6.3: Logic and the Role of Arguments

We use logic every day. Even if we have never formally studied logical reasoning and fallacies, we can often tell when a person’s statement doesn’t sound right. Think about the claims we see in many advertisements today – Buy product X, and you will be beautiful/thin/happy or have the carefree life depicted in the advertisement. With very little critical thought, we know intuitively that simply buying a product will not magically change our lives. Even if we can’t identify the specific fallacy at work in the argument (non causa in this case), we know there is some flaw in the argument.

By studying logic and fallacies we can learn to formulate stronger and more cohesive arguments, avoiding problems like that mentioned above. The study of logic has a long history. We can trace the roots of modern logical study back to Aristotle in ancient Greece. Aristotle’s simple definition of logic as the means by which we come to know anything still provides a concise understanding of logic (Aristotle, 1989). Of the classical pillars of a core liberal arts education of logic, grammar, and rhetoric, logic has developed as a fairly independent branch of philosophical studies. We use logic everyday when we construct statements, argue our point of view, and in myriad other ways. Understanding how logic is used will help us communicate more efficiently and effectively.

defining arguments

When we think and speak logically, we pull together statements that combine reasoning with evidence to support an assertion, arguments. A logical argument should not be confused with the type of argument you have with your sister or brother or any other person. When you argue with your sibling, you participate in a conflict in which you disagree about something. You may, however, use a logical argument in the midst of the argument with your sibling. Consider this example:
Brother and sister, Sydney and Harrison are arguing about whose turn it is to clean their bathroom. Harrison tells Sydney she should do it because she is a girl and girls are better at cleaning. Sydney responds that being a girl has nothing to do with whose turn it is. She reminds Harrison that according to their work chart, they are responsible for cleaning the bathroom on alternate weeks. She tells him she cleaned the bathroom last week; therefore, it is his turn this week. Harrison, still unconvinced, refuses to take responsibility for the chore. Sydney then points to the work chart and shows him where it specifically says it is his turn this week. Defeated, Harrison digs out the cleaning supplies.

Throughout their bathroom argument, both Harrison and Sydney use logical arguments to advance their point. You may ask why Sydney is successful and Harrison is not. This is a good question. Let’s critically think about each of their arguments to see why one fails and one succeeds.

Let’s start with Harrison’s argument. We can summarize it into three points:

1. Girls are better at cleaning bathrooms than boys.
2. Sydney is a girl.
3. Therefore, Sydney should clean the bathroom.

Harrison’s argument here is a form of deductive reasoning, specifically a syllogism. We will consider syllogisms in a few minutes. For our purposes here, let’s just focus on why Harrison’s argument fails to persuade Sydney. Assuming for the moment that we agree with Harrison’s first two premises, then it would seem that his argument makes sense. We know that Sydney is a girl, so the second premise is true. This leaves the first premise that girls are better at cleaning bathrooms than boys. This is the exact point where Harrison’s argument goes astray. The only way his entire argument will work is if we agree with the assumption girls are better at cleaning bathrooms than boys.
Let's now look at Sydney's argument and why it works. Her argument can be summarized as follows:

1. The bathroom responsibilities alternate weekly according to the work chart.
2. Sydney cleaned the bathroom last week.
3. The chart indicates it is Harrison's turn to clean the bathroom this week.
4. Therefore, Harrison should clean the bathroom.

Sydney's argument here is a form of inductive reasoning. We will look at inductive reasoning in depth below. For now, let's look at why Sydney's argument succeeds where Harrison's fails. Unlike Harrison's argument, which rests on assumption for its truth claims, Sydney's argument rests on evidence. We can define evidence as anything used to support the validity of an assertion. Evidence includes: testimony, scientific findings, statistics, physical objects, and many others. Sydney uses two primary pieces of evidence: the work chart and her statement that she cleaned the bathroom last week. Because Harrison has no contradictory evidence, he can't logically refute Sydney's assertion and is therefore stuck with scrubbing the toilet.

defining deduction

Deductive reasoning refers to an argument in which the truth of its premises guarantees the truth of its conclusions. Think back to Harrison's argument for Sydney cleaning the bathroom. In order for his final claim to be valid, we must accept the truth of his claims that girls are better at cleaning bathrooms than boys. The key focus in deductive arguments is that it must be impossible for the premises to be true and the conclusion to be false. The classic example is:

All men are mortal.
Socrates is a man.
Therefore, Socrates is mortal.

We can look at each of these statements individually and see each is true in its own right. It is virtually impossible for the first two propositions to be true and the conclusion to be false. Any argument which fails to meet this standard commits a logical error or fallacy. Even if we might accept the arguments as good and the conclusion as possible, the argument fails as a form of deductive reasoning.
A few observations and much reasoning lead to error; many observations and a little reasoning to truth. ~ Alexis Carrel

Another way to think of deductive reasoning is to think of it as moving from a general premise to a specific premise. The basic line of reasoning looks like this:

This form of deductive reasoning is called a syllogism. A syllogism need not have only three components to its argument, but it must have at least three. We have Aristotle to thank for identifying the syllogism and making the study of logic much easier. The focus on syllogisms dominated the field of philosophy for thousands of years. In fact, it wasn't until the early nineteenth century that we began to see the discussion of other types of logic and other forms of logical reasoning. It is easy to fall prey to missteps in reasoning when we focus on syllogisms and deductive reasoning. Let's return to Harrison's argument and see what happens.

Logic: The art of thinking and reasoning in strict accordance with the limitations and incapacities of the human misunderstanding. ~ Ambrose Bierce
Considered in this manner, it should be clear how the strength of the conclusion depends upon us accepting as true the first two statements. This need for truth sets up deductive reasoning as a very rigid form of reasoning. If either one of the first two premises isn’t true, then the entire argument fails. Let’s turn to recent world events for another example: In the debates over whether the United States should take military action in Iraq, this was the basic line of reasoning used to justify an invasion. This logic was sufficient for the United States to invade Iraq; however, as we have since learned, this line of reasoning also shows how quickly logic can go bad. We subsequently learned that the "experts" weren’t quite so confident, and their "evidence" wasn’t quite as concrete as originally represented.

**defining induction**

Inductive reasoning is often thought of as the opposite of deductive reasoning; however, this approach is not wholly accurate. Inductive reasoning does move from the specific to the general. However, this fact alone does not make it the opposite of deductive reasoning. An argument which fails in its deductive reasoning may still stand inductively. Unlike deductive reasoning, there is no standard format inductive arguments must take, making them more flexible. We can define an inductive argument as one in which the truth of its propositions lends support to the conclusion. The difference here in deduction is the truth of the propositions establishes with absolute certainty the truth of the conclusion. When we analyze an inductive argument, we do not focus on the truth of its premises. Instead we analyze inductive arguments for their strength or soundness.

Another significant difference between deduction and induction is inductive arguments do not have a standard format. Let’s return to Sydney’s argument to see how induction develops in action:

1. Bathroom cleaning responsibilities alternate weekly according to the work chart.
2. Sydney cleaned the bathroom last week.
3. The chart indicates it is Harrison’s turn to clean the bathroom this week.
4. Therefore, Harrison should clean the bathroom.

What Sydney does here is build to her conclusion that Harrison should clean the bathroom. She begins by stating the general house rule of alternate weeks for cleaning. She then adds in evidence before concluding her argument. While
her argument is strong, we don’t know if it is true. There could be other factors Sydney has left out. Sydney may have agreed to take Harrison's week of bathroom cleaning in exchange for him doing another one of her chores. Or there may be some extenuating circumstances preventing Harrison from bathroom cleaning this week.

*You should carefully study the Art of Reasoning, as it is what most people are very deficient in, and I know few things more disagreeable than to argue, or even converse with a man who has no idea of inductive and deductive philosophy. ~ William John Wills*

Let's return to the world stage for another example. After the 9/11 attacks on the World Trade Center, we heard variations of the following arguments:

1. The terrorists were Muslim (or Arab or Middle Eastern).
2. The terrorists hated America.
3. Therefore, all Muslims (or Arabs or Middle Easterners) hate America.

Clearly, we can see the problem in this line of reasoning. Beyond being a scary example of hyperbolic rhetoric, we can all probably think of at least one counter example to disprove the conclusion. However, individual passions and biases caused many otherwise rational people to say these things in the weeks following the attacks. This example also clearly illustrates how easy it is to get tripped up in your use of logic and the importance of practicing self-regulation.