Here, you’ll learn
• to carefully distinguish between evaluating premises and evaluating inferences.
• another way to evaluate inferences.

Practice Evaluating Arguments

Now that we have the Bob Method for evaluating inferences at our disposal, let’s evaluate the premises and inferences in the following arguments:

Argument 1

1. Some non-human animals can experience emotions, as can humans.  
   • Is the premise true or false?¹

2. Human beings are similar to some non-human animals in some respects.  
   from 1
   • Is the inference valid or invalid?²
   • Is the argument good or bad? Why?³
   • What opinion, if any, should we form about the conclusion on the basis of this argument?⁴

Argument 2

1. Current science enables us to understand everything.  
   premise

2. Religion isn’t science.  
   premise

3. We needn’t appeal to religion in order to understand anything.  
   from 1 and 2

   • Is premise 1 true or false?⁵
   • Is premise 2 true or false?⁶
   • Is the inference valid or invalid?⁷
   • Is the argument good or bad? Why?⁸
   • What opinion, if any, should we form about the conclusion on the basis of this argument?⁹
Argument 3

1. Many people believe things on the basis of faith alone. \hspace{1cm} \textbf{premise}
2. It’s okay to believe things on the basis of faith alone. \hspace{1cm} \textbf{from 1}

- Is the premise true or false?\textsuperscript{10}
- Is the inference valid or invalid?\textsuperscript{11}
- Is the argument good or bad? Why?\textsuperscript{12}
- What opinion, if any, should we form about the conclusion on the basis of this argument?\textsuperscript{13}

Argument 4

1. All philosophy majors enjoy disagreeing with people. \hspace{1cm} \textbf{premise}
2. Philosophy majors make good lawyers. \hspace{1cm} \textbf{from 1}

- Is the premise true or false?\textsuperscript{14}
- Is the inference valid or invalid?\textsuperscript{15}
- Is the argument good or bad? Why?\textsuperscript{16}
- What opinion, if any, should we form about the conclusion on the basis of this argument?\textsuperscript{17}

Premises and Inferences

Let’s pause, now, to think about the relationship between premises and inferences.

- Can a valid inference have true premises?\textsuperscript{18}
- Can a valid inference have false premises?\textsuperscript{19}
- Can an invalid inference have true premises?\textsuperscript{20}
- Can an invalid inference have false premises?\textsuperscript{21}

The moral of this story is that premises and inferences are \textit{very different things!} The fact that one is bad doesn’t make the other bad, and the fact that one is good doesn’t make the other good.

We can use the Hanging Man Analogy to think about arguments. The ultimate conclusion is like a fellow suspended by a beam from a rope. The premise is the beam and the inference is the rope.
Just as ropes and beams are entirely different things, premises and inferences are entirely different things. Premises can be good while inferences are bad, and premises can be bad while inferences are good.

And of course, in order for the guy to be safely supported, both the beam and the rope need to be strong. Similarly, in order for an argument to support its conclusion, both the premises and the inferences need to be good.

**Thinking about Bob**

One very nice thing about the Bob Method is that it helps us to clearly distinguish between being right and being rational. Bob will believe any false premise we give him so he’ll be wrong much of the time, but this doesn’t stop Bob from reasoning correctly on the basis of the information he accepts. This insight has important practical implications. When I find myself disagreeing with someone, for instance, it’s often quite helpful for me to understand how that person is reasoning, given the basic assumptions that the person happens to hold. I frequently discover that although I don’t share that person’s basic assumptions, I can appreciate the fact that the person is thinking in a reasonably rational fashion, given those starting assumptions. And this discovery helps me to understand that person better and allows me interact with that person more easily. There’s all the difference in the world between thinking “This person has some beliefs I don’t share,” and thinking “This person is basically irrational, or seriously benighted.”

Another nice thing about the Bob Method is that it can be used to evaluate any inference. We can apply it to inferences that we find in textbooks, or in letters to the editor, or on the web. We can always ask, “If Bob, a perfectly rational person, accepted these ideas, would he also believe what allegedly follows from them?” The Bob Method, in other words, has the great benefit of universality.

The unfortunate thing about the Bob Method, however, is that it requires us to predict what a completely rational person will believe. We aren’t completely rational, however, and our own irrationality can contaminate our application of the method. In short, the Bob Method has the shortcoming of corruptibility.

Symbolic logic is all about giving us another method to evaluate inferences, one that will have benefits and shortcomings complementary to those of the Bob Method. This method will not be applicable to each and every inference we’ll ever see in real life. It will be less than universal. But it won’t rely upon our logical intuitions and so it will be incorruptible by our innate irrationality.

<table>
<thead>
<tr>
<th></th>
<th>Universality</th>
<th>Incorruptibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Bob Method</td>
<td>Yes! 😊</td>
<td>No. 😞</td>
</tr>
<tr>
<td>The ?? Method</td>
<td>No. 😞</td>
<td>Yes! 😊</td>
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</tbody>
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So, what is this complementary method?

**The Formal Method for Evaluating Inferences**

To uncover the new way to evaluate inferences, let’s take a look some more arguments.

**Argument 5**

1. If Max is a poodle then Max is a dog. premise
2. Max is a poodle. premise
3. Max is a dog. from 1 and 2

- Is the inference valid or invalid? 

**Argument 6**

1. If religion is a good thing then the government should sponsor some denomination. premise
2. Religion is a good thing. premise
3. The government should sponsor some denomination. from 1 and 2

- Is the inference valid or invalid?

**Argument 7**

1. Animals can think. premise
2. If animals can think then they should have rights. premise
3. Animals should have rights. from 1 and 2

- Is the inference valid or invalid?

What do arguments 5, 6, and 7 have in common?

---

1. You might want to commit this “poodle / dog” argument to memory because we’ll be using it, and variations upon it, later on. It’s a remarkably handy little argument.
All of these arguments share the same *shape*, or *form*.

Specifically, they all have the form

1. If □ then ○.  
   \[
   \text{premise}
   \]
2. □.  
   \[
   \text{premise}
   \]
3. ○.  
   \[
   \text{from 1 and 2}
   \]

See?

**Argument 5**

1. If *Max is a poodle* then *Max is a dog*.  
   \[
   \text{premise}
   \]
2. *Max is a poodle.*  
   \[
   \text{premise}
   \]
3. *Max is a dog.*  
   \[
   \text{from 1 and 2}
   \]

**Argument 6**

1. If *religion is a good thing* then *the government should sponsor some denomination.*  
   \[
   \text{premise}
   \]
2. *Religion is a good thing.*  
   \[
   \text{premise}
   \]
3. *The government should sponsor some denomination.*  
   \[
   \text{from 1 and 2}
   \]

**Argument 7**

1. *Animals can think.*  
   \[
   \text{premise}
   \]
2. If *animals can think* then *they should have rights.*  
   \[
   \text{premise}
   \]
3. *Animals should have rights.*  
   \[
   \text{from 1 and 2}
   \]

(Note that the order in which the premises occur doesn’t matter. "□" can occur before “If □ then ○,” as happened in Argument 7.)

This inference form is valid. Its most common name is “modus ponens,” but we’ll be calling it “Arrow Out” when we study it at greater length in Chapter 1.

Symbolic logic exploits the following facts:

- Certain abstract inference forms, like the one we’ve just seen, are valid.
- Any “real-life” inference of these valid forms will be valid, too.
- Any abstract or “real-life” argument in which the premises are connected to the conclusion by means of only valid inferences is valid as well.

---

\[modus\] “Modus” is Latin for “mode” or “way” (as in “MQ,” or *modus operandi*). “Ponens” is Latin for “affirming.” So *modus ponens* is “the way of affirming.” There’s a way of denying, too, which we’ll see later.

\[modus ponens\] “Arrow Out?” It’s because we’ll be symbolizing “if…then…” with an arrow and because this inference rule allows us to take something out of that arrow.
These facts give us the “Formal Method” for evaluating inferences.

The Formal Method for Evaluating Inferences:
- If we can work our way from the premises of an argument to the conclusion of the argument using only valid inference forms then the argument is valid.

This is the method that complements the Bob Method so nicely. The Formal Method can’t be applied to every argument — not all arguments will involve the argument forms — but because it gives us particular argument forms to look out for, it won’t rely upon our fallible intuitions about what inferences are valid and which aren’t.

Let’s see how the formal method can show that the following argument is valid:

**Argument 8**

“If Clara will come to the party then we’ll have a good time. Clara will come to the party. If we have a good time then we’ll come home after midnight. If we come home after midnight then we’ll sleep in late. Therefore we’ll sleep in late.”

First, we’ll write down all the premises.

1. If Clara will come to the party then we’ll have a good time.  premise
2. Clara will come to the party.  premise
3. If we have a good time then we’ll come home after midnight.  premise
4. If we come home after midnight then we’ll sleep in late.  premise

Then we can see how “We’ll have a good time” follows from the sentences on lines 1 and 2 using our valid inference rule.

1. If Clara will come to the party then we’ll have a good time.  premise
2. Clara will come to the party.  premise
3. If we have a good time then we’ll come home after midnight.  premise
4. If we come home after midnight then we’ll sleep in late.  premise
5. **We’ll have a good time.**  from 1 and 2

This allows us to conclude “We’ll come home after midnight,” from the sentences on lines 3 and 5 using our valid inference rule.

1. If Clara will come to the party then we’ll have a good time.  premise
2. Clara will come to the party.  premise
3. **If we have a good time then we’ll come home after midnight.**  premise
4. If we come home after midnight then we’ll sleep in late.  premise
5. **We’ll have a good time.**  from 1 and 2
6. **We’ll come home after midnight.**  from 3 and 5
And now we can conclude “We'll sleep in late,” from the sentences on lines 4 and 6 using our valid argument form.

1. If Clara will come to the party then we'll have a good time.                       premise
2. Clara will come to the party.                                          premise
3. If we have a good time then we'll come home after midnight.                premise
4. If we come home after midnight then we'll sleep in late.                  premise
5. We'll have a good time.                                                from 1 and 2
6. We'll come home after midnight. from 3 and 5
7. We'll sleep in late.                                                   from 4 and 6

Because “We'll sleep in late,” is the conclusion of the argument, and because we could work our way there from the premises using only valid argument forms, we know that this argument is valid.

Now let’s look at some more arguments.

**Argument 9**

1. If Max is a poodle then Max is a dog.                             premise
2. Max is a dog.                                                  premise
3. Max is a poodle.                               from 1 and 2

• Is this inference valid or invalid?25

**Argument 10**

1. If Hank got 100% on the exam then he got an A on the exam.       premise
2. Hank got an A on the exam.                                     premise
3. Hank got 100% on the exam.                                    from 1 and 2

Is this inference valid or invalid?26

**Argument 11**

1. Sandra is in a position of authority.                              premise
2. If Sandra is president then she’s in a position of authority. premise
3. Sandra is president.                                         from 1 and 2

Is this inference valid or invalid?27

What do arguments 9, 10, and 11 have in common?

---

iv See? Here’s a variation on that “Poodle / Dog argument.” There are other variations, too, which is why it’s good to remember these “Poodle / Dog” arguments. They’re handy.
Arguments 9, 10, and 11 all have this form:

1. If □ then ○.  
2. ○.  
3. □. from 1 and 2

See?

Argument 9

1. If Max is a poodle then Max is a dog. premise
2. Max is a dog. premise
3. Max is a poodle. from 1 and 2

Argument 10

1. If Hank got 100% on the exam then he got an A on the exam. premise
2. Hank got an A on the exam. premise
3. Hank got 100% on the exam. from 1 and 2

Argument 11

1. Sandra is in a position of authority. premise
2. If Sandra is president then she’s in a position of authority. premise
3. Sandra is president. from 1 and 2

(Note that the order in which the premises occur doesn’t matter. “□” can occur before “If □ then ○,” has happened in Argument 11.)

This inference form is invalid. It’s called “the Fallacy of Assuming the Consequent” because the back part of an “if… then…” sentence is called the “consequent” and because this fallacy involves assuming that the back part of an “if…then…” sentence is true in order to infer that the front part of the “if…then…” sentence (otherwise known as the “antecedent”) is true. We'll see this fallacy again in Chapter 1.

Now that we have an invalid inference form, we can expand the formal method for evaluating inferences as follows:

The Formal Method for Evaluating Inferences:
- If we can work our way from the premises of an argument to the conclusion of the argument using only valid inference forms then the argument is valid.
- If any attempt to work our way from the premises of an argument to the conclusion of the argument forces us to use an invalid inference form then the argument is invalid.
For example, let’s consider the following argument:

**Argument 12**

“Elliot is a hard worker. If Elliot is a hard worker then he’ll have good letters of recommendation. If Elliot has good letters of recommendation then he’ll get the job. If Elliot is a computer programmer then he’ll get the job. Therefore Elliot is a computer programmer.”

First, we’ll write down all the premises.

1. Elliot is a hard worker. premise
2. If Elliot is a hard worker then he’ll have good letters of recommendation. premise
3. If Elliot has good letters of recommendation then he’ll get the job. premise
4. If Elliot is a computer programmer then he’ll get the job. premise

Then we can see how “Elliot has good letters of recommendation” follows from the sentences on lines 1 and 2 using our valid inference rule.

1. Elliot is a hard worker. premise
2. If Elliot is a hard worker then he’ll have good letters of recommendation. premise
3. If Elliot has good letters of recommendation then he’ll get the job. premise
4. If Elliot is a computer programmer then he’ll get the job. premise
5. Elliot has good letters of recommendation. from 1 and 2

This allows us to conclude “Elliot will get the job” from the sentences on lines 3 and 5 using our valid inference rule.

1. Elliot is a hard worker. premise
2. If Elliot is a hard worker then he’ll have good letters of recommendation. premise
3. If Elliot has good letters of recommendation then he’ll get the job. premise
4. If Elliot is a computer programmer then he’ll get the job. premise
5. Elliot has good letters of recommendation. from 1 and 2
6. Elliot will get the job. from 3 and 5

At this point, however, we run into trouble because in order to infer the conclusion of our argument, “Elliot is a computer programmer,” we’d need to commit the Fallacy of Assuming the Consequent on lines 4 and 6.
1. Elliot is a hard worker.  
2. If Elliot is a hard worker then he'll have good letters of recommendation.  
3. If Elliot has good letters of recommendation then he'll get the job.  
4. If Elliot is a computer programmer then he'll get the job.  
5. Elliot has good letters of recommendation.  
6. Elliot will get the job.  
7. Elliot is a computer programmer.  

Because the attempt to work our way from the premises of this argument to the conclusion forced us to use an invalid inference form, this argument is invalid. The conclusion does not validly follow from the premises.

Now that we’ve seen how to use the Formal Method to assess arguments for validity, try your hand and the following arguments:

**Argument 13**

Is this argument valid?²⁸

1. We don’t know we’re not dreaming.  
2. If we don’t know we’re not dreaming then we can’t trust our senses.  
3. If we can’t trust our senses then we can’t believe what science tells us.  
4. If we can’t believe what science tells us then we shouldn’t believe in evolution.  
5. If we shouldn’t believe in evolution then we should believe that God created everything.  
6. We can’t trust our senses.  
7. We can’t believe what science tells us.  
8. We shouldn’t believe in evolution.  
9. We should believe that God created everything.  

²⁸
Argument 14

Is this argument valid? 

1. If there is something now then there never was a time at which there was nothing.  
2. There is something now. 
3. If there never was a time at which there was nothing then there is a necessary being. 
4. If God exists then there is a necessary being. 
5. There never was a time at which there was nothing. 
6. There is a necessary being. 
7. God exists.

Argument 15

Is this argument valid?

“If it’s unethical to kill one innocent person to save five others then utilitarianism is wrong. It is unethical to kill one innocent person to save five others. If utilitarianism is wrong then deontology must be right. If deontology is right then Kant is correct. Therefore Kant is correct.”

Argument 16

Is this argument valid?

“If it’s wrong to treat people as a means to an end then it’s unethical to marry someone for their money. It is unethical to marry someone for their money. If it’s wrong to treat people as a means to an end then Kant is correct. If Kant is correct then morality is objective. Therefore morality is objective.”

Now that we’ve completed this Introduction to Symbolic Logic, you have some familiarity with the material that we’ll be studying. Don’t worry if you still feel a little confused. Remember, you weren’t expected to learn anything here because you’ll be seeing many of the important bits again. If you have some sense of what validity is, you’re in good shape. We’ll start doing “real” symbolic logic in Chapter 1. See you there!

Answers

1. I think this is true. It certainly seems to me as though animals can experience emotions.
2. This inference is valid, I think. If someone believes 1, she’ll have to believe 2.
3. This is a good argument because it has all good premises and all good inferences.
4. We should believe the conclusion because the argument has proven it to be true.
I’d say this is false. Certainly not everything can be explained by science at its current level of development, and some questions about science might be unanswerable by science in principle.

(By the way, if you find yourself thinking, “But Bob would believe this premise because Bob is perfectly gullible and believes all premises,” you’re right. We don’t use Bob to evaluate premises for exactly that reason. According to Bob, all premises are true. We only use Bob to evaluate inferences.)

I’d agree with this. Science might study religion, and religion might appeal to the results of science, but religion is not itself a science. At least that’s how it seems to me.

This inference is valid. If 1 and 2 were true then 3 would have to be true as well. Anyone (like Bob) who believed 1 and 2 would be compelled to believe 3.

This argument is bad because of its bad premise.

We should form no opinion about the conclusion on the basis of this argument.

I would say that the premise is true.

I would say that the inference is invalid. Bob could believe 1 without believing 2. He could easily say something like, “Although many people believe things on the basis of faith alone, it still isn’t okay to have faith-based beliefs like that.”

It’s bad because the inference is bad.

We should form no opinion about the conclusion.

Not true. Some philosophy majors don’t enjoy disagreeing.

Invalid. Even if idea 1 were true, idea 2 wouldn’t necessarily follow.

To see this, let’s use the Bob Method. Bob would believe that all philosophy majors enjoy disagreeing with people – because that’s a premise and because he’s gullible enough to accept all premises – but he wouldn’t be compelled to think that philosophy majors make good lawyers on the basis of this. He might say something like, “There’s much more to being a good lawyer than disagreeing with people, so someone could enjoy disagreeing but be a terrible lawyer.”

It’s bad because both the premise and the inference are bad.

We should form no opinion about the conclusion on the basis of this argument.

Yes. This happened in argument 1.

Yes. This happened in argument 2.

Yes. This happened in argument 3.

Yes. This happened in argument 4.

This inference is valid. If Bob believes “If Max is a poodle then Max is a dog,” and if Bob believes “Max is a poodle,” then Bob will be forced to believe “Max is a dog.”

This inference is valid. If Bob believes “If religion is a good thing then the government should sponsor some denomination,” and if Bob believes “Religion is a good thing,” then Bob will be forced to believe “The government should sponsor some denomination.”

This inference is valid. If Bob believes “Animals can think,” and if Bob believes “If animals can think then they should have rights,” then Bob will be forced to believe “Animals should have rights.”
This inference is invalid. See why? Max could be some other kind of dog, like a schnauzer or a chihuahua. If he is, then the premises will be true and the conclusion false.

This inference is invalid. Maybe Hank got a 99% on the exam. This would give him an A, so the premises can be true and the conclusion false.

This inference is invalid. Sandra could be in some other position of authority. Maybe she’s vice-president or treasurer.

Yep. It’s valid. We can work our way from the premises to the conclusion using only valid inferences.

This argument is invalid. The problem is that line 7 is inferred using the fallacy of assuming the consequent.

It’s valid. We can work our way from the premises to the conclusion using only valid inferences.

This argument is invalid. This argument depends upon inferring “It’s wrong to treat people as a means to an end,” from “If it’s wrong to treat people as a means to an end then it’s unethical to marry someone for their money” and “It is unethical to marry someone for their money.” But that’s to commit the Fallacy of Assuming the Consequent.