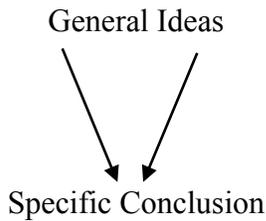


## Deductive and Inductive Reasoning

The two major types of reasoning, *deductive* and *inductive*, refer to the process by which someone creates a conclusion as well as how they believe their conclusion to be true.

**Deductive reasoning** requires one to start with a few general ideas, called *premises*, and apply them to a specific situation. Recognized rules, laws, theories, and other widely accepted truths are used to prove that a conclusion is right. The concept of deductive reasoning is often expressed visually using a funnel that narrows a general idea into a specific conclusion. In practice, the most basic form of deductive reasoning is the *syllogism*, where two premises that share some idea support a conclusion. It may be easier to think of syllogisms as the following theorem: If  $A=B$  and  $C=A$ , then  $B=C$ .

*Deductive Reasoning in Theory:*



*Deductive Reasoning in Theory:*

A is B  
C is A  
Therefore, B is C.

*Deductive Reasoning in Practice:*

All muscles are made out of living tissue.  
All humans have muscles.  
Therefore, all humans are made out of living tissue.

Note that the above paragraph states that the premises *prove* the conclusion, not justify it. Deductive reasoning is meant to demonstrate that the conclusion is absolutely true *based on the logic of the premises*. Compare the following syllogisms:

All musical instruments make sounds.

Airplanes make sounds.

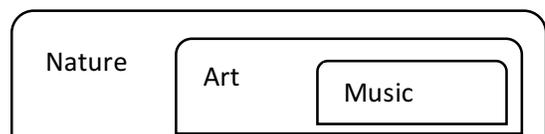
Therefore, airplanes are musical instruments.

All art is an imitation of nature.

Music is art.

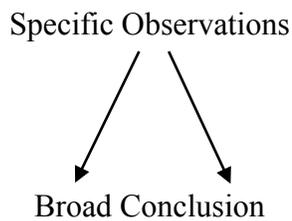
Therefore, music is an imitation of nature.

The syllogism on the left contains two objectively true premises, but its conclusion is false because it is possible for airplanes and instruments to be totally separate entities while still having the same properties. The syllogism on the right takes premises that overlap and uses them to prove that a statement is definitely true. Although deductive arguments rarely come in the exact form of a syllogism, the same thought process can be used to evaluate their strength and create counterarguments. You can more easily imagine the above syllogisms like this:



**Inductive reasoning** uses a set of specific observations to reach an overarching conclusion; it is the opposite of deductive reasoning. So, a few particular premises create a pattern which gives way to a broad idea that is likely true. This is commonly shown using an inverted funnel (or a pyramid) that starts at the narrow premises and expands into a wider conclusion. There is no equivalent to a syllogism in inductive reasoning, meaning there is no basic standard format. All forms of inductive reasoning, though, are based on finding a conclusion that is most likely to fit the premises and is used when making predictions, creating generalizations, and analyzing cause and effect.

*Inductive reasoning in Theory*



*Inductive Reasoning in Practice*

My neighbor's cat hisses at me daily.  
At the pet store, all the cats hiss at me.  
Therefore, all cats probably hate me.

Just as deductive arguments are meant to prove a conclusion, inductive arguments are meant to *predict* a conclusion. They do not create a definite answer for their premises, but they try to show that the conclusion is the most probable one given the premises. In the above example, there are several possible factors that could contribute to a cat's reaction toward the arguer. Perhaps she wears a deodorant that cats dislike, or maybe she is hostile toward cats and neglected to mention it. But, considering neither of these factors are acknowledged in the premises, these are not considered the most probable conclusions. The most probable conclusion, given the premises that have been supplied, is that cats hate the arguer. An inductive argument is either considered weak or strong based on whether its conclusion is a probable explanation for the premises. Compare these inductive arguments:

The cost of college has been increasing over the past several decades. Therefore, higher taxes on the rich are probably the best way to help middle class America thrive.

The past five Marvel movies have been incredibly successful at the box office. Therefore, the next Marvel movie will probably be successful.

Once again, the reasoning on the left is weak while the right is strong. On the left, the two statements made are likely true on their own, but the first premise does not predict the second to be true. Since there is no obvious correlation between the two, the argument is weak. On the right, the premise identifies a pattern, and the conclusion provides a logical continuation of this pattern without exaggeration. Thus, the argument is strong.

\*Note: With both deductive and inductive reasoning, a *strong* argument is not always *true*. For more information on identifying whether an argument works, refer to the "Identifying Logical Fallacies" handout.\*