Business Logic

Lecture 4: Recognizing Arguments

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Lecture Learning Objectives:

At the end of the lecture, you will be able to:

1. Define and identify arguments.
2. Differentiate arguments from explanation.
3. Understand how to recognize arguments
4. Apply the different techniques in recognizing arguments.

What is an argument?

Both logic and critical thinking centrally involve the analysis and assessment of arguments. "**Argument**" is a word that has multiple distinct meanings, so it is important to be clear from the start about the sense of the word that is relevant to the study of logic. In one sense of the word, an argument is a heated exchange of differing views as in the following:

Sally: Abortion is morally wrong and those who think otherwise are seeking to justify murder!

Bob: Abortion is not morally wrong and those who think so are right-wing bigots who are seeking to impose their narrow-minded views on all the rest of us!

Sally and Bob are having an argument in this exchange. That is, they are each expressing conflicting views in a heated manner. However, that is not the sense of "argument" with which logic is concerned. **Logic** concerns a different sense of the word "argument." An **argument**, in this sense, is a reason for thinking that a statement, claim or idea is true.

For example:
Sally: Abortion is morally wrong because it is wrong to take the life of an innocent human being, and a fetus is an innocent human being. In this example Sally has given an argument against the moral permissibility of abortion. That is, she has given us a reason for thinking that abortion is morally wrong. The conclusion of the argument is the first four words, "**abortion is morally wrong**." But whereas in the first example Sally was simply asserting that abortion is wrong (and then trying to put down those who support it), in this example she is offering a reason for why abortion is wrong.

We can (and should) be more precise about our definition of an argument. But before we can do that, we need to introduce some further terminology that we will use in our definition. As I've already noted, the conclusion of Sally's argument is that abortion is morally wrong. But the reason for thinking the conclusion is true is what we call the premise. So, we have two parts of an argument: the **premise** and the **conclusion**. Typically, a conclusion will be supported by two or more premises. Both premises and conclusions are statements. A statement is a type of sentence that can be true or false

and corresponds to the grammatical category of a "**declarative sentence**." **For example**, the sentence, "The Nile is a river in northeastern Africa" is a statement. Why? Because it makes sense to inquire whether it is true or false. (In this case, it happens to be true.) But a sentence is still a statement even if it is false. **For example**, the sentence, The Yangtze is a river in Japan is still a statement; it is just a false statement (the Yangtze River is in China). In contrast, none of the following sentences are statements:

Please help yourself to more casserole Don't

tell your mother about the surprise

Do you like Vietnamese pho?

The reason that none of these sentences are statements is that it doesn't make sense to ask whether those sentences are true or false (rather, they are requests or commands, and questions, respectively).

So, to reiterate: all arguments are composed of premises and conclusions, which are both types of statements. The **premises of the argument** provide a reason for thinking that the conclusion is true. And arguments typically involve more than one premise. A standard way of capturing the structure of an argument is by numbering the premises and conclusion. **For example**, recall

Sally's argument against abortion:

Abortion is morally wrong because it is wrong to take the life of an innocent human being, and a fetus is an innocent human being.

We could capture the structure of that argument like this:

1. It is morally wrong to take the life of an innocent human being

2. A fetus is an innocent human being

3. Therefore, abortion is morally wrong

By convention, the last numbered statement (also denoted by the "therefore") is the conclusion and the earlier numbered statements are the premises. This is what we call putting an argument into standard argument form. We can now give a more precise definition of an argument. An **argument** is a set of statements, some of which (the premises) attempt to provide a reason for thinking that some other statement (the conclusion) is true. Although arguments are typically given in order to convince or persuade someone of the conclusion, the **argument** itself is independent of one's attempt to use it to convince or persuade. **For example**, I have just given you this argument not in an attempt to convince you that abortion is morally wrong, but as an illustration of what an argument is.

Identifying arguments

The best way to identify whether an argument is present is to ask whether there is a statement that someone is trying to establish as true by basing it on some other statement. If so, then there is an argument present. If not, then there isn't. Another thing that can help in identifying arguments is knowing certain key words or phrases that are premise indicators or conclusion indicators. **For example**, recall Sally's abortion argument:

Abortion is morally wrong because it is wrong to take the life of an innocent human being, and a fetus is an innocent human being.

The word "**because**" here is a premise indicator. That is, "**because**" indicates that what follows is a reason for thinking that abortion is morally wrong. Here is another **example**:

I know that the student plagiarized since I found the exact same sentences on a website and the website was published more than a year before the student wrote the paper. In this example, the word "**since**" is a premise indicator because what follows it is a statement that is clearly intended to be a reason for thinking that the student plagiarized (i.e., a premise).

Notice that in these two cases, the premise indicators "**because**" and "**since**" are interchangeable: I could have used "because" in place of "since" or "since" in the place of "because" and the meaning of the sentences would have been the same. In addition to premise indicators, there are also conclusion indicators. **Conclusion indicators** mark that what follows is the conclusion of an argument. **For example**,

Bob-the-arsonist has been dead for a year, so Bob-the-arsonist didn't set the fire at the East Lansing Starbucks last week.

In this example, the word "**so**" is a conclusion indicator because what follows it is a statement that someone is trying to establish as true (i.e., a conclusion).

Here is **another example** of a conclusion indicator:

A poll administered by Gallup (a respected polling company) showed candidate x to be substantially behind candidate y with only a week left before the vote, therefore candidate y will probably not win the election.

In this example, the word "**therefore**" is a conclusion indicator because what follows it is a statement that someone is trying to establish as true (i.e., a conclusion). As before, in both of these cases the conclusion indicators "so" and "therefore" are interchangeable: I

could have used “so” in place of “therefore” or “therefore” in the place of “so” and the meaning of the sentences would have been the same.

A list of some common premise and conclusion indicators: **Premise indicators:** **Conclusion indicators:**

since therefore because so for hence
as thus
given that implies that seeing
that consequently
for the reason that it follows that is shown by the
fact that we may conclude that

Although these words and phrases can be used to identify the premises and conclusions of arguments, they are not failsafe methods of doing so. Just because a sentence contains them does not mean that you are dealing with an argument. This can easily be shown by examples like these:

I have been running competitively since 1999.
I am so happy to have finally finished that class.

Although “since” can function as a premise indicator and although “so” can function as a conclusion indicator, neither one is doing so here. This shows that you can’t simply mindlessly use occurrences of these words in sentences to show that there is an argument being made. Rather, we have to rely on our understanding of the English sentence in order to determine whether an argument is being made or not. Thus, the best way to determine whether an argument is present is by asking the question: Is there a statement that someone is trying to establish as true or explain why it is true by basing it on some other statement? If so, then there is an argument present. If not, then there isn’t. Notice that if we apply this method to the above examples, we will see that there is no argument present because there is no statement that someone is trying to establish as true by basing it on some other statement. **For example**, the sentence “I have been running competitively since 1999” just contains one statement, not two.
But arguments always require at least two separate statements—one premise and one conclusion, so it cannot possibly be an argument.

Another way of explaining why these occurrences of “so” and “since” do not indicate that an argument is present is by noting that both premise indicators and conclusion indicators are, grammatically, conjunctions. A **grammatical conjunction** is a word that connects two separate statements. So, if a word or term is truly being used as a premise or conclusion indicator, it must connect two separate statements. Thus, if “since” were really functioning as a premise indicator in the above example then what

followed it would be a statement. But “1999” is not a statement at all. Likewise, in the **second example** “so” is not being used as a conclusion indicator because it is not conjoining two separate statements. Rather, it is being used to modify the extent of “happy.” In contrast, if I were to say “Tom was sleeping, so he couldn’t have answered the phone,” then “so” is being used as a conclusion indicator. In this case, there are clearly two separate statements (“Tom was sleeping” and “Tom couldn’t have answered the phone”) and one is being used as the basis for thinking that the other is true.

If there is any doubt about whether a word is truly a premise/conclusion indicator or not, you can use the substitution test. Simply substitute another word or phrase from the list of premise indicators or conclusion indicators and see if the resulting sentence still makes sense. If it does, then you are probably dealing with an argument. If it doesn’t, then you probably aren’t. **For example**, we can substitute “it follows that” for “so” in the

Bob-the-arsonist example: Bob-the-arsonist has been dead for a year; it follows that Bobthe-arsonist didn’t set the fire at the East Lansing Starbucks last week.

However, we cannot substitute “because” for “so” in the so-happy-I-finished that-class example:

I am because happy to have finally finished that class. Obviously, in the latter case the substitution of one conclusion indicator for another makes the sentence meaningless, which means that the “so” that occurred originally wasn’t functioning as a conclusion indicator.

Arguments vs. explanations

So far I have defined arguments in terms of premises and conclusions, where the premises are supposed to provide a reason (support, evidence) for accepting the conclusion. Many times, the goal of giving an argument is simply to establish that the conclusion is true. **For example**, when I am trying to convince someone that obesity rates are rising in the U.S. I may cite evidence such as studies from the Center for Disease Control (CDC) and the National Institute of Health (NIH). The studies I cite would function as premises for the conclusion that obesity rates are rising. **For example**:

We know that obesity is on the rise in the U.S. because multiple studies carried out by the CDC and NIH have consistently shown a rise in obesity over the last four decades.
We could put this simple argument into standard form like this:

1. Multiple studies by the CDC and NIH have consistently shown a rise in obesity over the last four decades.

2. Therefore, obesity is on the rise in the U.S.

The standard form argument clearly distinguishes the premise from the conclusion and shows how the conclusion is supposed to be supported by the evidence offered in the premise. Again, the goal of this simple argument would be to convince someone that the conclusion is true. However, sometimes we already know that a statement or claim is true, and we are trying to establish why it is true rather than that it is true. An argument that attempts to show why its conclusion is true is an explanation. Contrast the previous example with the following:

The reason that the rate of obesity is on the rise in the U.S. is that the foods we most often consume over the past four decades have increasingly contained high levels of sugar and low levels of dietary fiber. Since eating foods high in sugar and low in fiber triggers the insulin system to start storing those calories as fat, it follows that people who consume foods high in sugar and low in fiber will tend to store more of the calories consumed as fat.

This passage gives an explanation for why obesity is on the rise in the U.S. Unlike the earlier example, here it is taken for granted that obesity is on the rise in the U.S. That is the claim whose truth we are trying to explain. We can put the obesity explanation into standard form just like any other argument. In order to do this, I will make some paraphrases of the premises and conclusion of the argument.

1. Over the past four decades, Americans have increasingly consumed foods high in sugar and low in fiber.

2. Consuming foods high in sugar and low in fat triggers the insulin system to start storing those calories as fat.

3. When people store more calories as fat, they tend to become obese.

4. Therefore, the rate of obesity is on the rise in the U.S.

Notice that in this explanation the premises (1-3) attempt to give a reason for why the conclusion is true, rather than a reason for thinking that the conclusion is true. That is, in an explanation we assume that what we are trying to explain (i.e., the conclusion) is true. In this case, the **premises** are supposed to show why we should expect or predict that the conclusion is true. **Explanations** often give us an understanding of why the conclusion is true. We can think of explanations as a type of argument, we just have to distinguish two different types of argument: **those that attempt to establish that their**

conclusion is true (arguments), **and those that attempt to establish why their conclusion is true (explanations)**.

Exercise 1 : Which of the following are arguments? If it is an argument, identify the conclusion of the argument.

1. The woman in the hat is not a witch since witches have long noses, and she doesn't have a long nose.

Argument, Conclusion - The woman in the hat is not a witch the other two are the premises that supports the conclusion.

2. I have been wrangling cattle since before you were old enough to tie your own shoes.

3. Albert is angry with me, so he probably won't be willing to help me wash the dishes.

4. First I washed the dishes and then I dried them.

5. If the road wasn't icy, the car wouldn't have slid off the turn.

6. Albert isn't a fireman, and he isn't a fisherman either.

7. Are you seeing that rhinoceros over there? It is huge!

8. The fact that obesity has become a problem in the U.S. is shown by the fact that obesity rates have risen significantly over the past four decades.

9. Bob showed me a graph with the rising obesity rates, and I was very surprised to see how much they've risen.

10. Albert isn't a fireman because Albert is a Greyhound, which is a kind of dog, and dogs can't be firemen.

11. Charlie and Violet are dogs and since dogs don't sweat, it is obvious that Charlie and Violet don't sweat.

12. The reason I forgot to lock the door is that I was distracted by the cl
own riding a unicycle down our street while singing Lynyrd Skynyrd's "Simple Man."

13. What Bob told you is not the real reason that he missed his plane to Denver.

14. Samsung stole some of Apple's patents for their smartphones, so Apple stole some of Samsung's patents back in retaliation.

15. No one who has ever gotten frostbite while climbing K2 has survived to tell about it, therefore no one ever will.

Exercise 2: Which of the following is an explanation and which is an argument? Identify the main conclusion of each argument or explanation. (Remember if the premise(s) seems to be establishing that the conclusion is true, it is an argument, but if the premise(s) seems to be establishing why the conclusion is true, it is an explanation.)

1. Wanda rode the bus today because her car was in the shop.

2. Since Wanda doesn't have enough money in her bank account, she has not yet picked up her car from the shop.

3. Either Bob or Henry rode the bus to work today. But it wasn't Henry because I saw him riding his bike to work. Therefore, it was Bob.

4. It can't be snowing right now since it only snows when it is 32 degrees or below and right now, it is 40 degrees.

5. The reason some people with schizophrenia hear voices in their head is that the cognitive mechanism that monitors their own self-talk is malfunctioning and they attribute their own self-talk to some external source.

6. Fracking should be allowed because, although it does involve some environmental risk, it reduces our dependence on foreign oil and there is much greater harm to the environment due to foreign oil drilling than there is due to fracking.

7. Wanda could not have ridden the bus today because today is a citywide holiday and the bus service is not operating.
8. The Tigers lost their star pitcher due to injury over the weekend; therefore, the Tigers will not win their game against the Pirates.

9. No one living in Pompeii could have escaped before the lava from Mt. Vesuvius hit. The reason is simple: the lava was flowing too fast and there was nowhere to go to escape it in time.

10. The reason people's allergies worsen when they move to Cincinnati is that the pollen count in Cincinnati is higher than almost anywhere else in the surrounding area.

READINGS AND VIDEO (Please see the digital copies of the materials.)

Reading 1 Van Cleave, M. (2016). Introduction to Logic and Critical Thinking. Retrieved from https://open.umn.edu/opentextbooks/textbooks/introduction-to-logic-and-critical thinking

Reading 2 Copi, I., Cohen, C & McMahon, K. (2014). Introduction to Logic Fourteenth Edition. London: Pearson Education Limited

Video 1 Arguments vs Explanation in https://www.youtube.com/watch?v=lEWTwbSRsaw

LECTURES (Please refer to the PowerPoint presentations)

ACTIVITY AND ASSESMENT

Answer Exercise 1 and 2 (Write your answer in a separate sheet of paper)

REFERENCES:

Introduction to Logic and Critical Thinking
Matthew J. Van Cleave, 2016

A Concise Introduction to Logic 9th Edition
Patrick J. Hurley, Wadsworth Thomson Learning, Inc. 2006