CHAPTER ONE

The Nature of Argument

(Excerpted from *Logic and Critical Reasoning*, by Stan V. McDaniel)

1.1 Argument and Value

When you hear the word "argument," do you think of a fight? Many people do. To them, argument means opposition. When such people hear that logicians deal with argument, they may imagine that logic amounts to endless bickering over trivial points. This mistaken idea comes from confusing the popular meaning of "argument" (as a fight) with the logical use of the term. The real goal of logical

> *Logical argument is a way of bringing thoughts together so as to make clear what they mutually prove.*

argument is clarity, along with the informed agreement that can come from clarity. The very word "Argument" traces back to Latin *argumentum*, to show or prove; and this in turn comes from Greek *argos*, "bright and clear."

Logical argument has its own special strength. The strength of logical argument is known as *validity*. "Valid" comes from the Latin word for strength, valere. Anything strongly built was once called "valid." The first goal of logic is to develop an understanding of validity -- what makes an argument strongly constructed and therefore valuable. By studying what makes a strongly constructed argument, you will also learn to recognize invalid (untrustworthy) arguments.

1.2 Argument Organization

A clear, strong argument is composed of two identifiable parts. The first part is a group of one or more statements called the premises. The second part is a single statement called the conclusion. The two parts of the argument are connected by the expression "therefore" (or one of its synonyms), which we will call the "fulcrum" of the argument. Here is an example of a clearly organized argument:

> Susan will be awarded the trophy if she manages to win the final race. She will certainly win the final race, provided that the Swedish competitor does not enter. *Therefore* if the Swedish competitor does not enter, Susan will be awarded the trophy.

THE FULCRUM EXPRESSION. The key to the logical pattern of the argument above is the *fulcrum word* "therefore."It tells us that we have an argument and identifies the point where the premises and the conclusion meet. The premises are the sentences that precede "therefore." The conclusion is the sentence that follows it. The structure may be analyzed as shown below.

PREMISE: Susan will be awarded the trophy if she manages to win the final race.
PREMISE: Susan will win the final race provided that the Swedish competitor does not enter.
CONCLUSION: If the Swedish competitor does not enter, Susan will be awarded the trophy.

In this analysis, the fulcrum word "therefore" is omitted. As the fulcrum word, its job was just to help us locate the premises and the conclusion.

PREMISES...thus...CONCLUSION
so
hence
consequently
accordingly
so we must conclude that
it follows from the above that
so it is implied that
therefore

Fulcrum Expressions (Type 1)

OTHER FULCRUM EXPRESSIONS. Arguments often use fulcrum expressions other than "therefore." The list on the left shows some of the main words and phrases that may replace "therefore."We have labeled these "Type 1." However, there are other fulcrum expressions that are located *before* the premises of the argument instead of after them. These we will call "Type 2."The order of premises and conclusion is reversed, but these expressions still identify which statements are the premises and which statement is the conclusion. For example, if we were to use *because* instead of *therefore*, the argument about Susan and the trophy would have to be rearranged as shown below. The order of the premises and the conclusion is reversed:

If the Swedish competitor does not enter, Susan will be awarded the trophy, *because* she will win the trophy if she wins the final race; and she will win the final race if the Swedish competitor does not enter.

These last two examples show us that a Type 1 fulcrum expression introduces the conclusion, while a Type 2 fulcrum expression introduces the premises. Now look closely at the example below. What is the fulcrum word, where is the conclusion, and what is the premise?

Because the wine is aged and aged wines are more expensive, the wine must be too costly for me to purchase.

In this case, the fulcrum word is located at the beginning of the argument. What follows after the fulcrum word must be the premise, and a strategically placed comma tells us where the conclusion begins. The pattern of this variation is:

> CONCLUSION...because...PREMISES
> because PREMISES, CONCLUSION
>
> since
> for
> on the grounds that
> for the reason that
> in view of the fact that
> on the condition that

Fulcrum Expressions (Type 2)

Because PREMISES, CONCLUSION.

When *analyzing* an argument we will always place the premises first and the conclusion last, regardless of the order they appear in the original. For example, here is the way the argument above would be analyzed.

PREMISE: This wine is aged and aged wines are more expensive.
CONCLUSION: This wine must be too costly for me to purchase.

(If you find yourself wondering whether this example is a valid argument, you are quite correct in doing so. Without knowing some details about the actual cost of the wine and the finances of the buyer, the conclusion would appear to be a bit premature. However we are showing this example only to illustrate the use of a Type 2 fulcrum expression, not to illustrate validity.)

MULTIPLE ARGUMENTS AND LOGICAL ANALYSIS. As you might guess from what we have said about variations, arguments are not always presented in a single clear and obvious form. Not only can the order of conclusion and premises be varied, but a passage may contain more than one argument: Two different sets of premises may have the same conclusion, more than one conclusion may use the same premises, and so on. However, for purposes of analysis we will always show just one set of premises and one conclusion. If a passage contains two conclusions we will say there are two arguments and analyze each one separately. This means that we must distinguish between the *written passage* that contains an argument, and the argument itself. Studying a passage to bring out the argument(s) it may contain is called a *logical analysis* of the passage.

1.3 Deductive and Inductive Validity

The fulcrum expression makes a specific assertion, namely that the premises *lead to* the conclusion in some clearly understandable way. The Latin word for "lead to" is duco. Among the English terms that derive from duco are "de<u>duct</u>ion" and "in<u>duct</u>ion*,"* which refer to the two most generally recognized kinds of logical argument. Thus there are two ways for premises to lead to a conclusion: deductively and inductively.

When an argument is deductively valid, the premises support the conclusion with no room for doubt. When an argument is inductively valid, the support may still be quite strong, but there is always some room for doubt. Study the definitions below carefully to make sure you understand the difference between deductive and inductive validity. As you will see from these definitions, a deductively valid argument gives us *absolute certainty* that the conclusion is true (provided the premises are true), while an inductively valid argument with true premises yields only a *significant degree of probability* for the conclusion.

For this reason, many (but not all) logicians prefer to use "valid" only in relation to deductive arguments, calling inductive arguments just strong or weak depending upon the degree of support the premises give the conclusion. In this

text, however, we will preserve the traditional meaning of valid as strong: If the premises provide a significant degree of support, an inductive argument may be called valid. In our definition "Significant" remains a relative term that depends upon the context in which we evaluate the argument.

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DEFINITIONS: VALIDITY

Deductively Valid Argument: The truth of the premises *absolutely guarantees* that the conclusion is true.

Inductively Valid Argument: The truth of the premises *significantly strengthens* the *probability* that the conclusion is true.

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We can clarify the difference between deductive and inductive validity further by defining what *invalidity* would be for each type:

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DEFINITIONS: INVALIDITY

Deductively Invalid Argument: The conclusion could possibly be false even if all the premises are true.

Inductively Invalid Argument: The probability that the conclusion is true gets no significant support from the truth of the premises.

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According to the above definitions, an argument may be deductively invalid but inductively valid. For example, consider the argument below. Is it valid, or not? Inductive, or deductive?

Every student who has taken this class in the last five years has found it easy to pass, so students who take this class in the future will find it easy to pass.

As you probably guessed, this is an inductive argument. The truth of the premise does not absolutely guarantee the truth of the conclusion. But as an inductive argument, does the premise lend *significant support* for the conclusion? A large class of inductive arguments, like the one above, rely upon statistical evidence—a number of previous cases is cited as evidence that future cases will be the same. The argument above refers to a reasonably lengthy past experience (a five-year period), and to a fairly large number of cases ("every student who has taken this class in the last five years"). If we believe that the time period and the number of cases provide significant support for the conclusion, we may consider the argument *inductively valid* (strong) -- perhaps with the reservation that no change has occurred in the course content, methods, and the general ability of students. However, the argument is *deductively invalid,* because its conclusion could possibly be false even if the premise is true.

Deductive arguments depend upon something quite different than statistical evidence. For a deductive argument to be valid, there must be a special kind of *logical linkage* between the premises and the conclusion. It is the task of our first chapters to explain the exact nature of the special logical linkage that creates strong deductive arguments.

1.4 Sentences and Statements

DECLARATIVE SENTENCES. In order to analyze arguments successfully, it's important to understand what kinds of sentences are acceptable in a strong argument, and what kinds are not. Sentences are written or spoken expressions that fall into two general types: declarative and non-declarative. A declarative sentence is one that declares, or sets forth in clear terms, something intended to be a description of the facts (or of possible facts). Here are some typical declarative sentences, each of which makes a claim, and could be either true or false.

DEFINITION: DECLARATIVE SENTENCE

A declarative sentence is a sentence that makes a factual claim and therefore can be either true or false.

CLAIM: Russia has decided to step up its manufacture of industrial robots to 8000 a year.
CLAIM: Authorities banned the largest neo-Nazi group in Germany yesterday.
CLAIM: A keypunch is the most common off-line device for recording information onto punched cards.

STATEMENTS. The claim made by a declarative sentence is called a *statement.* Different declarative sentences may make the same claim, in which case we say they express the same statement. Of course, whenever we make a claim, we must express that claim in the form of some sentence or other, and some sentences may express the claim more clearly than others. When a claim is made by a poet or a novelist, the sentences used to express the claim may be obscure, elaborate, or couched in metaphor in order to serve the artistic purposes of the author. When a claim is made for the purposes of argument, however, it is important that the claim be expressed clearly and unambiguously so that its logical relation to the remainder of the argument may be more easily understood. Part of the skill of analyzing an argument is to assess the meaning of the claims made in the argument, and, if necessary, to re-state those claims in clearer form. Sometimes, if a claim is particularly unclear, one will have to make an "informed guess" as to the claim being made and analyze the argument on that basis.

HISTORICAL NOTE: What we are referring to here as a statement, which is the claim being made by a sentence, has historically also been called a "proposition." It is then said that more than one form of a sentence might express the same proposition. In this text however we will use the term "statement" to indicate the claim made by a particular declarative sentence.

COMMAND: Get out of my way!
QUESTION: What's wrong?
INVOCATION: O Ye Gods!
SUGGESTION: Eat Grandad's Chips.
CONVENTION: How do you do?
EXCLAMATION: Ouch!
PRAYER: Give us this day our daily bread.
PERFORMATIVE: With this ring I thee wed.

Some Types of Non-Declarative Sentences

NON-DECLARATIVE SENTENCES. In contrast, Non-declarative sentences make no claims. Instead, non--declarative sentences are used to ask a question, make a demand, complete a ceremony, express a feeling, and so on. When a motorcycle policeman issues a command like "Pull over!" it makes no sense to ask if what he says is true or false. But when he says "You were speeding," this is a declarative sentence—a claim which you may well argue (in court) to be false, although the policeman says it is true.

DECLARATIVE SENTENCES IN ARGUMENTS. A valid argument in the strict sense must be composed only of statements, that is, of claims made by declarative sentences. If a premise in an argument made no claim, it could never be called true or false, and then you could not ask if the premises taken all together are true. This, in turn, would mean that you could not apply the concept of validity to the argument (see the definitions of validity, above).

Similarly, if the conclusion did not express a statement, you could not say that the conclusion must be true when the premises are true, or even that the conclusion is probably true when the premises are true, and again we could not apply the concept of validity to the argument. This of course applies whether the argument is inductive or deductive.

Sometimes, though, a non-declarative sentence is used in an argument to express a statement in a kind of indirect way. In such cases we must be able to discern the declarative purpose of the sentence and restate it in declarative form. In Chapter Two, we will discuss the circumstances in which some kinds of non-declarative sentences may be translated into declarative ones to make them eligible for use in an argument.

1.5 Validity and Truth

When we say an argument is deductively valid we mean only that the conclusion *must* be true whenever the premises are true. This does not mean that the premises or conclusion in a valid argument are necessarily true. They can be false, as in the following example.

If the moon is square, then I'm a green cheesecake. The moon is square. Therefore, I'm a green cheesecake.

This argument is deductively valid, but the premise "The moon is square" and the conclusion "I'm a green cheesecake" are false (unless you do happen to be a green cheesecake, which is highly unlikely!). Although "The moon is square" is a declarative sentence that makes a claim, it is never likely to be true—so it is equally unlikely that the speaker will use this argument to prove that he or she is a green cheesecake! Now compare the last argument with this one.

If this diploma is authentic, then James is a dentist. The diploma is authentic. Therefore, James is a dentist.

This argument is also deductively valid. In fact, it has exactly the same *logical pattern* as the previous argument. And in this case, unlike the previous example, the premises could possibly be true. Yet even though they could be true, they may not be, and the conclusion may not be true either. All of the premises could be false, and the conclusion could also be false, but this would not change the validity of the argument.

THE FALLACY OF VALIDITY. People sometimes confuse validity with truth. The evident validity of an argument may give them the feeling that its premises (and therefore its conclusion) are true. Politicians and military leaders have, at times in history, used arguments like the (fictional) one below.

The Hypothians are evil monsters with no regard for human life. Any evil monsters with no regard for human life must be killed. We are forced to conclude that the Hypothians must be killed.

The validity of this argument is evident: If the premises were true the conclusion would have to be true as well. But when people confuse truth with validity, the obvious validity of the argument can lead them into imagining that the premises and the conclusion are true without checking further into the facts of the case. When a person makes this mistake, he or she has fallen prey to a fallacy (untrustworthy reasoning).

Actually, the validity of an argument contributes nothing to the truth or falsity of the premises or the conclusion. The question of truth or falsity has to be settled by an independent appeal to evidence. A great deal of persuasion in politics and advertising depends upon confusion regarding this point. You will easily recognize a whole class of advertising ploys in the following:

> FALLACY OF VALIDITY
>
> Supposing that the premises, or the conclusion, of an argument are true just because the argument is obviously valid.

(1)   Tim `Bigfist' Galloway, the famous boxer, is strong and fast, because anyone who drinks MAXIM SUPER PROTEIN is strong and fast, and Tim `Bigfist' Galloway drinks MAXIM SUPER PROTEIN daily.

THE FALLACY OF SUPPOSING THE PREMISES ARE TRUE. Argument (1) above is a valid one, and the conclusion (That Tim Galloway is strong and fast) may be true. But the truth of the conclusion does not at all guarantee the truth of the premises. It may be true that Galloway is strong and fast; but this does not mean that he drinks MAXIM SUPER PROTEIN daily. There are more ways than one to become strong and fast. Furthermore, the second premise may not be true at all. To imagine that the premises are true because the conclusion is true, even when the argument is valid, is again to fall prey to a fallacy. One reason for slipping into such a fallacy is that the argument may easily be mistaken for the *causal claim* below.

    (2)   Tim `Bigfist' Galloway, the famous boxer, is strong and fast because he drinks MAXIM SUPER PROTEIN daily.

This is not an argument, but a simple claim that MAXIM SUPER PROTEIN is the *cause* of Galloway's strength and speed—a claim that may be false. In (2) the word "because" is not being used as the fulcrum word of an argument the way it is in (1). But when the advertiser presents (1) above, he hopes the reader will confuse it with (2), and then mistakenly think that the validity of (1) supports the truth of (2).

    A similar case of the fallacy of supposing the premises are true occurs in television commercials, not in words, but in the visual scene. The viewer sees a very muscular person working out with a certain piece of workout equipment and various extravagant claims are made about the effectiveness of the equipment. The implied argument is that the model achieved such fine muscularity by using this piece of equipment. In actual fact, however, the model is likely a body builder who works out regularly at a gym and may not ever use that equipment except when filming the commercial. (Weight-loss commercials and hair-growing commercials are frequently examples of essentially the same fallacy.)

> **FALLACY OF SUPPOSING THE PREMISES ARE TRUE**
>
> Supposing that the premises of an argument are true just because the conclusion is known to be true.

    THE FALLACY OF SUPPOSING THE CONCLUSION IS FALSE. Another mistake that comes from confusing validity with truth may occur if, discovering that the premises of (1) are false, we decide that the conclusion must be false as well. That is, knowing that Tim Galloway does not drink MAXIM SUPER PROTEIN daily, and knowing that MAXIM has little effect upon one's strength and speed (the premises), we are led to doubt the conclusion that Galloway is strong and fast. Again, Galloway may be strong and fast as a result of his years of training. The falsity of the premises does not prove the falsity of the conclusion.

> **FALLACY OF SUPPOSING THE CONCLUSION IS FALSE**
>
> Supposing that the conclusion of an argument is false just because the premises are known to be false.

1.6 Soundness

    After all this discussion of validity and truth, it may seem that there is a problem: If validity in an argument has nothing to do with the truth of its premises or its conclusion, what is the point of studying validity? After all, isn't the question of truth the real issue in any dispute? Is there any value in validity? Questions like these often arise when one begins to study logic. Sometimes it is difficult for a person to see how an argument can be of any use unless its premises and its conclusion are true. The notion of a *sound* argument can help clear up this puzzle.

    A sound argument is one that is not only valid, but also has true premises. It is an error, however, to believe that an argument is of no use unless it is sound. Obviously, having a sound argument is essential when the purpose of presenting the argument is to prove the conclusion. But proving a conclusion is not the only use of argument. Our lives are made up not only of immediate truths and falsehoods, but also of possibilities and hypotheses, speculations and plans. Often valid deduction aids in projecting possible future results. In the sciences, for example, valid deduction is used to relate theories to possible experiments. When the premises of an argument are taken from an unproven theory, they are not yet known to be true or false. But deduction can be used to establish what they would lead to if they were true, and this can help in evaluating the theory.

    Despite the importance of deduction in speculative human activity, many people do not understand the difference between validity, truth, and soundness. They may call an argument true or valid or sound and mean the same thing by all three terms. They may also call a statement valid or sound meaning merely that it is true. When a logically careful person points out a difference between truth and validity, people sometimes become irritated, imagining that this is just an unimportant quibble indulged in by an argumentative individual. (Another reason people may become irritated is that they may not *want* the issue to be clarified, as that could weaken their position). Actually, seeing the difference between validity and truth is an essential factor in clear thinking.

    For example, consider the difference between the argument itself, and the viewpoint of the person making the argument. When a person states an argument in ordinary conversation he or she is likely to be using the argument to prove the conclusion, and so believes that the argument is valid and that the premises are true. But if the person does not

recognize the distinction between validity, truth, and soundness, the evident validity of the argument may cause that individual to commit the fallacy of validity. Then you will see them clinging to the idea that the premises and conclusion are true no matter what is done to show their falsity.

The reverse of this can also happen, and can cause misunderstanding and confusion. A person may set forth an argument not to prove the conclusion, but rather to speculate about what might be true if the premises are true. This may happen often when more than one possibility is being discussed. But sometimes very literal-minded people mistake the hypothetical argument for one the arguer believes is conclusive. Then a misunderstanding can arise that, in extreme cases, might give the listener a completely wrong understanding of what is being said.

THE SIGNIFICANCE OF LOGIC IN LIFE. The significance of this point for our lives cannot be underestimated. In the course of history entire social and economic systems have been constructed around a set of apparently valid arguments, and only after many years of setbacks and suffering have the people following such systems been forced to admit that while the arguments of their founders may have been valid, the premises have turned out to be false. At that point their recognition of the differences between validity and truth becomes as painful as an entire cultural revolution with all of the severe changes in individual lives that such an event inevitably produces.

Something of this sort happened when the system of astronomy proposed by Copernicus came into conflict with the earlier system of Ptolemy, in which the earth was taken to be the center of the universe. Certain facts of astronomy did follow logically from the premises of Ptolemy's system, and the internal validity of the system, plus the circumstance that some of its conclusions were true, made people cling to a belief in the premises long after they were scientifically proven false.

The fallacy of validity, carried to an extreme, can lead to pathological results. A person can build up a dream world of delusion which has a great deal of internal logical consistency. Within this world certain arguments will be perfectly valid; but their validity is mistaken by the deluded individual as "proving" their conclusions, so they remain convinced that their dream world is real and resist all efforts to show that they are mistaken. When we are able to see the difference between validity and truth, we take hold of a powerful tool for changing our ideas.

But if validity does not depend on the truth of the premises, how can you settle questions of validity? It is common for people to rely only upon their untrained intuitive sense of validity. Sometimes this works, but often it does not. Untrained intuition may lead to fallacious (untrustworthy) reasoning. The success of deceptive advertising is a testimony

> *When we are able to see the difference between validity and truth we take hold of a powerful tool for changing our ideas.*

to this fact. It is possible, however, to improve one's logical intuition by means of special training. When this is done one is not only liberated from the influence of faulty argument but one is also able to read, write, and communicate more effectively. Further, trained logical intuition leads to greater understanding of all kinds of scientific and organizational systems, since ultimately every field of human occupation depends in some way upon logical principles.

Finally, logical ability is a powerful tool for evaluating one's own personal standpoint in relation to the world and to others. This can be a significant factor in personal growth.

1.7 Motivations and Causes

As example (2) above about Tim Galloway illustrates, words like "because" and "since" are not always used as fulcrum expressions for arguments. When we said that Galloway is strong and fast *because* he drinks MAXIM, we used "because" to make a causal claim: Drinking MAXIM *causes* Galloway's strength and speed. Yet another use of words like "because" is to state a person's motivation for doing something. The sentences below contain "because" and "since," but they are not arguments. Which of them are causal claims, and which are statements of a person's motivation?

(a) The candle flame snuffed out because the oxygen in the chamber was used up.
(b) Her promotion was approved, since the manager found her work consistently of the highest quality.
(c) The official caught malaria because he was bitten by an infected mosquito.
(d) She decided on a formal wedding because her social status called for it.

Did you guess correctly? Sentences (a) and (c) are causal claims, while sentences (b) and (d) are statements of motivation. Motivations differ from causes in that one can usually change one's motivation, while the action of a cause

cannot ordinarily be interfered with. In example (d), the person's social status does not force her to have a formal wedding; but in example (a) the laws of combustion do demand that the flame will be extinguished when the oxygen is used up. Of course, not all cases are as easy to determine as those given above. Here are several ways to test a passage in order to determine if it is an argument, a statement of causes, or an account of the motivation for an action.

1. *Can the passage be true or false?* Since a valid argument remains valid regardless of the truth or falsity of its components, it is never appropriate to ask if an argument is true or false. In the case of statements of cause or motivation like (a) through (d) above, however, it is quite meaningful to ask if they are true or false.

2. *Does the passage depend on causal laws?* To determine the truth or falsity of a causal statement, there is a need to refer to causal laws (discovered by science). For example, sentence (a) above depends upon the laws of chemistry that establish the need for oxygen to support combustion.

3. *Must you ask someone for an explanation?* To determine the truth or falsity of a motivational statement, there is a need to refer to some individual's own testimony about his or her motives for doing something. Thus the truth of sentence (d) above depends upon asking the bride why she decided on a formal wedding, while the truth of sentence (b) depends upon asking the manager why he decided to promote his employee.

4. *Is the passage a single sentence?* Although an argument may occasionally be stated in the form of a single sentence, usually an argument will have more than one premise, will depend upon the relations between the premises, will include a fulcrum expression, and will attempt to put forward all of the information needed to justify the conclusion. Thus an argument is generally *more complex* than a statement of causes or motivations.

5. *Is there any attempt to support a claim?* Sentences (a) through (d) above make no attempt to support a claim. Instead they simply *make* a claim. For example, in sentence (c) above the claim that the official caught malaria is not in question. The speaker is not attempting to *prove* that the official caught malaria by stating that he was bitten by an infected mosquito. Instead, the speaker is simply stating that the official *did* catch malaria, and then additionally stating the cause of this. In contrast, an argument is always distinguished by the presence of some statements (the premises) put forth in support of the claim made in the conclusion.

Of course, arguments may *include* material having to do with either causes or motivations, and the line between an argument and a causal claim or statement of motivation is not always easy to see at first glance. Inductive arguments especially often involve appeals to causal laws. It will be easier to tell the difference between an argument and a statement of cause or motivation after you have studied the specific kinds of linkages that can exist between the premises and the conclusion of an argument in virtue of which we say that the argument is deductively valid.

1.8 Reasons and Explanations

The terms "reason" and "explanation" are ambiguous (they have more than one meaning). If we ask for the *reason* the candle went out, or for an *explanation* of the candle's going out, we probably are asking for the cause. When we ask a person to *explain* his or her actions, or to give the *reason* for those actions, we usually want a statement of the person's motivation. Finally, the premises of an argument may be given as a *reason* for believing that the conclusion of the argument is true. Thus "reason" and "explanation" may refer to causes, to motivations, or to premises, depending upon the context.

Sometimes confusion about these different meanings of "reason" and "explanation" creates misunderstanding. For example, a questioner might ask for reasons (meaning motivations) and might be answered with a statement of causes. Compare the two explanations below. As you can see, their effects are quite different.

(1) "Why was this forest destroyed?" "Because men with chainsaws cut down the trees and bulldozers pushed the timber into the river."

(2) "Why was this forest destroyed?" "Because the owner of the lumber company wanted to buy a yacht for his daughter's birthday present."

Example (1) answers the question by stating the causes of the destruction of the forest. Example (2) answers the same question by giving the motivation, on the part of the owner of the lumber company, for cutting down the trees. In either case the answer could be thought of as giving a "reason" or an "explanation."

In a discussion it is often quite helpful to be clear about exactly what is being asked for when a demand is made for reasons or explanations, or about exactly what is being stated when reasons or explanations are offered. Similarly, when deciding whether a passage is an argument, it can be useful to ask if the passage seems to be offering someone's reasons (motivation) for doing or believing something, or if it is giving an explanation (cause) for an event. If it is either of these, it is not an argument.

STUDY PROBLEMS. Get out your pencil and write answers to these reading questions in the blanks. These questions are here to help you identify important points in this Chapter. Most of them are taken verbatim from the text, and in the same order of occurrence.

1.	The goal of logical argument is _____.
2.	Valid comes from the Latin word for _____.
3.	"Therefore" is the balance point or _____ of an argument.

4.	Expressions like "hence" come before the _____ of an argument.
5.	Expressions like "for" come before the _____ of an argument.
6.	If an argument is deductively valid and the premises are true, then the conclusion is _____ (true, probable).
7.	A large class of inductive arguments rely upon _____ evidence.
8.	For a deductive argument to be valid, there must be a special kind of logical _____ between the premises and the conclusion.
9.	Declarative sentences are those that can be either _____ or _____.
10.	A statement is the _____ made by a declarative sentence.
11.	"Get out of my way!" is a _____ (declarative, non-declarative) sentence.
12.	One way to tell a declarative sentence from a non-declarative one is to ask yourself whether the sentence makes a _____.
13.	A valid argument in the strict sense must be composed only of _____.
14.	When people confuse truth with validity, the validity of an argument may lead them to think that the premises and the conclusion are _____.
15.	A fallacy is _____ (trustworthy, untrustworthy) reasoning.
16.	When you suppose that the premises are true just because the conclusion is true, you are falling prey to the fallacy of _____.
17.	When you suppose that the conclusion is false just because the premises are false, you are falling prey to the fallacy of _____.
18.	An argument that is valid and has true premises is called a _____ argument.
19.	The fallacy of validity, carried to an extreme, can lead to _____ results.
20.	It is _____ (appropriate, inappropriate) to ask if an argument is true or false.
21.	To determine the truth or falsity of a motivational statement, there is a need to refer to some individual's own _____.
22.	To determine the truth or validity of a causal statement, there is a need to refer to _____.
23.	An argument is generally more _____ than a statement of causes or motivations.
24.	When we ask for the reason the candle went out, we usually want to know the _____.
25.	When we ask a person to explain her actions, we usually want to know her _____.

EXERCISE 1. Below is a group of short paragraphs. Decide which of them you think are arguments, which are statements of cause, which are statements of motivation, and which are neither. For each case you identify as an argument, write out an analysis indicating the premises and the conclusion in the manner shown in this Chapter. Then use your intuitive sense of validity to decide which arguments you think are inductively or deductively valid, and which are not valid. Be prepared for classroom discussion of the details that may apply to each decision.

1. You can't be cured of this illness, since everyone who has been cured was born in Indiana, and you weren't born in Indiana.
2. Nobody denies that people should be so taught and trained in youth, as to know and benefit by the ascertained results of human experience. But it is the privilege and proper condition of a human being, arrived at the maturity of his faculties, to use and interpret experience in his own way.
3. I must exist, for to think is to exist, and to doubt is to think. I must be thinking even if I doubt that I exist, and I do doubt that I exist.
4. If the radio is playing, it is attached to a power source. However, the radio is not playing, so it is not attached to a power source.
5. Steven says "If you give me ten dollars, I'll give you the information you need." Since you do give Steven ten dollars, you will get the information you need.
6. He moved closer to the fire, for his clothing had become quite damp during the walk, and the night breeze was sharp.
7. Every pelican born on the island since March has had a misshapen beak, and spraying with di-ethyl-methyl-toluol began in late February. We can conclude that the spraying has caused birth defects in the pelican population.
8. You will get better schools, since the candidate said "If you vote for me, you will get better schools" and you did vote for the candidate.
9. There are significant problems standing in the way of interplanetary research: Because of engineering difficulties space probes contain only limited instrumentation; furthermore, certain biological problems prevent human researchers from engaging in extended space flights; and other difficulties exist which are too numerous to mention here.
10. Lassie eats Dog-Gro dog food, and Lassie is loyal. Therefore if you eat Dog-Gro you will be loyal.
11. All of the dogs I know that eat Dog-Gro dog food are loyal dogs. I must conclude that eating Dog-Gro makes dogs loyal.
12. Out of a study of 10,000 dogs, 85% of those eating Dog-Gro were found to be loyal, while only 40% of those not eating Dog-Gro were found to be loyal. Therefore eating Dog-Gro makes dogs loyal.
13. The Balkanese Islands are less than 500 miles from Torentina. All territory less than 500 miles from any country belongs by natural reasoning to that country. I conclude, my friends, that the Balkanese Islands belong to Torentina.
14. The theory that every voluntary action must be produced by an act of mind called a volition must be false, because a volition is itself an action; as such, a volition must be either voluntary or involuntary. But if a volition is voluntary, the act which it produces must be voluntary as well; and if a volition is voluntary, the theory requires that it must be produced by another volition, and another and another *ad infinitum.*
15. Ascorbic acid helps the body resist the poisonous effects of smoke and pollution, and it is involved in the production of collagen, the connecting substance in cells. It is found in green peppers, broccoli, and fresh fruits. Therefore everyone should eat fresh fruits, green peppers, and broccoli.
16. There can be no doubt that all our knowledge starts out with experience. For how should our faculty of knowledge be called into action if objects, affecting our senses, did not produce images in our minds, stimulating our intellect to compare, combine, and distinguish these images? And certainly it is this very comparing, combining, and distinguishing that creates the knowledge of objects we call experience.
17. When Burford Falls let its sewage treatment plant release 100,000 gallons of raw sewage into the river, the small towns downriver immediately filed a lawsuit against Burford Falls. However, not six months later one of those same small towns released 2,500 gallons of raw sewage into the river, claiming that because the river was swollen with winter rains no serious pollution would result. Because of this, certainly, the lawsuit against Burford Falls is seriously weakened.
18. J. Lathrop Perkins and his followers founded the community of Perkins Springs. For five years Perkins was the undisputed leader and rallying point of the community. But in the sixth year there was a social upheaval. Perkins' leadership position was removed by the town board of directors, who had the backing of Perkins' own wife. Therefore Perkins left for Brazil, taking half of the original community, still loyal, with him.

EXERCISE 2. By comparing the two arguments below, decide what kind of logical pattern they have in common. Then write out five different arguments of your own that you think have exactly the same logical pattern.

1. If this cat is a thoroughbred, then it is eligible for the contest. The cat is a thoroughbred, so it is eligible for the contest.
2. If the water boils exactly five minutes, the eggs will be perfect. The water boils exactly five minutes, so the eggs will be perfect.

FALLACIES IN THIS CHAPTER

FALLACY OF VALIDITY. Supposing that the premises, or the conclusion, of an argument are true just because the argument is obviously valid.

FALLACY OF SUPPOSING THE PREMISES ARE TRUE. Supposing that the premises of an argument are true just because the conclusion is true.

FALLACY OF SUPPOSING THE CONCLUSION IS FALSE. Supposing that the conclusion of an argument is false just because the premises are false.

Declarative Sentence Analysis

(Excerpted from *Logic and Critical Reasoning*, by Stan V. McDaniel)

2.1 Screening Out Non-Declarative Sentences

The first step in analyzing an argument, described in Chapter One, was to arrange the argument with the premises first and the conclusion last. The second step is to screen out non-declarative sentences. Let us imagine we have a device called a "Declarative Sentence Filter" (DSF for short) that screens out non-declarative sentences and allows only declarative sentences (in the strict sense) to pass through. Now suppose you input the following sentences into your DSF.

What's up, Doc?	William loves potatoes.
Pull over, Buddy!	Ummm-m-m! Potatoes!
Bettina is a lawyer.	Junior, eat your potatoes!

Only "Bettina is a lawyer" and "William loves potatoes" will pass through your DSF. The other sentences are commands, questions, or exclamations that do not express statements. As such, they cannot, strictly speaking, play a role in any argument.

But your DSF must not be simplistic in its determination of which sentences are declarative and which are not. It is possible to express a statement in a non-declarative form, in order to give it some special emphasis. In such cases, your DSF must identify the *declarative value* of the expression. If there is a declarative value, the sentence may still play a meaningful role in an argument.

2.2 Finding the Declarative Value

THE IMPORTANCE OF CONTEXT. Here is the text of an advertisement in the Entertainment section of a newspaper. What is its declarative value?

Direct from Broadway! The Polynesian Dancers. All seats $10.00.

Taken separately we would have to classify each one of these fragments as non-declarative. (Even "All seats $10.00" is non-declarative when considered all by itself, because it does not specify enough context). But taken together *in their intended context* they do have a declarative value. Putting the fragments within a theatrical context, the DSF would output their net declarative value as:

The Polynesian Dancers have most recently performed on Broadway. All seats to the performance of the Polynesian Dancers are $10.00.

Frequently non-declarative and declarative expressions are combined; for example, a person might exclaim, "OW! That hurts!" Here OW! is a non-declarative exclamation, and your DSF would reject it. "That hurts!" is potentially a statement, but your DSF could not accept it as it stands, because it is too vague. You must know what hurts, and who is hurting. For example, if Jonathan hits his thumb with a hammer and Jonathan says "That hurts!" we understand the declarative value quite well: "Jonathan's bruised thumb hurts him." This illustrates how important the context can be in identifying the declarative value of non-declarative expressions. Without a context we could never come up with a declarative value for "that hurts!"

But a word of warning is needed here. In an effort to show their logical brilliance, zealous beginners will sometimes force a context on a sentence without really having enough information. It can be just as misleading to make up an inappropriate context as it is to miss seeing one. If the context is made clear by other sentences in the argument, by all means use it. If it is not clear, but the argument involves very common situations which could be reasonably presupposed, take such common situations into account. But be careful about going beyond this point.

For example, beginners sometimes think that every command can be turned into a statement containing "should." For example, they might interpret "Do not steal" as the moral injunction "You should not steal." This appears declarative but its status as true or false depends on the truth or falsity of the moral system to which it belongs. As a "commandment" it remains a command. When a drill sergeant commands, "Company, HALT!" to replace his command with "You should

Generally, when faced with a command, it is best to leave it as a command rather than change it into something less than is intended.

all stop marching now" would not adequately reflect the authoritarian military context. On the other hand, in a statement like "to avoid an explosion you should keep the dial below 100," the "should" is not a matter of morality but of practical truth or falsity. Generally, when faced with a command, it is best to leave it as a command rather than change it into something more than is intended. Here, as in every case, the context must be taken into consideration.

2.3 False Context

Since knowing the proper context is so important in understanding the declarative value of a sentence, it is natural for those who wish to persuade you to their viewpoint to try to create a *false context* which will lead you astray when you attempt to evaluate their claims. There are many ways in which false context may be created. Learning to recognize false context is a valuable skill in determining the actual declarative value of sentences used in arguments.

FALSE CONTEXT IN ADVERTISING. Have you ever received in the mail a coupon that is printed to resemble a bank certificate or a check made out to you? Actually, you are only being offered a discount (probably on an already inflated price), but the false context actually persuades some people to think they have been sent a check which they hurry to "cash" by buying the product. False context appears regularly in television commercials. For example, a cheap brand of instant coffee may create the illusion, in its commercials, that sophisticated people at high-class restaurants have been secretly given instant coffee to drink, and the sophisticates can't tell the difference between the instant coffee and high-quality freshly roasted and brewed coffee. You are invited to believe that the cheaper coffee belongs in a sophisticated context, and is therefore just as good as the more expensive coffee.

Once we realize how false context can be used in advertising, hundreds (if not hundreds of thousands) of television commercials can be spotted using this fallacy. Actors may be shown smiling, laughing and happy while using a product, with the implication that if you use the product you will also be smiling, laughing and happy. Automobile commercials use special effects to make an automobile resemble a space ship or perform amazing feats of driving, with the implication that if you drive this car you will feel like you are driving a space ship or performing amazing feats of driving. The idea behind all such commercials is to create a false context and convince the viewer that it represents reality.

The famous philosopher and writer, Alan Watts, often spoke of the phenomenon of *eating the menu instead of the meal*. What he meant by this was that a person who is overly impressed by the exotic names of things on a menu will convince himself or herself that the food is delicious, even though it is really pretty ordinary. "Scrambled eggs with hot sauce served on a tortilla" may be tasty, but it doesn't sound half as exciting to a non-Spanish speaker as "Huevos Rancheros." Many people do not realize that a fancy menu may also be a form of advertising.

Labels on products are another way in which advertising may introduce false context. Consider the argument below.

> The label says that this food is made of "tender, ripe tomatoes." and that chemicals have been added "to preserve freshness." Therefore this food is fresh and made from quality ingredients.

To draw the conclusion, one has to be "eating the menu" (the label) instead of the meal (the food inside): The premise of the argument is about *what the label says*, not about what is actually inside the container. This example is *deductively invalid,* because it bases a conclusion upon someone's "menu" or description of the facts rather than on the facts themselves. It is possible, in each case, for the conclusion to be false while the premises are true.

Is the example *inductively valid?* Ask yourself in whether or not the premise *significantly increases the probability* that the conclusion is true. Past experience with misleading advertising may lead you to suspect just the opposite. The probability that what the label says is true depends on one's trust in the manufacturer. On the other hand, if the list of ingredients on the government-mandated listing in the back of the label says the product contains "tomatoes," that is more

probably true because of the regulations for labeling–but that does not establish whether the tomatoes were tender and ripe when prepared. We could say at least that the can contains tomatoes!

FALSE CONTEXT IN EMOTIVE AND BIASED LANGUAGE. Another way in which false context may be introduced is through the use of *emotive or biased language.* This happens when a person, or a situation, is described in terms that are designed to arouse specific emotions or attitudes, thus producing a false context in which that person or situation is viewed in a distorted manner. In food labeling, for example, the expression "freshness preserver" is often used to describe a chemical additive that does nothing more than artificially maintain the color of the ingredients long after they are fresh. "Freshness preserver" is a biased term intended to make us view the product in a favorable way, since we tend to look favorably upon truly fresh produce. Similarly, political parties may coin nicknames for their opponents using emotionally charged language, like "Slick Willy" or "Tricky Dick."Again the attempt is to establish a context in the listener's mind that puts the opponent in a bad light. The example below is a case of bias created by emotive (emotionally charged) language.

> Quasimodo is nothing but a drooling, half-witted hunchback. You shouldn't pay any attention
> to anything he says.

The expression "drooling, half-witted hunchback" is a biased description of Quasimodo intended to arouse emotions of aversion and ridicule. Quasimodo's physical handicap (hunchback) may have nothing to do with his wit, or lack of it. The purpose of the premise is to tilt one's attitude unfavorably toward Quasimodo, leading one to think of him as inconsequential and not worth being paid any attention. To defuse the emotionally charged language, look for the purely declarative value of the premise. Stripped of its emotive language, the argument might look like this:

> Quasimodo has a physical handicap and speaks awkwardly. Therefore, you shouldn't pay
> attention to anything he says.

Suddenly a spotlight is thrown on the weakness of the argument. The premise may be true, but there is no reason to suppose the conclusion follows. If we added a premise to the effect that things said by physically and verbally handicapped persons are always worthless, the argument would be valid, but experience shows that this added premise is false. Thus even with the added premise this is not a *sound* argument. Removing the emotionally charged language helps us to stop and evaluate the argument objectively, rather than accept the false context suggested by the biased description.

FALLACY OF FALSE CONTEXT

Concluding that something has a certain character, or is true, simply because it has been described that way.

When false context is present, you can appropriately describe the situation with a qualifier, such as "The menu says..." or "The label says..." or "The politician says..." In the case of emotive or biased language, you can say "The speaker characterizes so-and-so as..."

2.4 Handling Quotations

Sometimes people get confused about the difference between a non-declarative sentence, and a declarative sentence that *quotes* a non-declarative sentence. When you are dealing with sentences that contain quotations, asking yourself what the sentence is *about* can be helpful. For example, what is the sentence below about?

> "I'll give you everything you have ever dreamed of," Samuels said, leering all the while.

The sentence is not about what Samuels will give you. It is about what Samuels *says* he will give you. It is also about *how* he said it (in a leering manner). The part in quotation marks is not the sentence itself. It is part of the sentence.

As a report of what Samuels said, the whole sentence is declarative because it may be true or false. Now consider the sentences below: are they declarative, or non-declarative?

> "What on earth are you doing?" Charles asked.
> "Ouch!" Sandra shouted, dropping the hammer.
> "Stop that at once!" Wilhelm commanded.

Although the first sentence *contains* a question, it is not itself a question. The question is in quotes. The sentence is a report of what Charles asked, and as such it can be true or false. The second sentence *contains* an exclamation, but it is not itself an exclamation; it is a report of what Sandra exclaimed, and it also tells us that Sandra dropped the hammer. As a report, it can be true or false and is declarative. The third sentence *contains* a command, but it is not a command. It is a report of what Wilhelm commanded. As a report, it can be true or false and is declarative. So although the three sentences contain non-declarative sentences as quotations, the sentences themselves are all declarative.

It is very important, when dealing with quoted passages, not to make inferences from the part of the passage that is in quotes, but only from the entire sentence. To do otherwise is just another example of the fallacy of false context. What the politician *says* is the menu; the fact *that he said it* is the meal. If he says "I will give you better schools," the declarative value is that he *said* you will get better schools. You cannot necessarily infer from this statement that you *will* get better schools.

The newspaper advertisements for a movie included a number of brief quotations from film critics indicating the film is "funny," "magical," "packed with robust humor," and "life-affirming." It seems natural to infer from the advertisement that this film is a light-hearted upbeat comedy. Actually, the film is one long downhill ride to a tragic ending, as two women rebel against masculine oppression and are driven to murder, robbery, and finally suicide. To go to the film expecting a comedy is to eat the menu (the advertisement) instead of the meal (the real plot of the film). Unfortunately, just as one may sometimes be deluded into imagining that the food he or she is eating is delicious (because of what the menu said) rather than greasy and unappealing (which it really is), people can be heard in the movie house forcing out nervous laughter at depressing scenes, as though to make the "menu" come true.

SITCOMS, MTV, AND FALSE CONTEXT. Among the outstanding examples of false context we might include the type of television program called a "sitcom." Here we find actors making all kinds of comments, most of which very few would find to be humorous in the real world, but because of the canned laughter provided by the sound technicians, a context of humor is in effect forced on the viewer. Taking this idea a bit further, one might also be inclined to include "singers" on MTV who lip-sync the words of a song as though they are actually singing while at the same time they are dancing vigorously (and certainly aerobically!). Sometimes the scene changes radically, but the vocal line continues as though the person has been singing without interruption. Again we have a kind of false context.

2.5 Restructuring Rhetorical Questions

One of the most common types of non-declarative sentences used for declarative emphasis is the "rhetorical question." This is a sentence in the form of a question but actually meant as an emphatic statement. We see a rhetorical question in the following argument:

> We must all love God; for what is God, but the Love of the World?

The fulcrum word "for" reverses the order of the premises and the conclusion. When we set out the argument for analysis, we rearrange it with the premises first and the conclusion last:

PREMISE: What is God, but the Love of the World?
CONCLUSION: We must all love God.

If we send the premise "What is God, but the Love of the World?" through our DSF, it will be *restructured* rather than rejected, because although it is a question it is a *rhetorical* question. The actual premise is the expected answer to the question. In this case, the speaker expects you to answer the question with "Yes, that's right: God is the Love of the World." Accordingly, the question is restructured appropriately by the DSF and the argument now looks like this:

PREMISE: God is the love of the world.
CONCLUSION: We must all love God.

Is this argument valid? Although the premise appears to be declarative, it is not entirely clear just what the speaker really means by it. For example, if the speaker means "All the world loves God," the argument might be valid, but probably not sound, since the premise is not likely true. Or suppose the speaker means "God loves the world." Then it does not follow logically that we must all love God in return. This argument is an example of a case where an apparently declarative statement is not as easy to understand as it may seem at first glance. We might have to conclude that the premise is not so much a declarative statement as it is an affirmation of faith. That takes the discussion out of the realm of "argument" and into a religious, emotive, persuasive, and symbolic context.

Often the wording of a rhetorical question must be adjusted to obtain the correct grammar and meaning. For example, consider this argument:

Gordio must be lying, since he is a Hypothian, and are not all Hypothians liars?

"Gordio is a Hypothian," will pass through the DSF unchanged. But "Are not all Hypothians liars?" is a rhetorical question and must be restructured. The expected answer to the question "Are not all Hypothians liars?" is: "Yes, all of them are liars." Thus "Are not all Hypothians liars?" becomes "All Hypothians are liars." (Notice that *not* is dropped from the rhetorical question when you turn it into a statement, because its use is merely to put the premise into question form.) The final result is:

PREMISE: Gordio is a Hypothian, and all Hypothians are liars.
CONCLUSION: Gordio must be lying.

Is this argument valid? Not if we consider that "being a liar" does not necessarily mean that everything one says is a lie. Gordio might be a person who frequently tells lies and is therefore considered a liar, but being a liar in this sense does not mean that what he says is always a lie.

2.6 Handling Pronouns

A declarative sentence is one that can be true or false. Unless the sentence clearly identifies its subject, there is no way to determine truth or falsity. Therefore, an expression standing alone that contains a pronoun such as "he" or "she" without giving any referent for the pronoun cannot be called (strictly) declarative. Compare the sentences below:

(a) He loves her, but she isn't interested.   (d) It moved slowly but steadily toward me.
(b) John loves her, but Susan has other plans.   (e) It's raining cats and dogs.
(c) John loves Susan, but she's married.   (f) It is strange to be home again.

What will our DSF output as the declarative value of each of these sentences, using only the context provided by the sentence itself? In sentence (a) *he, she,* and *her* are unspecified. There is not enough context for us to know who these pronouns refer to. In sentence (b), we cannot assume that *she* refers to Susan. Sentence (c), on the other hand, provides a sufficient context for us to know that *she* in the sentence probably refers to Susan, because of the love-marriage context. The output from the DSF for (c) will replace the pronoun with its referent, Susan. In sentence (d) *it* is unspecified. Without further context, our DSF must reject (a), (b), and (d). But the DSF will output the following for (c).

(c) John loves Susan, but *Susan* is married.

Now what about (e) and (f), which appear to have an unspecified *it*? Why does our DSF accept these sentences?

INDEFINITE SUBJECT. In these cases *it* does not require a referent. In certain cases of impersonal verbs, passive voice, and infinitive phrases, sentences may have an "indefinite subject" expressed by "it" and still be declarative. Sentences (e) and (f) are this kind of sentence. "It" as used in these two sentences does not demand a specific referent.However. The colloquial expression "raining cats and dogs" of course means "raining very hard," so the DSF would output (e) as "It's raining very hard." Sentence (f) does not involve such a colloquialism and could be left as it is, but it also could be output simply as "being home again is strange."

GENERALIZED SUBJECT. The pronoun "you" sometimes needs no referent, as in "If you watch what you are doing, you can avoid mistakes." In a case like this, "you" is meant generally to refer to any reader of the sentence, so there is no need to specify a particular individual. On the other hand, "You have won a million dollars" demands some specification for "you." Unfortunately, we can't all have won a million dollars!

In any given case, then, your DSF may accept a sentence containing pronouns as declarative (in the strict sense) only if the context is sufficient for us to know who, or what, the pronouns refer to, or the pronouns are used to describe an indefinite or general subject. When the referent of a pronoun is known, the DSF will replace the pronoun with the appropriate name.

STUDY PROBLEMS. Write out the declarative value for each of the examples below. (The declarative value is the result you get when you put the example through your DSF.) If there are any issues which make the result uncertain in your mind, make a note of those issues and how they have influenced your decisions. Be especially sensitive to contextual clues. (Answers are in the Appendix.)

1. Halt! Who goes there? Give the password!
2. If you've got a bear, don't take him for a walk on a highway in Connecticut. You could be fined $50.00.
3. LEAPIN' LIZARDS! Not just one Annie but half a dozen or more on the stage of the Uris Theater.
4. J.R.R. Tolkien is a famous author. He wrote The Hobbit and The Lord of the Rings.
5. Oh, oh! This pair of scissors is defective. Give me the pinking shears.
6. "Who is it?" said Julie, peering into the gloom.
7. Pull over, buddy. You were going seventy.
8. I don't care what you say--he's not coming to dinner.
9. It's foolish to waste time with trivia. Study logic instead.
10. It Came From Outer Space. Now showing at the Bijou.

EXERCISE 3. Discuss the declarative value, or lack of it, for each of the examples below.

1. It really got me interested. I told him I'd follow through.
2. Susan and Mary are rivals. She's a physician and she has never been to Italy.
3. The square of the hypotenuse of a triangle is twice the sum of the squares of the other two sides.
4. Don't touch this wall. The paint's wet.
5. A keypunch is the most common off-line device for entering information onto punched cards.
6. A key presidential aide encouraged the policy, according to an American who once lobbied for Torentina.
7. A bartender taking a taxi home from work blew the whistle on the driver, who she said struck a man walking in the road.
8. "Don't touch this wall," Ralph warned, "The paint's wet."
9. Caesar! Beware the ides of March!
10. The critic J.H. Brandon said that C.S. Lewis, who wrote *Out of the Silent Planet*, is his favorite fantasy author.
11. Watch what others are doing. You can learn a lot. A new romance could have a beneficial effect on your work.
12. Beware the Jabberwock, the jaws that bite, the claws that catch; beware the frumious Bandersnatch!
13. One important focus of research is detection and evaluation of the disease.
14. The ease of getting the stuff from the concession stands to your seat is a primary consideration in ball-park food snacks.
15. Do not be shy. Changes in your personal appearance will make others sit up and take notice.
16. The cube of the hypotenuse of a triangle is three times the sum of the cubes of the other two sides.
17. Caesar ought to beware the ides of March.
18. If he wants to avoid assassination, Caesar ought to beware the ides of March.
19. Either you should avoid touching this wall, or you will get paint on your fingers.
20. She could learn a lot if she watches what others are doing.
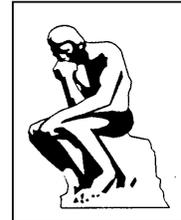
EXERCISE 4. The examples below are cases of the fallacy of false context. Explain how the fallacy applies in each case.

1.   The brochure says "The old-world skills of the woodcarver are meticulously employed in the making and assembly of each of these fine timepieces. Each piece of richly-grained genuine hardwood is carefully selected before being shaped and painstakingly hand-finished by a master craftsman!" But the watches are being offered for only $39.95. Therefore if I order one of these watches, I will be getting a real bargain.

2.   The man who came to the door said he would clean our carpets for half the price charged by a commercial carpet cleaner, but with the same or better quality. Therefore I will get a carpet cleaning as good as one done by a commercial cleaner for a much lower price.

3.   The presidential candidate said that if she was elected, she would never raise our taxes. She was elected. Therefore I can rest assured that my taxes will not be raised.

4.   The leader of the opposition party said the rival candidate is advocating socialism and is secretly a Nazi. I cannot vote for anyone who is a socialist and a Nazi. Therefore I can't vote for the rival candidate.

EXERCISE 5 (Homework). Identify at least three examples of false context you may find in your daily activities and bring the examples to class for class discussion.
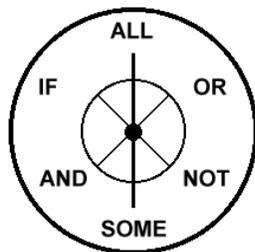

FALLACIES IN THIS CHAPTER

> FALSE CONTEXT: Concluding that something has a certain character, or is true, simply because it has been described that way.

CHAPTER THREE

AND and OR

(Excerpted from *Logic and Critical Reasoning*, by Stan V. McDaniel)

3.1 The Basic Logic Words

The validity of a very large number of arguments depends upon the meaning of certain seemingly gentle, but actually very dynamic, expressions. Tradition has labeled them "logical constants," but we will call them simply the basic logic words. As you can see, the wheel of basic logic words has a vertical axis, determined by the pair ALL and SOME, and two diagonal axes, defined by the pairs IF...NOT and AND...OR. The terms on the vertical axis, ALL and SOME, are called *quantifiers* because they have to do with quantity. These will be discussed in a later chapter. AND, OR, NOT, and IF are called *connectors.* Although the connectors are very small words, their logical power is quite great, and many common fallacies can be traced to unclear ideas about their use. A thorough understanding of them will form a strong foundation for your study of logic.

The Wheel of
Basic Logic Words

HISTORICAL NOTE: The traditional name for connectors is "connectives." We have selected the term "connector" as having a more dynamic character.

3.2 Simple and Compound Sentences

The words and, or, and if are used to connect *two* sentences together, so they are called *bivalent* connectors (bivalent = "connects to two"). The remaining connector "not" connects only to a single sentence, and is called a *monovalent* connector (monovalent = "connects to one")

BIVALENT CONNECTORS:	AND, OR, IF
MONOVALENT CONNECTOR:	NOT

A sentence that contains no connectors is called a *simple* sentence. When a sentence contains at least one connector (whether bivalent or monovalent), it is called a *compound* sentence. For example, the compound sentence "John is tall and John is slender" contains two component sentences. The component sentences (joined by the connector) are "John is tall" and "John is slender." The first component is called the *left-hand component,* and the second is called the *right-hand component.* Finally, if a compound sentence contains more than one connector, it is a type of compound sentence called *multicompound.*

DEFINITIONS

Simple Sentence: Containing no connectors.
Compound Sentence: Containing at least one connector.
Multicompound Sentence: Containing more than one connector.

MAJOR AND MINOR CONNECTORS. When a sentence is multicompound, the connector that affects the entire sentence, not just part of it, is called the *major connector*. A connector that does not affect the entire sentence is called a minor connector. In the multicompound sentence below there are three connectors, AND, IF, and NOT. Before going on, circle the major connector and underline the minor connectors in this sentence.

Joan is an expert veterinarian, and she will treat an animal free if its owner is not able to pay.

In the example above the major connector is AND, because the two components it connects make up the entire sentence. For added clarity, we will place the major connector between slash marks and capitalize it. The minor connectors are underlined.

Joan is an expert veterinarian /AND/ she will treat an animal free if its owner is not able to pay.

The left-hand component is a simple sentence "Joan is an expert veterinarian." The right-hand component is a multicompound sentence, "Joan will treat an animal free *if* its owner is *not* able to pay." IF and NOT in the right-hand component are *minor connectors* because they affect only that component.

DEFINITIONS

Major Connector: In a compound or multicompound sentence, the connector that affects all of the component sentences.
Minor Connector: In a multicompound sentence, any connector that does not affect all of the component sentences.

TRUTH CONDITIONS. When we have a simple declarative sentence such as "Storm clouds are gathering in the west," it is usually a simple matter to determine its truth or falsity (we need only to look westward). But suppose now we have a compound or a multicompound sentence that has simple declarative sentences as its components? What will be the relationship between the truth or falsity of the component sentences, and the truth or falsity of the sentence as a whole? In the case of each connector, there are *truth conditions* that determine the truth or falsity of the entire sentence in relation to the truth or falsity of the components. The truth conditions for a connector are important because they determine the logical force of any sentence having that connector as its major connector.

3.3 The AND Connector

Sentences whose major connector is AND are classified as *conjunctions.* The components of a conjunction are called the *conjuncts.*

DEFINITIONS

Conjunction: A sentence whose major connector is AND.
Conjunct: Any component sentence in a conjunction.

3.3.1 Truth Conditions for AND

If we know the truth conditions for a connector, we can identify the *inference rules* that would apply to that connector. An inference rule is a simple argument pattern, having one or two premises and a conclusion, and determined to be deductively valid by an analysis of the truth conditions for the connectors. Inference rules simplify our analysis of

more complex arguments. The name of each inference rule has a short form, and also has a two-letter abbreviation, either of which may be used in place of the name to save space. In traditional texts, the inference rules have peculiar names, like "adjunction," and "modus tollendo ponens." In our text we will use less obscure (and more meaningful) names.

3.3.2 Truth Conditions and Inference Rules for AND

For a conjunction to be true, both conjuncts must be true. If any of the conjuncts are false, then the entire conjunction is false.

> TRUTH CONDITIONS FOR AND
>
> *True Conjunction:* Both components are true.
> *False Conjunction:* One or both components are false.

The inference rules for AND are based on these truth conditions. (Let *A* and *B* stand for any two sentences.)

(1) The rule of CONJUNCT (CONJ) (CJ): Remove a conjunct from a conjunction.

| PREMISE: | *A and B* | PREMISE: | *A and B* |
| CONCLUSION: | *A* | CONCLUSION: | *B* |

(2) The rule of JOINUP (JOIN) (JU): Join two statements with AND to create a conjunction.

PREMISE:	*A*	PREMISE:	*A*
PREMISE	*B*	PREMISE	*B*
CONCLUSION:	*A and B*	CONCLUSION:	*B and A*

> HISTORICAL NOTE: The rule of CONJUCT is traditionally called "Simplification" and the rule of JOINUP is traditionally called "Adjunction."

3.3.3 Varieties of AND

RELATIONAL AND. Most of the words in our language can be used in more than one way, and the basic logic words are no exception. In the two sentences below, "and" is used in two different ways. Only one of the sentences uses "and" as a logical connector. Which of the two uses "and" as a logical connector?

(a) John and Bill are brothers.   (b) John and Bill both go to college.

In sentence (a) "and" is not used as a logical connector. It merely identifies John and Bill as individuals who are related in a certain way. We could rephrase (a) by writing (c) John is Bill's brother. In contrast, (b) uses "and" as a logical connector. We cannot remove "and" from this sentence without distorting its meaning. This is because (b) is actually two sentences, connected by AND: (d) John goes to college /AND/ Bill goes to college. Now consider sentence (e). Is "and" used as a connector?

(e)   We are reporting the lifestyles of the rich and famous.

If "and" is being used as a connector, the sentence would be analyzed like this:

(f)   We are reporting the lifestyles of the rich /AND/ we are reporting the lifestyles of the famous.

How can you tell if this is a correct analysis? You need to know more about the context. In the context of the television program "Lifestyles of the Rich and Famous," no attention at all was paid to people like Mother Teresa, the Pope, or the president of France, even though these individuals are quite famous. In this context, it is the *combination* of fame and wealth that is referred to by the expression "rich and famous." We could rephrase the sentence as follows: (g) We are reporting the lifestyles of famous rich people. Both (e) and (g) are simple, because they contain no connectors.

AND IN A SERIES. Which of the two sentences below uses "and" as the connector AND? Which one does not use "and" as a connector?

(h)   Red, green, and blue are colors.
(i)   Smith, Jones, and Ryan made up the crew.

Sentence (h) uses "and" as a connector. Actually it contains three component sentences joined by AND.

(j)   Red is a color AND green is a color AND blue is a color.

In contrast, sentence (i) does not use "and" as a connector, but instead uses it to list three things that must all be present to form a whole. It would not be correct to interpret (i) the way we interpreted (h) with (j). If we did, we would have the following incorrect result: (k) Smith made up the crew AND Jones made up the crew AND Ryan made up the crew. Actually The "and" in (i) is a relational "and" which helps list the three persons that, together, make up the crew. Their relationship is that they are all crew members, just as in (c) the relationship between John and Bill is that they are brothers.

REPEATED AND. A bivalent connector always has only two components even when one or more of the components is itself compound. When a sentence contains more than one AND and no other connectors besides AND, none of the ANDs takes logical precedence over another. In such cases we arbitrarily pick one of the ANDs as the major connector. In this text it will be up to you to decide which of a series of ANDs you wish to take as the major connector. However, the AND you select as the major connector will affect your interpretation of the components of the sentence. For example, suppose you decide to pick the rightmost AND as the major connector for (j). Then you will have:

Red is a color and green is a color /AND/ blue is a color.
Left-hand component   Right-hand component

SYNONYMS OF AND. There are a number of ways the AND connector can be expressed in English. A common variation is to add the auxiliary word *both:* "Joan is both a veterinarian and a cat fancier," means "Joan is a veterinarian and Joan is a cat fancier." Several synonyms of AND are shown in the box on the right. The words in parentheses, "so" and "with," are not strictly synonyms of AND, but sometimes function logically as AND. When you say "The cat *with* the red collar belongs to Joan," you are not only saying that the cat belongs to Joan, but also that the cat has a red collar.

BUT
ALTHOUGH
MOREOVER
EVEN THOUGH
BOTH...AND
NOT ONLY...BUT
(SO)   (WITH)

Some Synonyms of AND

The cat *with* the red collar belongs to Joan = The cat belongs to Joan AND the cat has a red collar.

3.4 The OR Connector

OR connects alternatives. There are two main ways in English to use "or". They are called the *inclusive* or and the *exclusive* or. On a restaurant menu, you will often find the statement "Soup or Salad," which means that you may have soup, or you may have salad, but you may not have both. This is an example of the *exclusive* use of "or." If you take one alternative, you exclude the other. The *inclusive* use of "or" is more liberal. The host who says "I can offer you cream or sugar for your tea," is understood to be offering you one, or the other, or both, of the alternatives.

Usually, from a logical standpoint, it is best to interpret "or" in a premise as an inclusive OR. Therefore in our text, when we refer to OR in capital letters, meaning the connector, we express only the *inclusive* sense of "or." When arguments appear in the text as examples or exercises, we will always assume that "or" is inclusive unless there is something very clear in the context that forces us to think of it as exclusive. In such cases, when "or" is used in the exclusive sense, we may always express it by means of a combination of the inclusive or and the phrase "but not both." Adding "but not both" makes the "or" exclusive because it excludes the possibility that both components can be true.

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DEFINITIONS

Alternations: Sentences whose major
connector is OR.
Alternatives: The components connected
by OR.
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3.4.1 Truth Conditions for Inclusive OR

Assuming the inclusive OR, an alternation is false in only one circumstance: when both alternates are false. This is quite different from the AND connector. The AND connector is true in only a single circumstance (when both conjuncts are true) and false in the remaining three circumstances. The OR connector is true in three circumstances and false in only a single circumstance (when both alternates are false). In many ways, as you will see, the AND and OR connectors seem to be "mirror images" of one another. What applies to one will be a kind of reversal of what applies to the other.

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TRUTH CONDITIONS FOR OR

True Alternation: At least one
alternate is true.
False Alternation: Both alternates
are false.
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HISTORICAL NOTE: Alternations are traditionally called
DISJUNCTIONS and the alternates are traditionally called
DISJUNCTS.
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3.4.2 Inference Rule for OR

ALTERNATE DENIED (ALTDEN) (AD): Obtain a result from an alternation . (Let *A* and *B* stand for any two sentences.)

PREMISE:	*A or B*	PREMISE:	*A or B*
PREMISE	*not A*	PREMISE	*not B*
CONCLUSION:	*B*	CONCLUSION:	*A*

ALTDEN represents a very common type of reasoning. Here is an example of an argument that uses ALTDEN to draw its conclusion: Tom is either in the attic or the cellar. What? You say Tom is not in the attic? Well, then, he must be in the cellar." Here's another: "We can deliver your new sofa on Saturday or on Monday. What? You won't be home on Monday? Then we'll have to deliver it on Saturday."

> HISTORICAL NOTE: The traditional name for ALTDEN is the somewhat forbidding Latin expression, "Modus Tollendo Ponens." It was also called by the even more forbidding "Disjunctive Syllogism."

3.4.3 Varieties of OR

OR IN A SERIES. In English "or" may appear only once when a series of items are listed as alternatives. In this respect "or" is similar to "and." For example, "Nails, tacks, or staples will do" contains only a single occurrence of "or" but logically it is multicompound: "Nails will do or tacks will do or staples will do."

MAJOR CONNECTOR FOR REPEATED OR. In such cases you are free to arbitrarily pick one of the ORs as the major connector. Of course, as in the case of repeated ANDs, the OR you pick as the major connector will determine the two components. For example, the sentence above will be analyzed as follows if we pick the rightmost OR as the major connector. In this case the left-hand component is an alternation, while the right-hand component is a simple sentence.

<p style="text-align:center">Nails will do or tacks will do /OR/ staples will do.</p>

3.5 Finding the Major Connector

Misreading a sentence so as to mistake a minor connector for the major one in a sentence can lead to fallacious results. For example, consider this sentence:

(a) The wagon left the trail at the bend and two of the horses were lame or the tracker has read the signs incorrectly.

Which is the major connector, OR or AND? The way the sentence is written makes it difficult to decide. Taking AND as the major connector would give you the following analysis:

(b) The wagon left the trail at the bend /AND/ Two of the horses were lame or the tracker has read the signs incorrectly.

Suppose we let A stand for the component "The wagon left the trail at the bend," and we let B and C, respectively, stand for the components "Two of the horses were lame" and "The tracker has read the signs incorrectly." Then the pattern of major and minor connectors we have chosen for this interpretation of the sentence is: A /AND/ (B or C). (for clarity we have used parentheses to set off the compound right-hand component from the simple left-hand one.)

On this analysis, the sentence is classified as a conjunction, because its major connector is AND. In a conjunction, both components are true when the entire sentence is true, so we could use the rule of CONJUNCT (CJ) to correctly deduce that if the sentence is true, then the first component, "The wagon left the trail at the bend," is true:

PREMISE: A /AND/ (B or C)
CONCLUSION: A   (By the rule of CJ)

Under this interpretation, we could also deduce (B or C) using the rule of CONJUCT, "Two of the horses were lame or the tracker has read the signs incorrectly," which would mean that the signs the tracker read (such as hoofprints in the dirt, etc.) were only those showing the horses were lame. It is understood to be true independently that the wagon left the trail at the bend. But now suppose we take OR as the major connector in the sentence instead of AND? This interpretation has the pattern: (A and B) /OR/ C.

The wagon left the trail at the bend and two of the horses were lame /OR/ the tracker has read the signs incorrectly.

This time the sentence is classified as an alternation, because the major connector is OR. Since it is an alternation, we can't use CONJUNCT to deduce anything from the sentence. At least one of the alternates must be true, but we do not know which ones are true. This reading of the sentence leaves open the possibility that the wagon did not leave the trail at the bend. We would be going beyond the evidence and we could very easily be mistaken, if we tried to deduce from the sentence that the wagon left the trail at the bend. Under this interpretation, the context indicates that the signs the tracker read (and about which he may be mistaken) indicate where the wagon left the trail, as well as showing the horses were lame. Whether the wagon left the trail at the bend depends upon the tracker having read the signs correctly. This example shows that selecting the wrong connector as the major connector can lead to fallacious results. We will call a fallacy made in this way the *Fallacy of the Misplaced Connector.*

The trouble with sentence (a) above is that there are no cues telling us how the sentence should be interpreted. In English certain cues may be used to help us decide which connector is the major one. Sensitivity to these cues can keep you from falling into the fallacy of the misplaced connector. One of the most common cues is a well- placed comma:

(c)   The wagon left the trail at the bend and two of the horses were lame, or the tracker has read the signs incorrectly.

In contrast to sentence (a), the comma in (c) sets off "the tracker has read the signs incorrectly" as a separate component, forcing us to take OR as the major connector and the rest of the sentence as the other component. We know that the signs the tracker read (and about which he may be mistaken) are those having to do not only with the horses, but also with where the wagon left the trail.

CONNECTOR AUXILIARIES. In addition to a careful use of commas, certain *connector auxiliaries* may be used to help us see the correct logical structure of the sentence. The word "either" is often used as an auxiliary with OR. When "either" begins a sentence, it alerts you to expect an OR later on as the major connector of the sentence. It also tells you that what stands between "either" and OR is the first alternative. Using both the comma and "either" as cues, sentence (c) could be even more accurately restated as shown below.

(d)   *Either* the wagon left the trail at the bend and two of the horses were lame, *or* the tracker has read the signs incorrectly.

Here the signs the tracker read would probably include not only hoofprints, but wagon wheel tracks. This version leaves no question as to which connector is the major one. OR must be the major connector. If you were to try to divide the sentence at AND instead, you would be violating the grammar of the EITHER...OR combination. Without cues such as the comma or the connector auxiliary, it may be difficult to be sure which connector in a poorly worded multicompound sentence is the major one. In such situations, there are still two things you can do to make a decision about the major connector.

(1)   Look carefully at the context of the passage where the sentence appears. The context will often provide a clue. In (d) above the context of wagons, horses, trail and tracker helps us to understand the context as that of the Old West.
(2)   Decide what different conclusions you will arrive at if you interpret the sentence in different ways. If one of the conclusions is more fitting for the context, use that interpretation.

Here are two examples of the fallacy of the misplaced connector. For each example, which connector has been mistaken for the major connector of the first premise, and which connector is really the major connector?

(1)   The wagon left the trail at the bend and two of the horses were lame, or the tracker has read the signs incorrectly. Therefore the wagon left the trail at the bend.
(2)   Either he had toast or a muffin, or he had no breakfast at all and went to work hungry. Therefore he went to work hungry.

In example (1) "and" has been mistaken for the major connector. The carefully placed comma tells us that the correct major connector is "or." As a result, the CJ rule can't be applied. In example (2) "and" has again been mistaken for the major connector. The correct major connector is the "or" just after the comma. Again the CJ rule can't be applied.

EXERCISE 5. For each sentence below, locate and circle the major connector, and underline the minor connectors. then circle the appropriate letter to show whether the sentence is simple (S), compound (C), or multicompound (M). Be prepared for classroom discussion of controversial examples.

1. Horses and cows are animals. S C M
2. On Thursday nights we either eat out or we have pizza delivered to our home. S C M
3. William will not telephone when he arrives at the camp. S C M
4. Each candidate gave three-minute answers to the moderator's questions and each had two minutes to rebut the other's answers. S C M
5. Stations from Boston and Newark took advantage of the opportunity, and so did stations from Buffalo, St. Louis, and other cities. S C M
6. What would once have been miracles are now daily performed with steam and coal and electricity and air, and with the human body. S C M
7. Either Mark is lying about his experience in the coal cellar and those scratches were from an ordinary cat, or the curse of the Baskervilles is upon him. S C M
8. Either the Hypothians are insincere or they will go beyond the present ban on crossbows and spears and add a ban on swords and daggers. S C M
9. The Torentinans have already gone beyond the present ban on crossbows and spears and have added a ban on swords and daggers. S C M
10. The chamber went dark and cold and either the power failed or there was a short circuit. S C M

EXERCISE 6. Write out sentences of your own that illustrate each of the synonyms of AND and OR that are listed in the text boxes above. Each sentence you write should be subject to the truth conditions for AND and OR respectively. Bring your work to class for discussion.

FALLACIES IN THIS CHAPTER

MISPLACED CONNECTOR: Misreading a sentence so as to mistake a minor connector for the major one in a sentence.

TRUTH CONDITIONS IN THIS CHAPTER

TRUTH CONDITIONS FOR AND: A conjunction is true only when both of its conjuncts are true. If one or both of the conjuncts are false, the entire conjunction is false.

TRUTH CONDITIONS FOR OR: When we assert the truth of an alternation, we are asserting that at least one of the alternatives is true. If both of the alternatives are false, the entire alternation is false. If one or both of the alternatives is true, the entire alternation is true.

INFERENCE RULES IN THIS CHAPTER

CONJUNCT (CONJ) (CJ): Remove a conjunct from a conjunction.

PREMISE:	*A and B*	PREMISE:	*A and B*
CONCLUSION:	*A*	CONCLUSION:	*B*

JOINUP (JOIN) (JU): Join two statements with AND to create a conjunction.

PREMISE:	*A*	PREMISE:	*A*
PREMISE	*B*	PREMISE	*B*
CONCLUSION:	*A and B*	CONCLUSION:	*B and A*

ALTERNATE DENIED (ALTDEN) (AD): Obtain a result from an alternation.

PREMISE:	*A or B*	PREMISE:	*A or B*
PREMISE	*not A*	PREMISE	*not B*
CONCLUSION:	*B*	CONCLUSION:	*A*

HISTORICAL NOTES:

CONNECTOR	= "Connective"
CONJUNCT	= "Simplification"
JOINUP	= "Addition"
ALTERNATE DENIED	= "Disjunctive Syllogism" or "Modus Tollendo Ponens."
ALTERNATION	= "Disjunction"