.
- We ended with the ultimate conclusion, on line 5.
- We’ve indicated the lines from which the subconclusion follows and the lines from which the ultimate conclusion follows in the justification column.

One quick word before we go on to the next argument: As we’ve seen, this argument has a subconclusion, the sentence “symbolic logic can’t help us to reason better in the real world.” Most arguments in “real life” do explicitly state a subconclusion or two, at least if the argument is reasonably complex. In symbolic logic, however, we’ll be presented with only the premises and the ultimate conclusion. We’ll then be asked to evaluate the argument by filling in the subconclusions for ourselves and seeing if each of these subconclusions safely follows from the premises or from other subconclusions that we’ve already supplied. To that extent, the arguments that we’ll see in our study of symbolic logic will be different from the arguments that we’ll see in other contexts, but what we’ll learn in our study of symbolic logic will be very applicable to those other arguments.
What Makes an Argument Good?

Now that we’ve seen a couple of arguments and had some practice identifying their various parts, we can talk about what makes some arguments good and other arguments bad.

Because an argument is a unit of reasoning that attempts to prove that its ultimate conclusion is true,

- if an argument is good then it succeeds in proving that its ultimate conclusion is true, (it does what an argument is supposed to do) and
- if an argument is bad then it doesn’t succeed in proving that its ultimate conclusion is true (it doesn’t do what an argument is supposed to do).

Given this understanding of what a good argument is and what a bad argument is…

- If you decide that an argument is good, should you be inclined to believe that the conclusion is true? 9
- If you decide that an argument is bad, should you be inclined to believe that the conclusion is false? 10

But what exactly makes an argument good?

Consider the following arguments:

Argument 3

1. You are and always have been nothing but a brain in a vat, fed all of your perceptions by a supercomputer. premise
2. You don’t have a body, in the sense of having hands, feet, arms, legs, a torso, etc. from 1

Is this a good argument (i.e. does it prove that the conclusion is true)? Why or why not? 11

Argument 4

1. Sometimes, you’re mistaken about what you see, like when you’re looking at an optical illusion, or at something very small or far away. premise
2. You can never trust any of your senses. from 1

Is this a good argument (i.e. does it prove that the conclusion is true)? Why or why not? 12

In general then, a good argument needs both good premise and good premise. 13
How Can We Evaluate Premises?

Because a premise is an idea that the argument assumes to be true, a premise is good only if it is, in fact, true.

Although there are some general principles to guide the evaluation of premises, we can’t have anything like a foolproof procedure for premise evaluation because any such procedure would constitute a “truth machine.” Instead, we must rely upon our own fallible judgment and common sense, as we did for Argument 3.

Argument 3

1. You are and always have been nothing but a brain in a vat, fed all of your perceptions by a supercomputer.
2. You don’t have a body, in the sense of having hands, feet, arms, legs, a torso, etc.

How Can We Evaluate Inferences?

Because an inference is the connection that holds between a set of ideas R and another idea C when the truth of the ideas in R is supposed to establish the truth of idea C, an inference is good only if this connection is strong. The key concept for us will be the notion of “validity.”

• An inference from set R to idea C is valid = If the ideas in R were true (which they might not actually be) then C would have to be true.

Valid inferences are perfect.

• An inference from set R to idea C is invalid = Even if the ideas in R were true, C could still be false.

Invalid inferences are imperfect. Some of them can still be good, but for the purposes of symbolic logic, only perfection will do. This, of course, constitutes a difference between symbolic logic and what we might call “real life” argument evaluation. In real life, the inference from “The sun has risen every morning” to “The sun will rise tomorrow” is very good indeed because the fact that the sun has risen every morning gives us excellent strong evidence for the claim that the sun will rise tomorrow. But this inference isn’t valid because even though the sun has risen every morning up to now, it might not rise tomorrow. The conclusion could still be false. Perhaps some undetected nuclear process in the center of the sun will cause it to explode at 2:31 this afternoon. That’s not very likely, but it’s conceivable so the inference falls short of absolute perfection.

How seriously does this difference between symbolic logic and “real life” evaluation undermine the practicality of symbolic logic? Not very seriously. Symbolic logic will give us a very precise and very useful set of skills that we can apply to the arguments that
we meet and construct in everyday contexts. This skill set won’t be exhaustive – it won’t cover everything – but it will cover more than enough to be extraordinarily useful. (Compare this to other very useful skill sets that you have, like the skill set that you use to drive a car or ride a bike. Is the utility of this skill set seriously undermined by the fact that it doesn’t help you to bake a cake? Of course not.)

The Bob Method for Evaluating Inferences

Evaluating inferences can be a tricky business, so it’s nice to have a technique that we can use. I like something I call “the Bob Method.”

To use the Bob Method to assess an inference from R to C, imagine Bob, a perfectly gullible but perfectly rational person. Because Bob is perfectly gullible, he believes all of the ideas in R, and because Bob is perfectly rational, he’ll reason correctly from R. Now ask yourself, “Is Bob compelled to believe C?” If so, the inference is valid. If not, the inference is invalid.

Can you see how the Bob Method would show the inference in Argument 4 to be invalid?

Argument 4

1. Sometimes, you’re mistaken about what you see, like when you’re looking at an optical illusion, or at something very small or far away. premise
2. You can never trust any of your senses. from 1

In the next part of this Introduction, we’ll get more practice with the Bob Method.

Answers

1. “Symbolic logic is the most important subdiscipline within philosophy” is the ultimate conclusion because it’s the main idea that the argument is trying to prove.
2. “Symbolic logic enjoys a high degree of mathematical rigor” is the premise because it’s being taken for granted and being used as evidence for the ultimate conclusion.
3. There aren’t any subconclusions. Although every argument must have an ultimate conclusion, at least one premise, and an inference, not every argument has subconclusions.
4. The inference is the allegedly “truth-conferring” connection that takes us from “Symbolic logic enjoys a high degree of mathematical rigor” to “Symbolic logic is the most important subdiscipline within philosophy.” In this argument, it’s marked by “therefore,” but inferences don’t always correspond to special words in the argument.
5. “Symbolic logic isn’t an important subject” is the ultimate conclusion because that’s the main idea that the argument is trying to get us to believe.
6. The premises are “Symbolic logic deals with idealized arguments,” “If symbolic logic deals with idealized arguments then it can’t help us to reason better in the real
world,” and “If symbolic logic can’t help us to reason better in the real world then it isn’t an important subject.” All of these ideas are being taken for granted by the argument and used as evidence for the ultimate conclusion.

“Symbolic logic can’t help us to reason better in the real world” is a subconclusion. The argument is giving us reason to believe it (unlike the premises) but the argument goes on to use this idea as a reason to believe the ultimate conclusion.

One inference is the allegedly “truth-conferring” connection that takes us from “Symbolic logic deals with idealized arguments,” and “If symbolic logic deals with idealized arguments then it can’t help us to reason better in the real world,” to “Symbolic logic can’t help us to reason better in the real world.” This inference is marked by the expression “it follows that.”

Another inference is the allegedly “truth-conferring” connection that takes is from “Symbolic logic can’t help us to reason better in the real world,” and “If symbolic logic can’t help us to reason better in the real world then it isn’t an important subject,” to “Symbolic logic isn’t an important subject.” This inference is marked by “therefore.”

Yes. If you decide that an argument is good, you should be inclined to believe that the conclusion is true. Remember, if an argument is good then it succeeds in proving that its ultimate conclusion is true. Knowing this, if you decide that an argument is good then you must think that it’s succeeded in proving the ultimate conclusion to be true; you don’t just think that the argument might lead some unwary people to believe the ultimate conclusion - you think that the argument has really proven the ultimate conclusion to be true. And if you think that, you’ll be led to accept that the ultimate conclusion is true.

Let’s apply this insight to Argument 2: “Symbolic logic deals with idealized arguments. If symbolic logic deals with idealized arguments then it can’t help us to reason better in the real world. It follows from this that symbolic logic can’t help us to reason better in the real world. But if symbolic logic can’t help us to reason better in the real world then it isn’t an important subject. Therefore symbolic logic isn’t an important subject.” I hope it’s clear that I sharply disagree with the ultimate conclusion of this argument. I think that symbolic logic is a very important subject. And because I disagree with the ultimate conclusion of this argument, I’m compelled to think that this argument is bad. (If I thought that the argument were good, after all, then I’d need to think that the conclusion is true, which I don’t.) Something is going wrong in this argument somewhere, and the main problem, I believe, is with the premise, “If symbolic logic deals with idealized arguments then it can’t help us to reason better in the real world.” That’s just false. It’s like saying “If weight-lifting has us lift weights specifically designed for weight-lifting then it can’t make us stronger in the real world.”

No. If you decide that an argument is bad, you shouldn’t necessarily believe that the conclusion is false. Remember, if an argument is bad then it doesn’t succeed in proving that its ultimate conclusion is true. Knowing this, if you decide that an argument is bad then you must believe that the argument hasn’t proven the ultimate conclusion to be true. The ultimate conclusion may, nonetheless, be true, and you might even have good reasons, quite apart from the bad argument, to believe it.
This is a bad argument because its premise is (probably) false. At the very least, you can’t just assume that you are and have always been nothing but a brain in a vat. This is a bad argument because its conclusion doesn’t follow from the premise. The inference is weak. Although it’s true that you’re sometimes mistaken about what you see, it doesn’t follow that you can never trust any of your senses.

A good argument needs both good premises and good inferences.

Bob would think something like this. “Although I accept that I’m sometimes mistaken about what I see, I don’t accept that I can never trust any of my senses. For one thing, I have senses other than sight and these senses might be more reliable. For another thing, something could be right most of the time even if it isn’t right all of the time, and I don’t see why I should trust something that’s right most of the time.”