Introduction to Analyzing and Evaluating Arguments

1. HOW TO ANALYZE AN ARGUMENT

Example 1. Socrates must be mortal. After all, all humans are mortal, and Socrates is a human.

What does the author of this passage want you to believe?

What reasons to believe that claim does he or she provide?

- We use the word argument to refer to a series of reasons given to support a claim.
- The claim being supported is the conclusion.
- The reasons given to accept the conclusion are called premises.

Rewrite the argument in Example 1 in the following format, which I will call “standard deductive form:”

Premise 1
Premise 2
...
Conclusion

Analyzing an argument means identifying its premises and conclusion. A standard way to do so is to write its premises as a list, followed by a solid line, followed by its conclusion.

Example 2. Fifteen years ago, Omega University implemented a new procedure that encouraged students to evaluate the teaching effectiveness of all their professors. Since that time, Omega professors have begun to assign higher grades in their classes, and overall student grade averages at Omega have risen by 30 percent. Potential employers, looking at this dramatic rise in grades, believe that grades at Omega are inflated and do not accurately reflect student achievement; as a result, Omega graduates have not been as successful at getting jobs as have graduates from nearby Alpha University. To enable its graduates to secure better jobs, Omega University should terminate student evaluation of professors. (From the GRE Pool of Argument Essay Topics)
What is the conclusion of the author’s argument?

What are his or her premises?

Rewrite the argument in standard deductive form.

Exercises. Rewrite each argument in standard deductive form.

1. **Example 3.** The death penalty should be adopted only if it deters murder. However, it could only do this if murderers understood the consequences of their actions before acting, and since this is not so, we must reject adopting the death penalty. (From the *Internet Encyclopedia of Philosophy*)

2. **Example 4.** Bertrand Russell must have been witty and written many books. After all, some philosophers who are now dead were witty and wrote many books, and Bertrand Russell was a philosopher who is now dead. (Adapted from Ian Hacking's *An Introduction to Probability and Inductive Logic*)

2. **HOW TO EVALUATE AN ARGUMENT**

Return to Example 1. Assuming that the premises are true, is there any way that the conclusion could be false?
If there is no way for the premises to be true and the conclusion to be false, then the argument is *deductively valid* (or just *valid*).

Are the premises true?

Should we accept the argument’s conclusion?

If an argument is deductively valid and its premises are true, then it is *sound*. The conclusion of a sound argument *must* be true.

**Example 5.** Socrates must be purple. After all, all cows are purple, and Socrates is a cow.

Rewrite this argument in standard deductive form.

Is it deductively valid?

Is it sound?

Is the conclusion true?

**Example 6.** Socrates must be a philosopher. After all, all cows are philosophers, and Socrates is a cow.

Rewrite this argument in standard deductive form.
Is it deductively valid?

Is it sound?

Is the conclusion true?

An argument can be valid but not sound. The conclusion of a sound argument can be either true or false. The fact that the argument is unsound just means that it does not establish that its conclusion is true.

Example 7.
Socrates is an ancient Athenian.
Some ancient Athenians are philosophers. Socrates is a philosopher

Example 8.
Socrates is an ancient Athenian.
Some ancient Athenians are women.
Socrates is a woman.

Are either of these arguments deductively valid?

Are either of these arguments sound?

Do either of these arguments have a true conclusion?

An invalid argument is also unsound. The conclusion of an invalid argument can be either true or false. It just doesn’t establish that its conclusion is true.

Exercises

3. Use the words deductively valid and sound to fill in the blanks: all
____________________ arguments are ____________________, but not all
____________________ arguments are ____________________.
4. Use the words *deductively invalid* and *unsound* to fill in the blanks: all ______________ arguments are ________________, but not all ______________ arguments are ________________.

5. Circle the letter of each combination that is *impossible*. (Adapted from *Introduction to Probability and Inductive Logic*)
   a. All premises true. Conclusion true. Valid.
   b. All premises true. Conclusion false. Valid.
   c. One premise false. Conclusion true. Valid.
   d. One premise false. Conclusion false. Valid.
   e. All premises true. Conclusion true. Invalid.
   f. All premises true. Conclusion false. Invalid.
   g. One premise false. Conclusion true. Invalid.
   h. One premise false. Conclusion false. Invalid.

Classify the following arguments as deductively valid or invalid and as sound or unsound.

**Example 9.**
If the Pitt administration wants the university to have successful sports teams, then it will support efforts to recruit talented athletes.
The Pitt administration will support efforts to recruit talented athletes.
The Pitt administration wants the university to have successful sports teams.

**Example 10.**
The Pittsburgh Pirates have had many consecutive losing seasons.
A team that has had many consecutive losing seasons is likely to have a winning season next year because it is due for some success.
The Pittsburgh Pirates are likely to have a winning season next year.

After you have analyzed an argument, the first two steps in evaluating it are to check:

1. Must the conclusion be true if the premises are true? That is, is the argument ______________?
2. If so, are all the premises true? That is, is the argument ______________?

**3. BEYOND SOUNDNESS AND VALIDITY**
Which of the following arguments are valid?
Example 11.
The theory of continental drift claims that Antarctica once formed a land bridge between Australia and South America. This theory explains why marsupials are found almost exclusively in Australia and South America today and some marsupial fossils have been found in Antarctica. The theory of continental drift is true.

Example 12.
Men who smoke are 23 times more likely to develop lung cancer than men who do not smoke. Smoking causes lung cancer.

Example 13.
The law of universal gravitation asserts that all massive objects exert an attractive force on one another. No violation of the law of universal gravitation has ever been observed. The law of universal gravitation will continue to hold tomorrow.

Are these arguments worthless, or do they provide some support for their conclusions?

Some arguments support their conclusions despite being invalid. We call such arguments inductive. Arguments for scientific theories and predictions are typically inductive. Sometimes the phrase “inductively valid” is used, but inductive validity (unlike deductive validity) is a matter of degree.

Return to Example 2.

Example 2. Fifteen years ago, Omega University implemented a new procedure that encouraged students to evaluate the teaching effectiveness of all their professors. Since that time, Omega professors have begun to assign higher grades in their classes, and overall student grade averages at Omega have risen by 30 percent. Potential employers, looking at this dramatic rise in grades, believe that grades at Omega are inflated and do not accurately reflect student achievement; as a result, Omega graduates have not been as successful at getting jobs as have graduates from nearby Alpha University. To enable its graduates to secure better jobs, Omega University should terminate student evaluation of professors. (From the GRE Pool of Argument Essay Topics)
We can rewrite this argument in the following format, which I will call “standard inductive form:”

Premise 1
Premise 2
...
========
Conclusion

Student grade averages at OU have risen by 30 percent since OU started using student evaluations. Potential employers have noticed this trend and believe that it constitutes grade inflation. Because of this perception of grade inflation, OU grads have not been as successful in getting jobs as AU grads. OU should end student evaluations to help its students secure better jobs.

The double line indicates that we recognize that the argument is not deductively valid and are interested in assessing its “inductive validity,” that is, the degree to which the premises support the conclusion.

Assume for the moment that the premises of the argument are all true and think about ways in which the conclusion could nevertheless be false. What unstated assumptions is the person who presented this argument making?

What reasons might you give for questioning the arguments premises?
To assess an inductive argument, think of ways in which the premises could be true and the conclusion false. Identify unstated assumptions that the person presenting the argument is making. Also think about possible objections to the premises.

**Exercises**

Analyze the following inductive arguments by writing them in inductive standard form. Then evaluate them by identifying unstated assumptions, looking for objections to the premises, and giving an overall assessment of the extent to which the premises support the conclusion.

1. Murdering an innocent human being is wrong. Human fetuses are innocent human beings. Abortion kills a human fetus. Therefore, abortion is wrong.

2. Men who smoke are more likely to develop lung cancer than men who do not smoke. Therefore, smoking should be banned.
3. There is evidence that smoking causes lung cancer in men: men who smoke are 23 times more likely to develop lung cancer than men who do not smoke, and among male smokers, there is a positive correlation between the frequency and duration of smoking and the frequency of developing lung cancer.

4. Do the premises support the conclusion to a greater extent in argument 2, or in argument 3? Why?

4. PROBLEMS

Analyze the following arguments by writing them in either deductive or inductive standard form. Use deductive standard form if the argument is deductively valid or if it is deductively invalid and the premises fail to support the conclusion. Use inductive standard form if it is deductively invalid but the premises support the conclusion to some extent.

Then evaluate the argument. If you wrote it in deductive standard form, assess its validity and soundness. If you wrote it in inductive standard form, identify unstated assumptions and potential objections to the premises, then give an overall assessment of the strength of the argument.

1. In surveys Mason City residents rank water sports (swimming, boating and fishing) among their favorite recreational activities. The Mason River flowing through the city is rarely used for these pursuits, however, and the city park department devotes little of its budget to maintaining riverside recreational facilities. For years there have been complaints from residents about the quality of the river's water and the river's smell. In response, the state has recently announced plans to clean up Mason River. Use of the river for water sports is
therefore sure to increase. The city government should for that reason devote more money in this year's budget to riverside recreational facilities. (From the GRE Pool of Argument Essay Topics.)

2. If students were environmentally aware, they would object to the endangering of any species of animal. But the well known Greenwood white squirrel is endangered because the construction of the Learning Center and new Science Complex has destroyed its native habitat. Yet, no Lander student objected. Therefore, Lander students are not environmentally aware. (From the philosophy.lander.edu Introduction to Logic)