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An Overview of Arguments

An *argument* is a group of statements, one of which (the *conclusion*) is taken to be supported by the remaining statements (the *premises*).

<u>*Five types of Arguments*</u>: **Inductive**, **Deductive**, **Abductive, Practical**, and **Other**.

An **Inductive** argument is an argument where the premises describe some cases of a phenomenon, and the conclusion predicts that further cases will be like those cases.
Three examples:

(P1) The sun rose today.
(P2) The sun rose yesterday.
(P3) The sun rose the day before yesterday.
(P4) The sun rose the day before the day before yesterday.
[etc.]
(C1) So, the sun will rise tomorrow.

(P1) Everyone I know has been stung by a bee.
(C) So, everyone has been stung by a bee.

(P1) 80% of our random sample reject communism.[1]
(C) So, 80% of the population reject communism.

Some of these are better arguments than others—but even in the first example, the premises do not strictly *guarantee* the truth of the conclusion. It is *possible*, albeit unlikely, that a gigantic burst of Q-radiation will destroy the earth tonight (no more sunrises!). Yet an inductive argument can count as a ***good*** argument to the degree that the conclusion is ***likely*** given the premise(s).

A **Deductive** argument, on the other hand, *does* strictly guarantee the truth of the conclusion, provided that the premises are all true. In a deductive argument, it is *logically impossible* to have all true premises and a false conclusion.

<u>Official Definition</u>: An argument is **deductive** if and only if [abbreviation: "iff"] it is not possible for the premise(s) to be true and the conclusion false.
Example of a deductive argument:

(P1) Imani likes either Coke or Pepsi.
(P2) Imani does not like Pepsi.
(C) So, Imani likes Coke.

[1] Technical note: The "cases" of concern in this premise are not individual people. Rather, the premise concerns a *group* of people. And the conclusion predicts that a further group will be like the observed group. Accordingly, the argument is not equivalent to "Each person in our random sample is 80% likely to reject communism; hence, each person in the population is 80% likely to reject communism." (That argument is inductive too, but the premise would often be false. A large random sample may well have people who are 100% against communism!)

So with a deductive argument, if we get you to accept the premises, then you *must accept the conclusion too*. Why? 'Cause in a deductive argument there's no way for both the premises to be true and the conclusion false.

Unfortunately, most of the time a deductive argument is called (misleadingly) a 'valid argument'. The label is misleading, since you can have a "valid" argument which is nonetheless a bad argument, all things considered. That's because the premises might be totally implausible. Yet the argument still counts as "valid" if it is the kind of argument where *if* you granted the premises, the conclusion *would* be guaranteed.

So if you hear a logician call an argument "valid," that does not mean that it is ultimately a good argument. Conversely, if an argument is "invalid," that does not mean it is a bad argument! All *inductive* arguments are invalid, technically speaking, i.e., they are non-deductive. Still, as we saw, there can be *good* inductive arguments. Thus, if you say that an argument is "invalid," you're saying that the premises do not *guarantee* the conclusion. Though the premises may still make the conclusion *very likely* for all that.

The term 'valid' is also misleading in that "validity" concerns a *relationship* between premise(s) and conclusion. It is NOT directly concerned the *actual truth* of the statements in the argument! This is contrary to how we use the word 'valid' outside the logic classroom: Ordinarily, we say that someone has made a "valid point" or that someone's perspective is "valid" when we mean that s/he made a true statement. But this is NOT how logicians use 'valid'—they say only that *arguments* are "valid." (Consequently, logicians do not speak of a point or a perspective as "valid;" they say instead that someone has a good point or has a legitimate perspective, etc.)

Of course, not every argument is deductive (= valid). Here's one example:

(P1) Imani likes either Coke or Pepsi.
(P2) Imani does not like Mountain Dew.
(C) So, Imani likes Coke.

In this, it is possible for the premises to be true, and the conclusion false. That's not to say the premises are *actually* true or the conclusion is *actually* false. Rather, it's just to say that this combination of truth and falsity is *possible*. A non-deductive (= invalid) argument is also called a *non-sequitur*—it is an argument where the conclusion is "does not follow" from the premise(s).

Some deductive arguments are also SOUND: An argument is *sound* iff it is BOTH deductive AND has only true premises. Thus, an argument is *unsound* iff it is not deductive or some premise is false. So, to check that an argument is sound, you have to verify that the argument is deductive and that *every* premise is true. Example:

(P1) If a thing is a rectangle, then it's not a circle.
(P2) This page is a rectangle.
(C) So, this page is not a circle.

This argument is sound, since it is deductive, and all of its premises are true.

Example of an unsound argument:

(P1) If Bill Gates is poor, then I'm a monkey's uncle.
(P2) Bill Gates is poor.
(C) So I'm a monkey's uncle.

This argument is unsound: Although it is deductive, it is not true that Bill Gates is poor.

NOTE: Truth and Falsity are NOT properties of *arguments*, but of *statements*. Thus, we do not say that a deductive argument is "true;" rather, we can say that it is deductive or that it is sound. Or, if we want to talk of "true" and "false," we can evaluate the *statements in the argument* as true or false.

An **Abductive** argument is an argument that is neither deductive nor inductive, where the conclusion stands as an *explanation* of the collection of facts given in the premises.
Examples:

(P1) I can't get online from my computer.
(P2) You can't get online from your computer.
(C) So, the University network is down.

(P1) My head aches.
(C) So, my head is shrinking

Even in the first example, it is possible for the conclusion to be false, even if the premises are true. (Perhaps we have both been banned from the network.) Nevertheless, the premises could render the conclusion more likely than not—and that makes the argument worth considering.

Note well that neither example is inductive. Unlike an induction, there is no *single* type of phenomenon at issue. E.g., in the first example, the premises concern our computers, and the conclusion concerns the University network. These may be related, but they are not examples of *one* phenomenon! Accordingly, the conclusion is not predicting that further examples will be like examples of the *same* phenomenon described in the premises.

[Aside: You may object that the first example assumes "If we both can't get online, then the University network is down." This may feel like an inductive prediction. However, that would be an *additional premise* in the argument. Moreover, adding that premise would render the argument *deductive* rather than inductive! Do you see why?]

Unfortunately, however, there are inductive and deductive arguments whose conclusions "explain" the premises in some sense. The second example of an **inductive** argument [above] could be said to have an "explanatory" conclusion. Further, the conclusion is also "explanatory" in the following *deductive* argument:

(P1) This figure is a triangle.
(C) So, this figure is a closed, three-sided figure.

After all, if the figure is a closed three-sided figure, that "explains" why it is a triangle. But still, the argument is deductive and NOT abductive, because the truth of the premise would *guarantee* that the conclusion is true. That fact trumps all.

Thus, in order to tell whether an argument is abductive, you must FIRST discern that the argument is <u>*neither deductive nor inductive*</u>.

Like an inductive argument, however, an abductive argument is a ***good*** *abductive argument* to the degree that the conclusion is *likely* given the premise(s). If the conclusion of an abductive argument is the *most likely* explanation out of all the explanations available, then the abductive argument is sometimes called an *inference to the* ***best*** *explanation.*

A **Practical** argument is an argument where the conclusion evaluates (as good or bad) some *action*, yet the argument is not deductive, nor inductive, and nor abductive. Often, the conclusion contains verbs like 'should' or 'ought', or it describes an action using terms like 'good' or 'bad'. Examples:

(P1) Stocks are low right now.
(P2) The economy will recover soon.
(C) So, I should buy stocks right now.

(P1) Kidnapping children makes money.
(C) So, it is good to kidnap children.

Neither of these arguments are deductive. Re: the first example, even if the premises are true, I might barely have enough money to feed my family. Nonetheless, the first example may well be a good argument if I have expendable income. So we want to recognize arguments of this type, given that they are sometimes legitimate, even though they are neither deductive, nor inductive, nor abductive.

When exactly is a practical argument a ***good*** *practical argument*? NOBODY KNOWS**.** That is debated vigorously among ethicists. (But notably, Decision Theory is an attempt to render some of these arguments as deductive, by importing further assumptions into such arguments. See the optional handout "Decision Theory Primer" for more details.)

<u>IMPORTANT</u>: Some arguments have conclusions which evaluate actions, and yet they are NOT practical arguments. Consider the following *inductive* and *deductive* arguments (respectively):

(P1) I shouldn't have played the lottery today.
(P2) I shouldn't have played the lottery yesterday.
(P3) I shouldn't have played the lottery the day before that.
[etc.]
(C) So, I shouldn't play the lottery tomorrow.

(P1) Thou shalt not steal.
(C) So, I should not steal this iPhone.

There are also *abductive* arguments with recommendations for/against various actions. So remember that the term 'practical argument' is reserved for an argument that is NOT any of the previous three types.

Other arguments exist besides the four types already listed. Some arguments in the "other" category are mixtures. Consider, for instance:

(P1) My car is usually out of gas.
(P2) My car currently isn't running.
(C) So, my car is currently out of gas.

The argument can appear to be inductively *and* abductively supported. Consider that if the argument just consisted of (P1) and (C), it would be inductive. Or if the argument just consisted of (P2) and (C), then it would look abductive. Yet since you've got both premises, it is *neither* inductive nor abductive. (Check the definitions of 'inductive' and 'abductive' to see why.)

A different kind of "other" argument is an enthymeme: In these arguments, too much is left out to say more precisely what type of argument it is. For instance:

(P1) The Democrats took control of the Congress and the White House.
(C) Thus, the economy will improve.

How is (C) supported by (P1) here? Is this an inductive prediction based on past cases (which aren't explicitly mentioned)? Or are we *deducing* the conclusion from a suppressed premise like "whenever the Democrats are in control, the economy improves"? It's impossible to say. So we put it in the "other" category.

Relatedly, some arguments can't be classified simply because they are *just a mess*. Consider:

(P1) I have ten toes.
(P2) Penguins live in Antarctica.
(C) So, Biden's economic plan will fail.

Observe that out of context, these three sentences would not seem to be an *argument* at all. But here, they indeed constitute an argument since one statement is marked as the conclusion (and other statements are marked as premises). So in this case, the three statements *are* an argument; it's just that it's a *really bad* argument. Because of that, it's not at all clear how the premises are meant to support the conclusion; hence, the argument goes in the "other" category.

Finally, some arguments in the "other" category are arguments by analogy. These are arguments that start from a similarity or analogy between two things. It then concludes that what's true of one is be true of the other. Here's a famous example:

(P1) A watch has a designer.
(P2) Our universe is like a watch.
(C) So, our universe has a designer.

This goes in the "other" category because it doesn't qualify as any of the other types:

- The truth of the premises would not guarantee the conclusion. Hence, the argument is not deductive.
- The premises do not list examples of universes with designers—so it's not inductive.
- The conclusion does not explain the joint truth of the premises—so it's not abductive.
- Finally, the conclusion is not a "should" or "ought" conclusion. Thus, it's not a practical argument either.

[Actually, some logic textbooks classify arguments by analogy as inductive. However, when logicians speak of induction, they normally do not have analogical reasoning in mind. And conversely, they are not thinking of induction when they talk of analogical reasoning.]

Unlike the just-plain-awful arguments, it is not *obvious* whether the watch-argument (for example) is a bad argument. It would depend on how appropriate the analogy is—i.e., whether the universe is similar *in the right way* to a watch. I'll let the theologians among you decide on that. But generally, an argument by analogy is a good argument to the extent that the analogy is a "tight" one (to put it roughly).

OPTIONAL APPENDIX

The preceding should suffice to give you an adequate grasp of the main types of arguments. However, if you're curious, you might consider a few further observations:

"Tricky" Premises

One thing you might notice is that *any* argument can be interpreted as deductive, if one interprets the argument as having the following implicit premise:

(IP) If all implicit and explicit premises of this argument are true, then so is the conclusion.

For example, remember our earlier inductive argument:

(P1) Everyone in my family has been stung by a bee.
(C) So, absolutely everyone has been stung by a bee.

This will be *deductive* if (IP) is included as an implicit premise of the argument.

Yet adding (IP) does not make the conclusion better supported: (IP) is certainly false in that instance. And to keep things simpler, let us henceforth assume that (IP) is *not* part of the arguments we consider. Still, it is worth noting that there is this "trick" for interpreting any argument as a deductive argument.

A related point is that we might read the argument as instead containing the following implicit premise:

(IP2) If all implicit and explicit premises of this argument are true, then the conclusion is likely.

If this is included as a premise, then you might notice that the argument no longer counts as "inductive" by our definition: Not all the premises describe the relevant phenomenon. But just to keep things simple, assume that none of the arguments we consider include (IP2) either.

Degenerate Deductions

Consider the following example:

(P1) Today is Tuesday.
(P2) Tomorrow is Wednesday.
(C) So, either you are pregnant or not.

The conclusion is a truism—it is *impossible* for that conclusion to be false! But weirdly, this automatically means that the argument is *deductive*. After all, recall the official definition:

Official Definition: An argument is **deductive** iff it is not possible for the premise(s) to be true and the conclusion false.

Again, it is not possible for the conclusion in our example to be false. But if the conclusion cannot be false, then you cannot have the combination: True premises and false conclusion. (If one half of the combination is impossible, then the combination itself is impossible.) But the impossibility of that combination is what makes an argument deductive, per our official definition.

Of course, it's a rather silly argument…so even though it's deductive, we might regard it as a "degenerate" case of deduction.

A different kind of "degenerate" case is seen in the following:

(P1) You are pregnant and you are not pregnant.
(C) So, today is Tuesday.

Here too, the argument vacuously meets the official definition of deduction. It is not possible for the premise to be true. Therefore, it is not possible for the premise to be true when the conclusion is false. So the argument satisfies the official definition of deduction.