

Philosophy 3480: Critical Thinking

Lecture on Reasons, Arguments, and the Concept of Validity

(1) The Concept of Validity

Consider the following three arguments:

The moon is not made out of a dairy product

Cheese is a dairy product

Therefore: The moon is not made out of cheese

The moon is made out of cheddar cheese

Cheddar cheese is blue cheese

Therefore: The moon is made out of blue cheese

There are trees in the Quad

It sometimes snows in Boulder

Therefore: There are cars in New York city.

As the above arguments illustrate, the evaluation of any argument involves two issues. First, are the premises of the argument plausible - that is, likely to be true? Secondly, do the premises provide satisfactory support for the conclusion of the argument?

Arguments are traditionally divided into two sorts: inductive and deductive. In an inductive argument, where the reasoning is good, the premises make it likely that the conclusion is true. 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 arguments almost always comes down, therefore, to the question of whether the reasoning is valid.

(2) 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 not done so.

(3) 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.

As an exercise, try diagramming the following arguments to determine, for each argument, whether it is valid or not.

 All men are mortal
 Socrates is a man
Therefore: Socrates is mortal

 Marlboro men do not eat quiche
 John does not eat quiche
Therefore: John is a Marlboro man

(4) Valid and Invalid Patterns of Inference - Hypothetical Reasoning

Consider the following arguments:

- Argument 1: If it's not raining today, we'll go on a picnic
It's not raining today.
 Therefore: We'll go on a picnic.
- Argument 2: If it's not raining today, we'll go on a picnic
It's raining today.
 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?

In thinking about this, 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.

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
Therefore:	$\frac{p}{q}$	Therefore:	$\frac{\text{Not } q}{\text{Not } p}$

(Affirming the antecedent)

(Denying the consequent)

II. The following inferences are not valid:

	If p, then q		If p then q
Therefore:	$\frac{q}{p}$	Therefore:	$\frac{\text{Not } p}{\text{Not } q}$

(Affirming the consequent)

(Denying the antecedent)