

Philosophy 1100: Introduction to Ethics

Critical Thinking – Lecture 1

Background Material for the Exercise on Validity

Reasons, Arguments, and the Concept of Validity

1. The Concept of Validity

Consider the following three arguments:

Therefore: The moon is not made out of a dairy product
 Cheese is a dairy product
 The moon is not made out of cheese

Therefore: The moon is made out of cheddar cheese
 Cheddar cheese is blue cheese
 The moon is made out of blue cheese

Therefore: There are trees in the Quad
 It sometimes snows in Boulder
 There are cars in New York City.

In the case of each of the above three arguments, what things are good, and what things are bad?

Argument 1

1. One virtue of this first argument is that both of the premises of the argument are true.
2. A second virtue is that **if** the premises are true, the conclusion must also be true. The truth of the premises is sufficient to guarantee, then, the truth of the conclusion.

Argument 2

1. One obvious defect of this second argument is that both of the premises of the argument are false.
2. But this second argument does share one virtue with the first argument, since here too it is true that **if** the premises were true, the conclusion would also have been true. The truth of the premises would be sufficient to guarantee, then, the truth of the conclusion.

Argument 3

1. One virtue of the third argument is that both of the premises of the argument are true.
2. In addition, the conclusion is also true.
3. This third argument lacks, however, a crucial virtue that was shared by the first two arguments, since it is not the case that **if** the premises are true, the conclusion must also be true. Indeed, the truth of the premises in the case of this third argument is completely irrelevant to the truth of the conclusion.

As the above arguments illustrate, then, the evaluation of any argument involves **two issues**:

- (1) Are the premises of the argument **true, or at least plausible** - that is, likely to be true?
- (2) Do the premises provide **satisfactory support** for the conclusion of the argument?

2. Deductive Arguments Versus Inductive Arguments

Arguments are traditionally divided into two sorts - inductive and deductive:

- (1) In an inductive argument, where the reasoning is good, the premises make it **likely** that the conclusion is true.

Illustration: If one has drawn 100 marbles from an urn, and all of them have been red, then it is surely more likely, other things being equal, that the next marble will be red than that it will be green.

- (2) In a deductive argument, on the other hand, **the reasoning is good only if the relationship between the premises and the conclusion is such that it is logically impossible for all of the premises to be true, and yet the conclusion false.**

Deductive arguments where the reasoning is good are described as **valid** arguments. A valid argument, accordingly, is one where the truth of the premises suffices to guarantee the truth of the conclusion.

In ethics, almost all of the arguments that one encounters are deductive arguments, rather than inductive ones. The question of whether the **reasoning** involved in an argument is good in the case of an ethical argument almost always comes down, therefore, to the question of whether the reasoning is **valid**.

3. A General Test for Validity

Intuitively, then, what one can do to test whether an argument is valid is to ask oneself if one can imagine a world - which may be very different from the

actual world - in which all of the premises of the argument are true, but the conclusion is false. If one can, then the argument is invalid (or fallacious).

In testing whether an argument is valid, it is important, when trying to imagine a world in which the premises are all true, and yet the conclusion false, not to add on to the premises, unconsciously, extra assumptions that one naturally associates with the premises in question. For adding on such extra assumptions may suffice to guarantee the truth of the conclusion when the original premises themselves would not have done so.

4. Testing for Valid and Invalid Inference by Venn Diagrams

The study of logic began with Aristotle (384-322 B.C.), and one of the things that Aristotle particularly focused upon was the study of what are known as **syllogistic** arguments, where a syllogistic argument consists of two premises and a conclusion, and where the two premises share a common term - **the middle term** - which is not present in the conclusion.

Here are two examples of syllogistic arguments:

Socrates is a man.

All men are mortal.

Therefore: Socrates is mortal.

All politicians are honest and forthright people.

No honest and forthright people are demagogues.

Therefore: No politicians are demagogues.

Here, in the case of the first of these arguments, the middle term - which occurs in both premises, but not in the conclusion - is "man"/"men", while, in the second argument, the middle term is the expression "honest and forthright people".

Notice, also, that the statements in a syllogistic argument typically contain terms such as "all", "some", "no", "any", and "every" - although one can also have statements that refer instead to some specific individual - such as the statements "Socrates is a man" and "Socrates is mortal" in the case of the first argument.

Aristotle set out rules specifying when such syllogistic arguments are valid, and when they are invalid. Doing so is a somewhat complex matter, as will be clear if one considers variations on the following syllogistic argument:

All As are Bs

All Bs are Cs

All As are Cs

The term "all" occurs in both of the premises and in the conclusion. In each case, one could replace the given occurrence of the term "all" by the term "no", or by the term "some", generating arguments of a different logical form. So, for example, one could replace the second occurrence by "some", and the third by "no", giving one the following argument:

All As are Bs
Some Bs are Cs
 No As are Cs

The first argument form is valid, and the second is not. One needs, then, rules that specify which forms are valid, and which not. Moreover, since there are three possibilities for each occurrence of the term "all", one can generate a total of $(3 \times 3 \times 3) = 27$ different argument forms. This does not mean that one will need 27 separate rules. But it does suggest that giving a satisfactory account may be a somewhat complicated matter.

Long after the time of Aristotle, however, logicians arrived at much simpler ways of evaluating arguments that involve statements containing terms such as "all", "some", "no", "any", and "every", and which say that everything has some property, or that some things have some property, or that nothing has some property. In particular, the logician Venn (1834-1923) developed a very simple and useful technique for determining whether an argument is valid - now called the method of Venn diagrams.

The method provides a vivid way in which one can determine whether or not there could be possible worlds where all of the premises of a given argument are true, but the consequent false. The technique that Venn developed is as follows. First, one uses a circle - or any other closed curve - to represent the set of all the things that have some property, P. The idea is that things that fall inside the circle have property P, while things that fall outside the circle do not.

Secondly, if one uses two circles, A and B, to represent the things that have property P, and the things that have property Q, respectively, then there are four ways in which those two circles can be arranged relative to one another:

- (1) Circle A could be inside of circle B;
- (2) Circle B could be inside of circle A;
- (3) Circles A and B could overlap without either being inside the other;
- (4) Circles A and B might be totally outside of one another.

If one circle falls within another, that must indicate that everything with the property represented by the former circle also has the property represented by the latter circle. So possibilities (1) and (2) above correspond to:

- (1) All things with property P have property Q;
- (2) All things with property Q have property P.

If, on the other hand, circles A and B overlap without either being inside the other, that corresponds to the possibility that

- (3) Some things with property P have property Q.

Finally, if circles A and B are totally outside of one another, that corresponds to the possibility that

(4) Nothing with property P has property Q.

Thirdly, there may, of course, be sets of things that are completely empty - such as the set of all unicorns. One needs to have a way of representing, then, the statement that a given set is not empty. This can be done by placing a letter inside the circle in question.

Fourthly, some arguments refer to a specific individual - such as Socrates. In that case, one should choose a letter to represent that specific individual - such as the letter 's' for Socrates - and one can then place it inside of the relevant circle or circles.

Finally, one evaluates a given argument by drawing in circles to represent all the properties mentioned in the premises or in the conclusion, and uses letters to represent any specific individuals referred to in the premises or in the conclusion, and then one considers all of the possible ways in which the circles and letters might be arranged so as to make all of the premises true. The question then is whether there is any arrangement that makes all of the premises true, but makes the conclusion false. If there is, the argument is invalid. If there is no such arrangement, the argument is valid.

To clarify this technique, let's try diagramming the following arguments to determine, for each argument, whether it is valid or not.

	All men are mortal.
	<u>Socrates is a man.</u>
Therefore:	Socrates is mortal.
	Marlboro men do not eat quiche.
	<u>John does not eat quiche.</u>
Therefore:	John is a Marlboro man.

5. Hypothetical Statements, and Valid and Invalid Patterns of Inference

Consider the following arguments:

Argument 1:	If it's not raining today, we'll go on a picnic
	<u>It's not raining today</u>
	Therefore: We'll go on a picnic.
Argument 2:	If it's not raining today, we'll go on a picnic
	<u>It's raining today</u>
	Therefore: We won't go on a picnic.

Argument 3: If it's not raining today, we'll go on a picnic
We won't go on a picnic
 Therefore: It's raining today.

Argument 4: If it's not raining today, we'll go on a picnic
We'll go on a picnic
 Therefore: It's not raining today.

Which of these arguments is valid - that is, which of these arguments is such that it is logically impossible for all of the premises to be true, while the conclusion is false?

People often have problems deciding correctly which of the above arguments are valid, and which are not. Compare the above four arguments with the following four arguments:

Argument 1: If Woofer is a cat, Woofer is an animal.
Woofer is a cat.
 Therefore: Woofer is an animal.

Argument 2: If Woofer is a cat, Woofer is an animal
Woofer is not a cat.
 Therefore: Woofer is not an animal.

Argument 3: If Woofer is a cat, Woofer is an animal.
Woofer is not an animal.
 Therefore: Woofer is not a cat.

Argument 4: If Woofer is a cat, Woofer is an animal
Woofer is an animal
 Therefore: Woofer is a cat.

These four arguments are much easier to evaluate for validity. But what is the relevance of these other four arguments? The answer is that in the strict sense of the term "valid", an argument is valid because of its logical form, and this means that any two arguments that have the same form must either both be valid or both be invalid. This means that when one replaces all occurrences of any descriptive expression in the sentences of a **valid** argument by some other expression, if the original argument was valid, the new argument must also be valid. (It is not the case, incidentally, that when one replaces all occurrences of any descriptive expression in the sentences of an **invalid** argument by some other expression, if the original argument was invalid, the new argument must also be invalid. The following, for example, is an invalid argument: $A \supset B$. Therefore, $A \supset C$. But if one replaces 'C' by 'B', the result is a trivially valid argument: $A \supset B$. Therefore, $A \supset B$.)

The point then is that the arguments in the first set of four arguments have the same logical form as the arguments in our second set of four arguments. This

can be seen by making the following substitutions in the second set of four arguments:

- (1) Replace "Woofers are cats" by "It's not raining"
- (2) Replace "Woofers are not cats" by "It is raining"
- (3) Replace "Woofers are animals" by "We'll go on a picnic"
- (4) Replace "Woofers are not animals" by "We won't go on a picnic"

When one does this, one winds up with the first set of four arguments.

Let's return, then, to the first set of four arguments. In thinking about those arguments, it may be helpful to notice that one can consistently say: "If it's not raining today, we'll go on a picnic; if it is raining today, we'll (still) go on a picnic. That is, we'll go on a picnic regardless of whether it rains." Noticing that this is perfectly consistent may help one to see that arguments 2 and 4 are not valid. For if some conclusion, *C*, does not follow when you add more information to your original premises, then the original premises cannot suffice to ensure that the conclusion, *C*, is true.

Why is that, given two arguments that have the same logical form, it can be easier in one case than in the other to see that the argument is invalid? One reason is that the premises of one argument may tempt one to import an additional premise that seems very natural, and that when added to the original premises, produces a valid argument. In the present case, since people do not usually go on picnics when it is raining, it is natural to add unconsciously the following premise to the two premises in the argument:

If it's raining, we won't go on a picnic.

But there is also a second reason, which is connected with the idea of **conversational implicature**. When a person utters a sentence, that sentence will entail various propositions, since by virtue of the meaning of the sentence. But there are conventions that govern conversation. One, for example, is that one should normally refrain from making a statement that is weaker than some stronger and equally simple statement. So for example, if Mary asks John about the weather in the mountains, if John knows that it is snowing, he should not say that it is either raining or snowing, even though that sentence is perfectly true. The reason he shouldn't say that is that Mary will naturally assume that John does not know that it is snowing, and does not know that it is raining; he knows only that one or other of those two things is the case.

Similarly, if one were to say that if it is not raining, we'll go on a picnic, that would violate the conversational convention just mentioned if we're going to go on a picnic regardless of whether or not it is raining. So if someone says that if it is not raining, we'll go on a picnic, a conversational implicature of their saying that is that if it is raining, we won't go on a picnic. But the latter sentence is not entailed by the former, as is shown by the fact that someone can say,

without contradicting themselves, "If it is not raining, we'll go on a picnic. If it is raining, we'll still go on a picnic. We'll go on a picnic come hell or high water."

One way of guarding against the temptation of fallacious inferences involving "if-then" statements is to be familiar with rules about valid and invalid forms of inference involving "if-then" statements.

I. The following inferences are valid:

	If p, then q		If p then q
	<u>p</u>		<u>Not q</u>
Therefore:	q	Therefore:	Not p
	(Affirming the antecedent)		(Denying the consequent)

II. The following inferences are not valid:

	If p, then q		If p then q
	<u>q</u>		<u>Not p</u>
Therefore:	p	Therefore:	Not q
	(Affirming the consequent)		(Denying the antecedent)

6. Statements Involving the Word "Only"

We have been considering "if-then" statements. A statement of the form "If p, then q" can also be written as "q if p". But now consider the following statements containing the word "only": "q only if p" and "q if and only if p". How are they related to "if-then" statements?

"q if and only if p" can be written more explicitly as "q if p and q only if p". But what about the part "q only if p"? One way of re-expressing that is as saying that if p is not the case, then q is not the case: "if not p, then not q". But the latter is necessarily equivalent to "If q then p".

The upshot is that a sentence of the form "q if and only if p" is a way of saying "if q then p, and if p then q". (Philosophers sometimes abbreviate "q if and only if p" as "q iff p".)

Consider, finally, **general statements** containing the word "only", such as "Only Americans born in the United States can be President."

What this says is one can be President **only if** one is an American born in the United States. So it could also be written as follows:

"If one can be President, then one is an American born in the United States."

7. “Only if” Statements Versus “If and only if” Statements”

A confusion that one needs to avoid, and that occurs quite frequently, is between statements involving “only if” and statements involving “if and only if”. On the face of it, one might find it surprising that there is any confusion, since “p is and only if Q” says more than “p only if q”, since it says that, and it also says “p if q”.

But suppose that Mary asks her mom whether she can play a video game, and her mom says that she can play a video game only if she has finished her home work. If Mary finishes her homework, she will probably conclude that she can play a video game. But her mom didn’t say that Mary could play a video game **if** she finished her homework. What she said was that Mary could play a video game **only if** she finished her homework. But in the context, it was natural for Mary to take her mom as saying that she could play a video game **if and only if** she finished her homework.

The moral is this. People sometimes say “only if” when they really mean “if and only if”. But it is important to avoid confusing “only if” statements with “if and only if” statements, since “if and only if” statements say more than “only if” statements.