Philosophy 1100: Introduction to Ethics

Critical Thinking – Lecture 2

Background Material for the Exercise on Inference Indicators

Inference-Indicators and the Logical Structure of an Argument

1. The Idea of an Inference-Indicator

To offer an argument is to claim that certain things are the case, and that they provide a reason for believing that something else is the case. The propositions that one puts forward as reasons for believing something else are the premises of the argument. The proposition that they are intended to support is the conclusion of the argument. The logical steps by which one moves from the premises to the conclusion are the inferences.

To understand the logical structure of an argument is simply a matter of knowing what these three components are. To determine what the logical structure of an argument is, then, one needs to answer the following questions:

(1) What is the basic conclusion that this argument is attempting to establish?

(2) What are the premises, or assumptions, that the person is putting forward in support of the conclusion?

(3) What are the inferences that the person is making, and that are supposed to take one from the premises to the final conclusion?

How does one go about answering these questions? The answer is that a passage that contains an argument will generally contain a number of words or phrases that function as <u>inference-indicators</u>. Consider, for example, the following sentence:

"I have just polished off two six packs; I am feeling very nauseous; I am unable to get up off the floor, and the rest of the world is spinning around me at something approaching the speed of light. Therefore I am probably slightly drunk."

Here the word "Therefore" is an inference-indicator, and it functions to indicate that the fact that I have just polished off two six packs, am feeling very nauseous, am unable to get up off the floor, etc., is a reason for drawing the conclusion that I am probably slightly drunk. So the pattern it points to is the following:

[Reason, inference-indicator, conclusion].

Other inference-indicators work in the opposite way. They indicate that what follows provides a reason for what precedes. Here is an example of that sort of inference-indicator:

"Mary is probably a marginally better tennis player than I am, since she has beaten me 6-0 in each of the last ten sets we have played."

Here the word "since" is an inference-indicator. In particular, it indicates that what follows it - i.e., the fact Mary has beaten me 6-0 in the last ten sets that we've played - is a reason for believing what precedes it - i.e. that Mary is probably a marginally better tennis player than I am. So the pattern this sort of inference-indicator points to is as follows:

[Conclusion, inference-indicator, reason].

Notice, however, that with words that are inference-indicators of this second type, it is sometimes possible for the word order to be inverted:

"Since Mary has beaten me 6-0 in each of the last ten sets we have played, she is probably a marginally better tennis player than I am."

When this is done, the pattern that this sort of inference-indicator points to is instead this:

[Inference-indicator, reason, conclusion].

But what is always true with this sort of inference-indicator is that the inference-indicator is always <u>immediately</u> followed by the <u>reason</u>.

2. Inference-Indicators Versus Argument-Indicators

Consider the following passage:

"The existence of a deity who created our world can be proved in the following way. Everything that exists either is due to chance, or results from the operation of natural laws that made its existence necessary, or is due to the action of an intelligent designer and creator. Our world contains things, however - such as living organisms - that are very complex indeed, and because of this it is unreasonable to suppose that their existence is simply a matter of chance. But neither is it the case that the existence of such things is necessitated by natural law. Consequently, there must be an intelligent designer and creator who is ultimately responsible for the existence of such things."

Are there any inference-indicators present in this passage? The three most plausible candidates are the three expression "can be proved in the following way", and the terms "because", and "Consequently". Of these, the second and the third are inference-indicators, but the first is not. Why is this? The answer is that while the expression "can be proved in the following way" is what might be referred to as an <u>argument-indicator</u>, it is not an inference-indicator, since while it indicates that an <u>argument</u>, or proof, is about to be set out, it does not point to

any specific <u>inference</u> in that argument - that is, to any <u>transition</u> from a <u>premise</u> to a <u>conclusion</u>. The word "because", by contrast, indicates that the proposition referred to by the term "this" is a reason for accepting the claim that follows. Similarly, the word "Consequently" also points to an inference, since it indicates that what follows it is a conclusion, and that what precedes it contains one or more premises on which the conclusion in question is based.

In short, argument-indicators are valuable in that they do alert you to the fact that the author is offering an argument in support of his or her view. But, unlike inference-indicators, they provide one with no help in working out what the <u>logical structure</u> of the argument in question is.

3. Some Common Inference-indicators of the Two Types

1. Inference-indicators of Type 1:   [Reason, Inference-indicator, Conclusion]

therefore	hence	consequently
so	thus	accordingly
as a consequence	entails	implies
from which it follows		

2. Inference-indicators of Type 2:   [Conclusion, Inference-indicator, Reason]

**   [Inference-indicator, Reason, Conclusion]**

since	for	because
is implied by	is entailed by	is a consequence of
follows from		

4. Utilizing Inference-indicators to Work out the Logical Structure of an Argument

The basic idea, then, is that one can pick out passages that contain arguments, and begin to work out the logical structure of those arguments, by looking for words and phrases, such as those listed above, that function as one or other of the two types of inference-indicators.

In doing this, however, there are two points that it is important to note. First, there are **other** words and phrases, besides those listed above, that function as inference-indicators. The above lists contain only some of the more common ones.

Secondly, however, there are some words that it may be tempting to view as inference-indicators, but that are not functioning in that way. (Especially tricky in this regard are words that often function as inference-indicators, but that do not always do so.)

5. Some Words that Are Not Inference-Indicators

Of the words and expressions that can easily be mistaken for inference-indicators, four categories, in particular, deserve attention.

(1) Argument-Indicators or Proof-Indicators

This category was discussed above. The basic idea is that these proof-indicator or argument-indicator expressions point to a claim for which someone is going to offer an argument, but they are not inference-indicators, since they do not point to an inference - that is, a move from a premise to a conclusion.

Here are some typical examples of this sort of expression:

can be proved that   can be demonstrated that   can be shown that

(2) Contrastive Terms

As the label suggests, contrastive terms do not point to the presence of an argument, let alone to a specific inference: they simply contrast one claim with another claim.

Here are some typical examples of contrastive expressions:

but   nonetheless   nevertheless   on the contrary

(3) Enumerative Terms

This third category consists of expressions that sometimes indicate premises involved in an argument, but these expressions do not point to a place where an inference is being made - where one is moving from one or more premises to a conclusion.

Here are some typical examples of this sort of expression:

first   second   next   in addition   moreover

(4) Conditional Statements and the Word "then"

The word "then", when it is not a temporal term, occurs within conditional statements – that is, statements of the form "if p then q" – and in such cases, it may be tempting view the word "then" as an inference-indicator.

The source of this temptation is probably that some "if . . . then - - -" statements are closely related to inferences. Consider, for example, the statement "If Socrates is a man, and all men are mortal, then Socrates is mortal." Because this statement expresses a necessary truth, and does so in virtue of its logical form, there is a corresponding, valid argument, namely

(1) Socrates is a man.
(2) All men are mortal.

Therefore: (3) Socrates is mortal.

Nevertheless, "if . . . then - - -" statements do not express inferences in arguments. For one thing, it is only when an "if . . . then - - -" statement is necessarily true (and in virtue of its logical form), that there will be a corresponding, valid argument. More important, in an argument, one is asserting that the premises are true, and that the conclusion is true. To advance an "if . . . then - - -" statement, however, is not to assert either that that antecedent is true, or that the consequent is true.

The term "then" in an "if . . . then - - -" statement should be viewed, accordingly, as part of a sentential connective, on a par with words like "and" and "or".

(5) Causal Explanation Expressions

This final category is an especially tricky one, since it involves words that **often** function as inference-indicators, **but that do not do so in some contexts**. Consider, for example, the word "because" in the following sentence

(1) Suzanne has been swimming very good times because she has been doing a good deal of weight training

The word "because" is often an inference-indicator, but it is not so in the case of the present sentence. The reason is that the fact that Suzanne has been doing a good deal of weight training is not being offered as a <u>reason</u> for believing that Suzanne has been swimming very good times. It is being offered, rather, as <u>a causal explanation</u> of the fact that she is swimming good times. So it is important to distinguish, in the case of sentences containing the word "because", between sentences that offer reasons for thinking that some claim is true and sentences that offer a causal explanation (or other type of explanation) for why something is the case.

As another illustration of the need for care in identifying inference-indicators, consider the following three sentences containing the word "since":

(2) 1001 is not a prime number, since it is divisible by 11.

(3) Paul hasn't written to me since he went to Europe.

(4) John hasn't played golf the past two years, since he has been living in Antarctica.

In the first of these sentences, "since" does function as an inference-indicator, but in the second it indicates, instead, a temporal relation, while in the third it refers to an explanation of a certain fact, rather than offering a reason for thinking that something is true.

Careful attention to wording can sometimes help one to determine whether or not one has an inference-indicator. To see this, compare sentence (1) with sentence (5):

(5) Suzanne must be swimming very good times, because she has been doing a good deal of weight training.

Here the word "must" indicates that the speaker, rather than reporting a fact that he or she is already aware of - the fact that Suzanne is swimming very good times - is instead drawing a conclusion from something else that he or she knows, namely, that Suzanne has been doing a good deal of weight training. (Terms such as "must" and "necessarily" typically function in either of two quite different ways. Sometimes they indicate that a certain proposition is necessarily true, rather than merely contingently so, and sometimes – as in the present case - they indicate instead that the proposition in question follows from some other proposition.)

Similarly, compare sentence (3) with sentence (6):

(6) Paul can't have written to anyone, since he is in Europe, and all the mail carriers there are on strike.

Just as with the use of the term "must" in sentence (5), so the use of the word "can't" in sentence (6) strongly suggests that the speaker, rather than referring to a fact that he or she already knows - namely, that Paul hasn't written to anyone - is instead drawing that conclusion from other things that he or she knows - namely, that Paul is in Europe, and that all the mail carriers there are on strike.

Finally, the context in which a sentence occurs may also make a difference. Consider, for example, sentence (5) when it occurs in the context of the following conversation:

"I haven't been playing golf the past two years." "That's a little hard to believe, given that you virtually lived for golf in the past." "I haven't been playing golf the past two years, since I have been living in Antarctica."

Here what follows the word "since" in sentence (5) does appear to be offering a reason for believing what precedes the word "since". For doubt has been expressed about the claim that precedes the word "since", and so it is natural, in this context, to see sentence (5) as offering a reason for believing that claim. Thus, in this context, the word "since" does appear to be functioning as an inference-indicator.