

**Hate Talk,
Straight Thought
and Wisdom:
a guide to critical thinking,
argumentation &
and decision making**

2nd edition

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CHAPTER ONE: CRITICAL THINKING & CLAIMS

Consider these examples of **stereotypes** (hasty generalizations about groups of people).

1. Those people are lazy.
2. Those people are sexually immoral.
3. Those people only care about their own kind.
4. Those people should be kicked out of the country.

What makes such stereotypes hate talk is that they are unfavorable generalizations and are sometimes used to justify harsh actions against the groups described. We are all recovering hate talkers. A sizeable minority of Americans would apply *those people* as referring to welfare recipients for claim #1, homosexuals for #2, Jews for #3, and illegal immigrants for #4. But even if we are enlightened enough to reject the **classism** of #1, the **homophobia** of #2, the **anti-semitism** of #3 and the **xenophobia** of #4, many of us would still agree that the statements apply to some (other) groups.

Critical Thinking

This course is not about trying to convince you that conservatives are hate talking bigots and that liberals are enlightened straight thinkers. Indeed, some members of the political left are guilty of some of the most egregious examples of hate talk in their

presentations of Evangelical Christians, corporate executives, or Republican political figures.

The purpose of this course is to train you in better techniques of critical thinking, so that you may be less vulnerable to the claims of hate talk (and less prone to use hate talk yourself). This will not have the effect of weakening values, but straight thought will make you a more effective advocate for your values.

Do not conceive of critical thinking as **common sense**. Indeed, do not even use that term in this course (unless you put it in quotation marks). What passes for "common sense" is merely what is widely assumed in the absence of analysis and evidence. The "proof" behind "common sense" is usually in the form of vague references to "they say that ... " (and it is never clear who "they" are).

WRITE IT RIGHT

Be very cautious about overused pronouns, especially, *they, them, their*.

There are three reasons why you should do a word search for these terms in all of your assignments, even posted discussion. One is that in hate talk "they" often refers to other groups of people who are stigmatized (as in the four hate talk sentences beginning this chapter, referring to "those people").

BAD PHRASING: *They are evil.*

GOOD PHRASING: *Members of Al Qaeda are evil.*

BETTER PHRASING: *Members of Al Qaeda use unacceptable means in pursuit of their goals.*

Also, many of the "common sense" defenders of hate talk vaguely refer to "they say" when asked to bring up proof.

BAD: *They say that each homosexual male has had sex with over a thousand men.*

GOOD: *One study found that the average number of sexual contacts for a homosexual man is ...*

BETTER: Jones, Garcia, Nguyen, Schwartz and Smith (2012) found that among self-identified homosexual men in their thirties living in San Francisco, 43% reported having only one sexual contact in the previous twelve months.

Finally, many students have gotten into the bad habit of using the plural pronouns *they, them, their* to improperly refer to singular nouns.

BAD: Each student should bring their pencil.

GOOD: Each student should bring his or her pencil. (now, the pronoun is singular to match the noun)

BETTER: All students should bring their pencils. (now, the noun is plural to match the pronoun)

BEST: Each student should bring a pencil.

Most hate talk is backed only by "common sense" because a careful consideration of the proof behind its claims would find many **unwarranted** assumptions that we do not have good reason to hold. A thorough analysis of the claims of hate talk would find that they have deep inconsistencies. Although this course will make you better at thinking critically, it does not guarantee that you will be forever immune to hate talk. Living in today's world means a continuous exposure to hate talk, and the sad odds are that you will sometimes find hate talk convincing. You might even find yourself uttering such a phrase. Since we are all recovering from an addiction to hate talk, everyday you must reinvigorate your commitment to scientific evidence and logical analysis. Be quick to identify the hate talk, but slow to label the speaker as intrinsically evil. He or she needs our pity, our help, and our guidance in how to think critically and feel empathically.

Here is a classic definition of **critical thinking**.

"Active, persistent, and careful consideration of a belief or supposed form of knowledge in light of the grounds which support it and the further conclusions to which it tends."

-John Dewey, 1909

Critical thinking includes logic, but it is broader, and makes explicit the (usually implicit) links between thoughts. **Logic** is the branch of **philosophy** (the study of knowledge) that is concerned with whether or not the reasons presented for a claim (if those reasons were true) would justify the acceptance of that claim. In practice, logic means striving for consistency of reasoning.

Logic is following the lines of reasoning, step by step, without any shortcuts. Logic is concerned about the process of how we get from one thought to another; and yes, the route does matter. Logic is a "left brain" function where the rules of math meet the rules of language and science.

"Man is a reasoning, rather than a reasonable, animal."

- Alexander Hamilton

Logic is not necessarily an end in itself, but a means to a better life and a more just society. Logic is not a destination, nor even a wise guide. At best, logic is a reliable compass, though one often blind to the objects directly in front of it. The best thing that we can say about logic is that it can guard against the errors and pain brought about by illogical thinking.

"Crime is common, logic is rare."

- Sherlock Holmes

The position of this book is that logic is an antidote for hate talk, and a necessary foundation for wisdom and justice.

Hypocrisy is a different kind of inconsistency, an inconsistency of one's statements and one's behavior. A hypocrite is one who engages in hypocrisy, someone whose actions are inconsistent with stated claims of value or policy. If a secretly homosexual U.S. Senator consistently opposes legislation to further gay rights, he may be logical in his arguments before the Congress, but he is a hypocrite in practice.

"Hypocrisy is the homage that vice pays to virtue."

- La Rochefoucauld

There is a similarity between logic and the criminal justice system. Both assume that reason is better than emotion, and the hallmark of reason is that consistency between different things is more compelling than the unique features of each individual case. If we are just, we must apply the same criteria for guilt and innocence to all cases. What serves as an excuse in one case must serve as an excuse in all relevantly similar cases.

Cognition vs. Affect

Critical thinking is supposed to help us figure out what is really true. In order to achieve a careful, deliberate determination about whether we should accept, reject, or suspend judgment about a claim, we must use our cognitive skills to identify, analyze, and evaluate arguments. Cognitive is the adjective form of the noun cognition. **Cognition** refers to concept formation and mental problem solving. It is a major new field within **psychology** (the scientific study of behavior) and pertains to such areas as language, intelligence, creativity, and decision making. (Of course,

these topics are also relevant to fields such as business, economics, and political science).

Cognition is usually a **conscious** process. In other words, we are awake when we are thinking and we are aware that we are engaging in these mental processes. About a hundred years ago, **psychoanalyst** Sigmund **Freud** suggested that much of our mental processes were unconscious. By this he meant that we are not always aware of the deeper forces underlying our thoughts, choices, and actions. Specifically, Freud contended that there are unconscious sexual and aggressive drives that determine many of our thoughts, choices, and actions. Freud used the term **unconscious** both as an adjective (referring to those dynamics of which we are not aware) and as a noun (referring to a region of the mind about which we lack awareness). Indeed, the purpose of the process of psychoanalysis is to gain awareness of this unconscious region of the mind.

WRITE IT RIGHT

The word *conscious* requires some terminological caution. We must distinguish between *conscious* and *conscience*. Only the former term means to be awake or aware of something. The latter term refers to the part of your mind inducing guilt. The conscience makes you feel guilty when you do something wrong. We speak of someone who commits a series of horrible acts as "having no conscience." We admonish our children to "always let your conscience be your guide."

Here is a way to remember the distinction between these terms: the first word repeats the letter O in

cOnsciOus

and think of those big O letters as two eyes which are open, so the person can be awake and aware.

The second word repeats the letter N in

coNscieNce

and think of those big N letters as saying "naughty, naughty."

Another terminological caution involves the word *subconscious*. Do not use that term in this course. Neither Freud nor most modern psychologists use this term. Freud only used the terms conscious, unconscious, and preconscious (to describe thoughts that were usually unconscious, but could be voluntarily called into consciousness). Be cautioned that most people who speak of the "subconscious" are likely to be **psychics** (those who claim paranormal abilities) rather than psychologists (scientists who study behavior). We will examine some of psychic claims in a later chapter.

Affect refers to emotions, moods, values, preferences, and priorities. Affect is therefore in a different dimension than cognition. The adjective of affect is affective. Someone who lets his emotions rule where reason should prevail could be accused of "thinking with his limbic system rather than his cerebrum" (because the limbic system is the part of the brain which generates the emotions, and the cerebrum is used for most cognition).

Affect differs from cognition		
Noun	Affect	Cognition
<i>Adjective</i>	Affective	Cognitive
<i>Focus</i>	Feelings	Thoughts
<i>Process</i>	Emotion	Logic
<i>Tests measure</i>	Mood level	Mental ability
<i>Future is</i>	Preferences	Predictions
<i>Planning involves</i>	Ends	Means
<i>Formation of</i>	Commitments	Concepts

WRITE IT RIGHT

Here is a terminological caution: *affect* is a noun and is not to be confused with the verb that is spelled the same way. The verb is pronounced differently and means something very different. *Affect*, the verb, sounds almost like the word *effect* and means to influence something. For example, *The weather affects my health*. *Affect*, the noun, has the accent on the first syllable and has a flat A like that in the word *cat*.

Affect and similar words			
WORD	ACCENT ON	NOUN OR VERB	MEANING
<i>Affect</i>	First syllable	Noun	Emotion, mood, feelings, values, goals, priorities
<i>Affect</i>	Second syllable	Verb	To influence
<i>Effect</i>	Second syllable	Noun	The result of a cause
<i>Effect</i>	Second syllable	Verb	To make something happen

Be cautious when using the verb *to feel* including its past tense *felt* and its noun form *feelings*. It is permissible to use these terms when describing a tactile sensation, such as *This surface feels slippery* or *This water feels hot*. It is alright to use these terms to describe an internal bodily state, such as *He felt tired* or *I feel hungry*. It is also appropriate to use these terms when describing affect, such as *I felt angry* or *He had feelings of joy*. What is not proper would be to use *to feel* or *feelings* when describing something cognitive, such as your position on a matter of public policy. Improper usage of this term reduces clarity and precision.

Another bit of useless phrasing is to put *in my opinion* in front of every statement you write. We know that everything you write and say is your *opinion*, and you don't have to keep reminding us.

Here are some examples of the inappropriate use of terms and some suggested improved phrasings.

BAD: *I feel Obama will win.*

WORSE: *In my opinion, Obama will win.*

GOOD: *I predict Obama will win.*

BETTER: *Given his standing in the polls and fundraising efforts, I conclude that Obama has the best chance of winning the election.*

BAD: *I feel that abortion is wrong.*

WORSE: *In my opinion, abortion is wrong.*

GOOD: *I take the position that abortion is wrong.*

BETTER: *Because abortion is inconsistent with my valuing of the life of the human fetus, I shall support government policies that reduce the practice of abortion.*

BAD: *I feel that Chris Christie would be a good president.*

WORSE: *In my opinion, Chris Christi would be a good president.*

GOOD: *I contend that Chris Christi would be a good president.*

BETTER: *Since I value transparent and honest government, I would prefer that someone like Chris Christi be president.*

BAD: *Governor Brown, what are your feelings about campaign finance reform?*

WORSE: *Governor Brown, what is your opinion on campaign finance reform?*

GOOD: *Governor Brown, what is your position on campaign finance reform?*

BETTER: *Governor Brown, what is your record on campaign finance reform?*

BAD: *I feel that God exists.*

WORSE: *In my opinion, God exists.*

GOOD: *God exists.*

BETTER: *I accept the existence of God, and have committed myself to make Him the center of my life.*

Claims

A **claim** is a statement about a person or thing. A **credible** claim is one that a logical person is likely to accept as true. What makes a claim credible is the main topic of this course.

The purpose of a claim may be to inform and/or persuade. One requirement for a claim is that we can judge it as being true or false. Here are examples of claims.

1. I am a male.
2. My father is under 80 years old.
3. Marco Rubio should be our next president.
4. Two plus two is at least five.
5. Pizza is the best food.

Claims are usually composed of a **subject** (the person or thing about which we are making the claim) and a **predicate** (a property, characteristic, or aspect) that we claim the subject has. Let's go back to our example statements and identify subject and predicate.

1. I (subject) am a male (predicate).
2. My father (subject) is under 80 years old (predicate).
3. Marco Rubio (subject) should be our next president (predicate).
4. Two plus two (subject) is at least five (predicate).
5. Pizza (subject) is the best food (predicate).

Many expressions are not claims. Questions and exclamations are not claims. Neither are commands, suggestions, insults, salutations, guesses, flirtations, stories or jokes. Requests are not claims, and neither are the subsequent responses granting (or

refusing) the request. Boasts are not claims, and neither are the subsequent responses expressing appreciation (or derision) at the boast. These are examples of non-claims.

1. What did she know, and when did she know it?
2. Oh no, not them again!
3. Don't stop thinking about yesterday.
4. Yo, dude!

Claims must be either true or false. Indeed, we should be able to judge each claim as being true or false, assuming that we have enough factual information and/or clarity of definition.

Let's revisit some of the initial examples of claims and come to a verdict on the truth of each.

1. I am a male.

If you have seen me, you know that claim #1 is true.

2. My father is under 80 years old.

If you have met my father, you know that claim #2 is false (since he proudly announces that he was born in 1920).

4. Two plus two is at least five.

If you know arithmetic, you know that claim #4 is false.

The ancient Greek philosopher **Aristotle** (384-322 BCE) is sometimes called the father of logic. He gave us three important

rules for judging the truth of any claim. (Although these rules seem obvious, but don't call them *common sense*.)

1. Identity: a claim is identical to itself
2. **Non-contradiction**: no subject can both have a predicate and lack it at the same time. This is also known as the law of **bivalence**: a claim cannot be both true and false, in the same way, at the same time.
3. **Excluded Middle**: for any particular predicate, a subject either has it or lacks it.

The letter **P** is often used to symbolize a claim. The symbol $\sim P$ is used to symbolize the opposite of a claim (its **contradictory**). Here are the $\sim P$ statements which parallel our first five claims.

1. I am a female. (Assuming that I am a human and humans cannot be both male and female simultaneously.)
2. My father is at least 80 years old.
3. Marco Rubio should not be our next president.
4. Two plus two is less than five.
5. Pizza is not the best food.

According to the law of non-contradiction: statement P and its contradictory $\sim P$ cannot both be true.

While Aristotle's first two laws are intuitively accepted by most people, the third is questioned by many students of logic. Is a middle answer always excluded? Consider these examples.

1. San Bernardino is a large city.
2. My father is old.
3. I would like to see Governor Brown re-elected.
4. Yesterday was warm.
5. Pizza is fattening.

The principle of excluded middle assumes that we must answer yes or no (true or false). With the above claims, it would be more appropriate to assess how true they are instead of simply whether they are true. Notice how we can increase precision by embracing the excluded middle.

1. San Bernardino has a population of about 200,000. That is a larger city than Highland, but a smaller city than Los Angeles.
2. My father was born in 1920, so he would be older than my mother, but younger than my uncle.
3. I would like to see Governor Brown re-elected if he was running against candidate X, but not if he was running against candidate Y.
4. Yesterday was 89 degrees.
5. A slice of that kind of pizza with those toppings is about 500 calories.

The only way to enforce the excluded middle is to develop cutpoints. Now, we can deem each claim as true or false.

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1. A large city has over a quarter of a million inhabitants. So, San Bernardino should not be classified as a large city.
 2. Old people are over 60 years of age, so he would be classified as old.
 3. I would like to see Governor Brown re-elected over his most likely opponent.
 4. Yesterday was 89 degrees, but under the July average of 92, so it should not be called warm.
 5. A slice of that kind of pizza with those toppings is more than her diet allows.

Notice how the use of these cutpoints reduces precision, because now I am classifying San Bernardino with Highland as small cities, and including July 1st and January 1st as “not warm” days.

TRUTH TABLE FOR CLAIMS AND THEIR CONTRADICTORIES

<i>P</i>	<i>~P</i>
T	F
F	T

This table shows that if statement P is true, its contradictory $\sim P$ must be false. If the contradictory $\sim P$ is true, then statement P must be false.

Analytic vs. Synthetic

One branch of philosophy known as **metaphysics** concerns the nature of reality: what really exists and what is its essential nature? Some great philosophers were metaphysical idealists who said that only our ideas really exist (and that material objects are just hallucinations, illusions, or imperfect copies of ideas). Other philosophers were metaphysical realists, arguing that only external, material objects exist.

A related branch of philosophy is **epistemology**: how do we know things; what counts as knowledge? Different ways of knowing, and different kinds of proof may apply to different kinds of claims. Usually, metaphysical idealists contend that the only way to know is by pure reason, while metaphysical realists contend that the only way to know is through the senses. This latter approach is called **empiricism**, and it is the methodology of **science**.

Claims can be classified as analytic or synthetic. **Analytic** claims deal solely with abstract concepts. Here are examples of analytic claims.

1. All bachelors are unmarried.
2. Red is a color.
3. A triangle has three sides.

Their truth is not dependent upon empirical knowledge of the condition of real objects in the external, objective world. In order to determine the truth of an analytic claim, pure logical analysis and a clear definition are sufficient. In our first five examples of claims, only #4 would be an analytical claim.

4. Two plus two (subject) is at least five (predicate).

We know that two plus two is less than five even without opening our eyes and counting the objects. We know this **a priori** (prior to observation).

Synthetic claims deal with external facts. In order to determine the truth of a synthetic claim, pure logic is not sufficient. The empirical approach is essential to test synthetic claims. Empiricism is the method of science, and emphasizes objective observation and precise measurement of the external world. This kind of knowledge is known as **a posteriori** (after observation).

1. I (subject) am a male (predicate).

2. My father (subject) is under 80 years old (predicate).

In the above five claims, #1 and #2 are clearly synthetic. In order to determine my gender or my father's age, you must get some factual information about us.

Reflexive claims, circular arguments & paradoxes

Most claims are not reflexive. **Reflexive** claims pertain to themselves. Here are some examples of reflexive claims.

1. Congress passes a law saying *"All laws passed by Congress must apply to Congress."*

2. Your professor says *"You should follow the instructions of your professor."*

3. A sign on the wall says *"Post no signs on this wall."*

4. Your friend says “*No generalization is always true.*”

5. The public address system ends a message with “*This announcement will not repeat.*”

Each of these statements is reflexive: #1 is, itself, a law passed by Congress; #2 is an instruction from your professor; #3 is a sign on the wall; #4 is a generalization itself; #5 is a part of an announcement.

Some reflexive claims are internally consistent in that they may apply to themselves without contradiction. Above, statements #1 and #2 are internally consistent. Congress does not contradict itself by saying that it will apply all of its laws to itself. Your professor does not contradict himself when he says to follow his instructions. Such internal consistency makes a statement analytically acceptable, but does nothing to provide the kind of external, empirical proof required in synthetic statements. So, claiming that *This statement is true* does not make it analytically true, but it does prevent it from being analytically false. Claiming *This statement is true* provides no synthetic substantiation. So, reflexive consistency is logical, but not usually sufficient proof by itself for the statement.

Some consistent statements are linked to others to create **circular arguments**. Here we have statements based upon statements that, in turn, are based upon the statement we started with. Here is one of the best examples

God exists, because the Bible says so, and the Bible is the word of God.

Circularity is not an inherent weakness of an argument, it is just not adequate as proof. Indeed, I do accept the existence of God

and the Bible as His word, but more proof will be required to convince an atheist of either the existence of God or the divine inspiration of the Bible.

A **paradox** is a reflexive claim that is, or at least appears to be, inconsistent. Analytically, a paradox must be false. In the above four examples of reflexive statements, #3 and #4 are close to being paradoxes, for they seem to contradict themselves. Consider these further examples.

1. This statement is false.
2. I am lying when I say this.
3. Only statements under over 10 words are true.
4. It is forbidden to forbid.
5. Please ignore this notice.
6. Never say never.
7. There are no errors in this book, except this one.
8. *“In principle, I am against principles.”* - Tristram Shandy
9. Expect the unexpected.
10. *“The golden rule is that there are no golden rules.”* - G.B. Shaw
11. Take no one's word for anything.
12. Distrust all that you are told.

THINK ABOUT IT

Is this statement reflexive?

All statements must be open to modification in light of future evidence and analysis.

If so, is it self-consistent or paradoxical?

Is this statement reflexive?

Tolerance must be absolute.

If so, is it self-consistent or paradoxical?

Definitional & descriptive vs. prescriptive

Axiology is the branch of philosophy concerned with values, and asks questions such as *What is the greatest good?* **Ethics** is a branch of axiology, and deals with questions about how we determine the moral course of action: *What should a person do in this situation?*

Claims that are **descriptive** are synthetic, just about the **data** (observable facts). For example,

I see two books on John's desk. I see three books on Mary's desk.

Notice: that there is no implied value claim in the above statements; we are not saying that the books are good or that one book is better than the other, or that Mary is better than John.

Claims that are definitional are analytic, just about the concepts.
For example,

Two plus two equal four.

Notice: that there is no implied value claim in this statement either; we are not saying that four is a good or bad amount.

Both definitional and descriptive claims are cognitive. They try to deal with the world that *is* rather than the world as it *should be*.

To enter the world of axiology and ethics, we need claims that are **prescriptive** and value laden. This leads us into the realm of affect (emotions, preferences, priorities, taste). Such prescriptive statements are about more than mere concepts or facts, but express **norms** (social rules about behavior and thought). In the our initial five examples of claims, only two are prescriptive

3. Marco Rubio should be our next president.

5. Pizza is the best food.

Whenever we see words like *should* or *ought*, we are dealing with statements prescribing a value laden norm. Also look for words like *good*, *better*, *best*, *bad*, *worse*, *worst*, and *evil*. Words like *must*, *right*, and *wrong*, are a little ambiguous because they might refer to values (as in the following examples)

Abortion is wrong.

(This is equivalent to: *You should not abort a fetus.*)

You must do your duty.
(This is equivalent to: *You should do your duty.*)

as well as some factual statements (as in the following examples)

To say that two plus two is five would be wrong.

Two and two must be four.

Indeed, if we can reduce a value judgment to a fact, then *good* becomes a merely descriptive statement.

Barry Bonds was a good baseball player because he hit so many home runs.

Prius is a good car because it gets a high gas mileage.

These statements reduce our value judgments to mere numbers, facts. Notice, that in such examples, we presume an initial agreement on the descriptive standard for what is good or bad, or right and wrong: that home runs equals a good ball player, and that higher miles per gallon makes for a good car.

The truth of descriptive claims is the **validity** of their empirical measurements (as demonstrated by the scientific method). In this sense, such statements are objective (assuming that we agree upon the initial definitions or empirical measurements). However, the truth of **normative** claims should be referred to as **value**, rather than validity. Judgments of value tend to be more subjective than objective, since human preferences and priorities differ from culture to culture, family to family, person to person, and even within ourselves from time to time).

WRITE IT RIGHT

Sometimes we refer to these *ought* claims as the realm of *feeling* or *opinion* or taste. I propose that we use terms like *normative* statements or *prescriptive* claims or *value* judgments because *opinion* and *feel* are also used to suggest descriptive claims with inadequate empirical backing, such as

I just feel that the Yankees will win the series.

Avoid terms like *opinion* and *feel* in this class and you will do well.

<i>Summary of different kinds of claims</i>			
Claim	Descriptive	Definitional	Prescriptive
Classification	Synthetic	Analytic	Normative
Field	Science	Math	Religion, Ethics
Deals with	Data	Formulas	Values
Process	Empirical	Pure logic	Revelation
Proof by	A posteriori verification	A priori verification	Vindication
Acceptance	Belief	Belief	Commitment
Psychological realm	Cognitive	Cognitive	Affective
Truth	Valid (data measurement)	Valid (deductive reasoning)	Value (do not call religion <i>valid</i>)
Verb	Is	Is	Should, Ought

It is the position of this book that logic has a role in each of these forms of truth. For synthetic statements, logic keeps scientific theories consistent with the data (and with themselves). For

analytic statements, logic is in the form of grammatical or mathematical rules. For prescriptive statements, logic is in the form of theology.

THINK ABOUT IT

Is this statement prescriptive?

Tolerance must be absolute.

Many times, people will try to convince others of a descriptive claim by relying upon emotional reasons. This approach is one of the techniques of **rhetoric**. People who are fearful or led by wishful thinking will sometimes accept a falsehood out of pure emotion. It is not that they are incapable of critical thought, it is just that emotions are often more powerful influences upon behavior, and the emotion over-rides critical thought.

“The trouble with most people is that they think with their hopes or fears or wishes rather than with their minds.”

- Will Durant

More than a half century ago, social psychologist Solomon Asch demonstrated that most people would rather go along with a group judgment about a fact than believe their own eyes. He told high school boys, all seniors interested in attending one of the military service academies, that there would be a group interview. There were six boys in the room at a time. They were asked a series of questions, like *why do you want a military career?* Finally, there was going to be a visual perception test, for all of the boys had expressed a desire to become aviators. On one side of the room,

there was a card with a line drawn on it. On the other side of the room, there was another card with three lines, A, B, and C. One of those lines was the exact length of the line on the other card at the opposite side of the room. The boys were asked to call out which of the three lines had the same length as the line on the other card. The answer should be obvious to any observer with normal eyesight, but Asch had arranged for the first five boys to give the same wrong answer. The real subject of this experiment was the last boy: to see if he would give the correct answer, based upon his own eyes, or whether he would conform to the (wrong) answer given by the other five members of his group. Most of the boys in that situation conformed, and gave the wrong answer. They preferred to **conform** (go along with the group) rather than trust their own vision.

Such conformity occurs even more often in the case of value judgments. We tend to imitate the values of others: our parents, our community, our peers, or celebrities. Unfortunately, that gets us back to hate talk. We feel more comfortable, emotionally, going along with the group, mouthing hate slogans and repeating deprecating jokes.

Critical thinking requires cognition, but following it up with behavior also takes courage and a willingness to challenge the thoughts, values, and actions of those around us.

Relativism

Relativism is the position that all truth is merely a matter of "opinion," varying from individual to individual (or from culture to culture or from epoch to epoch). The most extreme form of this is **subjectivism** which assumes that truth varies from one individual to another, so I have *my truth* and you have *your truth*. Usually, the conclusion is something like "*and everybody is entitled to his opinion.*" That usually shuts down the discussion rather than elevating its level.

The first problematic aspect with this approach is the use of the vague term, *opinion*. Your right to your "opinion" does not

1. oblige me to agree with you
2. oblige me to not to argue with you
3. oblige me to listen to you.

If we get through the vague term *opinion*, relativism is really arguing that no truth is permanent or absolute. What might be true for me today may not be true for you (or even for me tomorrow). Clearly, relativism is untenable when it comes to objective claims, especially those that are synthetic.

"Reality is that which, when you stop believing in it, doesn't go away."

- Philip K. Dick

Whether the earth is flat or round may depend upon how we define *round* but this is not a matter of *opinion*. Whether the earth goes around the sun or the sun goes around the earth may depend upon how we define *goes around* but it is not a matter of *opinion*. Whether or not humans evolved from lower species may depend upon how we define *evolved* but it is not a matter of *opinion*.

I have not heard even the staunchest defenders of relativism say

For me the earth is round, but for you it is flat

or

My ancestors evolved from lower primates, but your lineage began with Adam and Eve.

However, relativism is widely assumed by many individuals when it comes to prescriptive claims.

"Almost every student entering the university believes that truth is relative The relativity of truth is not a theoretical insight, but a moral postulate, the condition of a free society, or so they see it."

- Alan Bloom

"He is YOUR God. They are YOUR Rules. YOU burn in Hell!"

- atheist lapel button

When applied to ethics (the branch of philosophy dealing with right and wrong behavior) relativism has led to **situational morality**: stealing may be morally acceptable in certain situations, but not in other situations. Some absolute relativists even argue that it is impossible to judge any individual action at any time because there are no absolute standards.

The position of this book is a rejection of relativism. This book is based upon the assumptions that truth exists, that it is possible to know the truth, and it is possible to communicate about the truth.

To say that there are is multiplicity of value systems is a descriptive statement that most social scientists would acknowledge as true. To say that there should be a multiplicity of value systems is a prescriptive statement. To say that all value systems are equal is a prescriptive statement, one which asserts

that its value system is better than the ones that say one value system is better than the others (and is thereby contradictory). To say that everything is relative is to deny the existence of any universal claim: something that holds for all persons, all societies, all times (and relativism is itself such a statement).

THINK ABOUT IT

Is this statement reflexive?

You have your truth, but it is not my truth. You have no right to try to impose your truth on me, or to impose your morality on me.

If so, is it self-affirming or paradoxical?

Unfortunately, the alternative to relativism is often the assumption that we are right (and others are wrong). We all have a tendency to **ego-centrism**, assuming that the world reflects (or should reflect) our unique perspective on it. We also have a tendency to **socio-centrism** or ethno-centrism, assuming that our particular group (e.g., Americans, Evangelicals, Republicans) has the best perspective on reality (especially that we have the best values). In addition to being a one-sided kind of relativism (*my values are right and yours are wrong*) this is the kind of approach that leads to hate talk (*for if my values are right, and theirs are wrong, then those people must be evil and we should hate them*).

Relativism is a paradoxical dead end. Ethno-centrism is a formula for hate talk. What then is the solution? This book contends that the path to follow is to

1. start out being committed to values
 2. engage in a genuine dialog those whose values are different, emphasizing similarities rather than differences
 3. modify our values as part of the process of connection with others
 4. use both critical thinking and empathy in our discernment of joint values
 5. use wise decision making in our development of joint actions
-

So, is tolerance paradoxical, self-affirming, prescriptive, and/or relativistic? The answer depends upon how we define tolerance. I suggest operationally defining tolerance as following the above five steps. That would make tolerance more of a prescriptive plan of action, and would be self-affirming and flexible enough to overcome relativism, ego-centrism and socio-centrism.

CHAPTER TWO: INFERENCE & ARGUMENTS

Inference

The noun *inference* comes from the verb to **infer**. To infer means to reason from something already known (or assumed) to something else not already known. The noun inference may describe the process of such reasoning or the conclusion that is its product. If the inference does not seem to follow from the observation, that is a **non sequitur**.

Inference has a relationship with the term *implication*. To **imply** means to suggest something, without explicitly stating it. If I said

That politician cheated on his wife. He swindled his business partner, his own cousin. He was charged with campaign fraud in his last election.

Notice, that I did not say that the politician was dishonest, or that he could not be trusted, or that he would be involved in more scandals if elected, but I arranged the presentation of the facts in such a way that I was clearly implying those things. If, after hearing my diatribe against the politician, you concluded that he was not honest, then that was an inference that you made. The writer (or speaker) implies. The reader (or audience) infers.

Suppose I am driving down the hill from the college to my home in the valley below. On the road I see some skid marks, then I notice the broken glass. Off to the side of the road I observe two badly smashed cars and an ambulance. When I get home I tell my wife that I saw a horrible

accident. But wait! Did I observe the accident or did I infer that there had been an accident?

If your definition of an automobile accident is the act of two cars colliding, I was not present on the scene when that occurred. I arrived later and saw only the signs of the accident: the skid marks, broken glass, smashed cars, and the ambulance. From these separate observations, I inferred that an accident had taken place.

For centuries, people looked upwards and saw what they assumed was the sun revolving around the earth. Then about four hundred years ago, **Copernicus** and **Galileo** concluded that the earth revolved around the sun and that the sun's apparent movement from east to west was actually due to the rotation of the earth. Neither Galileo nor Copernicus observed the earth's rotations on its axis nor its revolution around the sun. Their new heliocentric theory was merely an inference based upon other observations. The rotation would account for day and night. The revolution of the earth around the sun accounts for the seasons.

The ancient Greek philosopher **Aristotle** (384-322 BCE) could rightly be called one of the grandfathers of the scientific method (as well as the father of logic). He concluded that dogs dream, not by asking a dog what it had dreamed of, but by observing that dogs bark while asleep, and then inferring that it was because they were dreaming.

The French humanist writer of the Enlightenment, **Voltaire**, was firmly committed to critical thinking as the formula for saving human kind of barbarism.

“Men will cease to commit atrocities when they cease to believe absurdities”

- Voltaire

His **assumption** (an idea accepted as a starting point, without initial proof) was that people were essentially good, and capable of rational action, so if we can just teach people how to think clearly, good actions will follow (his inference). This approach is known as **humanism**.

Much of inference is based upon reasoning from a past cause to a future effect, or from a present effect back to a past cause. (More on how this is done in chapter four.)

In the 20th century, behavioral psychologists sought to explain human behavior in terms of **stimulus** (what is going on in the current environment) and **response** (behavior). Notice that both stimuli and responses are directly observable by the studying the organism's behavior, and we don't have to get inside the organism's mind.

Sometimes we observe both a stimulus being followed by a response. At other times, we observe only one of these events, and have to infer the other. Sometimes we just observe the stimulus and infer how the organism will respond. This is an inference of present to future.

Present *observed* -----> Future *inferred*

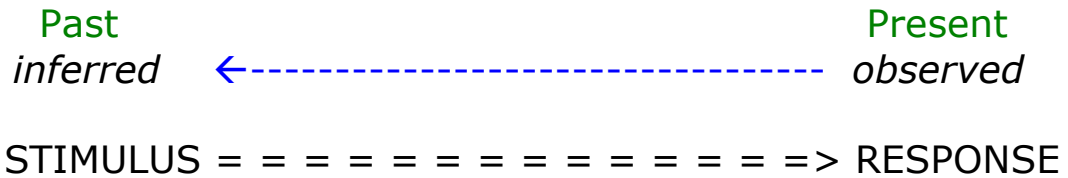
STIMULUS = = = = = = = = = = = = = = => RESPONSE

Here is an example.

OBSERVED STIMULUS: The ball has been hit to the center fielder.

INFERRED RESPONSE: He will run after it and try to catch it.

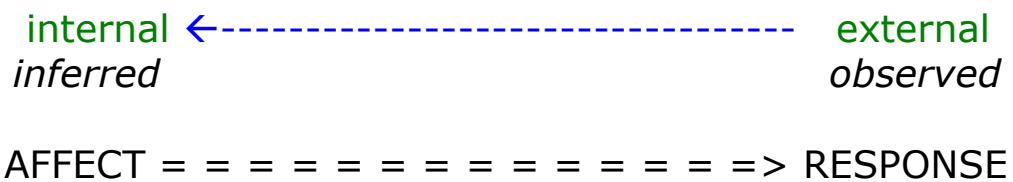
Sometimes we see the response and infer that some stimulus must have occurred before the response. This is an inference of present to past.



Here is an example.

OBSERVED RESPONSE: My wife just bought a lot of material at the fabric store.
INFERRED STIMULUS: There must have been a big sale.

Sometimes we observe the response (which is external and observable) and we infer some internal affective state (e.g., emotion, motivation) not in itself directly observable.



Here are some examples.

OBSERVED RESPONSE: That man is yelling at his kids.
INFERRED AFFECT: He must be very angry.

OBSERVED RESPONSE: That little girl is crying.
INFERRED AFFECT: She must be sad, hurt or frustrated.

OBSERVED RESPONSE: Bob is voting for the Democrats this year.
INFERRED AFFECT: He must be in agreement with their policies.

OBSERVED RESPONSE: Sarah is flying coach instead of first class.
INFERRED AFFECT: Saving money must be more important to her than comfort.

Proper inference is a key to wisdom. Everyday we see and hear thousands of messages, and we make all sorts of inferences on the basis of these. Some of what we hear is gossip from friends, some is advertising on a billboard, some of it is from the political campaign. We ignore many of these messages, but with a few, we make important inferences that guide our actions.

*“Smart is when you only believe half of what you hear.
Brilliant is when you know which half to believe.”*

- Orben's Current Comedy

THINK ABOUT IT

What did (then) Senator Obama imply when he said the following in April of 2008 on his poor performance among primary voters in Pennsylvania?

“It's not surprising, then, they get bitter, they cling to guns or religion or antipathy to people who aren't like them or anti-immigrant sentiment or anti-trade sentiment as a way to explain their frustrations.”

Do you infer that, being a University of Chicago professor, he was merely offering a sociological explanation of how people's backgrounds influence their political attitudes?

Do you infer that, because he was speaking to a room full of wealthy donors in San Francisco, he was trying to flatter them by demeaning people in other parts of the country?

What did (then) Senator Clinton imply when she said in May of 2008 amid calls for her to end her presidential campaign rather than push on until June ...

“My husband did not wrap up the nomination in 1992 until he won the California primary somewhere in the middle of June, right? We all remember Bobby Kennedy was assassinated in June in California. You know I just, I don't understand it.”

Do you infer that, she was just reminding us that some past nominations were not decided until after California's June primary (which took place in February in 2008)?

Do you infer that she was really implying: *I better keep my campaign going strong because Obama might get assassinated before the convention?*

Your inferences about what you think these candidates meant will be largely determined by your level of affective commitment to those candidates. You will tend to see the comments of your preferred candidate in the most favorable or innocuous frame, while viewing those of the candidate you oppose as a confirmation of why you have rejected that candidate.

Truth tables show the relationships between statements. Either a statement (symbolized by the letter **P**) or its **contradictory** (symbolized by $\sim P$) must be true. **P** and $\sim P$ cannot both be true in the same way at the same time. If **P** is observed to be true, then the contradictory statement, $\sim P$, can be inferred to be false, even if we have not directly observed that it is false. If statement **P** is observed to be false, then the contradictory statement $\sim P$ can be inferred to be true, even if we have not directly observed it to be true. Here is an example.

P = There are birds in the park.

$\sim P$ = There are no birds in the park.

These statements are contradictories: they cannot both be true (at least they cannot both be true at the same time if we are using the same understanding of *birds*, and the same understanding of *park*). According to the law of the excluded middle, there either are (some) birds in the park or there are no birds in the park.

The truth table for this negation looks like this.

P	$\sim P$
T	F
F	T

THINK ABOUT IT

This truth table can help you solve the following puzzle. You are visiting a country inhabited by two tribes of people. They look alike, dress alike, and speak the same language with the same accent, so there is no way to distinguish between them. However, one tribe always tells the truth to visitors, and the other always tells lies. You come to a fork in the road and need to know which way to go, right or left. A man is there, but you do not know to which tribe he belongs. What one question should you ask him in order to know whether to go to the right or the left? The honest tribe will give you the correct answer, but the lying tribe will give a false answer.

Ask this question: *What will you tell the next visitor who asks you which way to go?* The truthful people will tell the next visitor the right way to go, and will tell you truthfully what they will tell the next visitor, so you may follow those directions. The lying people will lie to the next visitor, but they will also lie to you about what they will say to the next visitor, so the two lies will cancel each other out and you may follow these directions as if they were the truth.

Here is the special truth table for that situation.

	WHAT THEY TELL NEXT VISITOR	WHAT THEY TELL YOU ABOUT NEXT VISITOR
honest tribe	right way <i>the truth</i>	right way <i>the truth</i>
lying tribe	wrong way <i>a lie</i>	right way <i>a lie</i>

Remember, your goal was not to hear the truth from the lying tribe (something they would never give you), but your goal was to learn the right way to go.

When two statements always have the same truth value, they are **equivalent** claims (**P** and **E**). If one statement is true, you may infer that the other statement is true. If one statement is false, you may infer that the other statement is false. Here is an example of such a pair.

Two plus two is not less than five.

Two plus two is at least five.

The truth table for these equivalent claims looks like this.

<i>P</i>	<i>E</i>
T	T
F	F

Alternative Interpretations

In the above example of the lying tribe, as in most of the situations we face in life, wisdom lies in making the right inference. However, in real life, there are usually several interpretations (inferences) that can be made from any observation.

Go back to my example of inferring that there had been an automobile accident on the road home. One alternative explanation could be that they were filming a movie: the cars were just props and the drivers and paramedics were actors.

In an apocryphal story told in sales training seminars, a shoe company once sent two scouts into a poor African country, one sent back a telegram saying

“Situation hopeless; no one wears shoes.”

while the other one wired back

“Glorious business opportunity; no one has shoes.”

The first scout had inferred that people did not want to have shoes, and so therefore, there was no business opportunity. The second scout had inferred that the only reason the people did not wear shoes was because no one had arrived with shoes to sell.

Many misunderstandings are due to inappropriate inferences, often with tragic results. In 1955 Emmett Till was an African American teenager living on the South Side of Chicago. His father had been killed in World War II, and so his mother wanted fourteen year old Emmett to spend the summer with male figures (uncles and grandfather) down on a farm in Mississippi. After working in the cotton fields all day, Emmett and his cousins headed off to a local store to get some soft drinks. As they left, the white woman who owned the store heard one of the boys whistle, and thought it was Emmett. She told her husband, and they both considered this the height of impropriety. The white husband and his friends went out to Till's uncle's farm, kidnapped Emmett, beat him, killed him, and threw his body in the river. The men then bragged about what they did. They were arrested, but a local, all white jury found them innocent.

This is more than just another vivid case of racial injustice, but also an example of an inappropriate inference. Young Emmett Till had a speech impediment: he stuttered. His mother taught him to overcome his stutter by whistling before he had something to say.

In the political arena, different parties (driven by their opposing agendas) will interpret events quite differently.

Headline: *Poverty rate continues despite federal spending.*

Democrat inference: *We need to spend more on fighting poverty.* The failure of present policy in stopping poverty is seen as a need for spending more.

Republican inference: *That shows that you can never solve the problem of poverty by throwing money at it. To spend more would just be wasting more.* The failure of present policy in stopping poverty is seen as an inherent indictment of present programs.

Notice the strategy: Whenever a problem persists despite the employment of a remedy, there are two plausible, yet opposite inferences:

1. the remedy was ineffective (i.e., stop wasting money on it)
2. the remedy was not given adequate trial (i.e., spend more money on it)

Suppose there are no major terrorist attacks on U.S. soil for the next five years. One inference could be: *We don't need to limit our civil liberties.* The lack of a problem means that the solution is no longer needed. But another inference could be: *This shows that the Patriot Act is helping us win the war on terrorism. We should keep it up.* The lack of a problem means that the solution must be working.

Notice the strategy: Whenever a problem disappears after the employment of a remedy, there are two plausible, yet opposite inferences:

1. the remedy is effective (i.e., keep spending money on it)
2. the remedy is no longer necessary (i.e., stop wasting money on it)

Many ancient superstitions are perpetuated by inappropriate inferences. The Aztecs tried to appease their gods by human sacrifice, so that the war god would grant them victory over their enemies and the rain god would help the corn grow. If, in a given year, the rains came and the corn harvest was abundant, the Aztecs reasoned that they did not want to jeopardize their success by reducing the number of sacrificial victims. If, in a given year, the rains came late or not enough, the corn harvest was jeopardized, so the Aztecs reasoned that they should sacrifice more victims. As a result of this process of inference, the number of annual Aztec sacrificial victims was in the thousands by the time that the Spanish arrived. One of the reasons why Cortez, with an "army" of a few hundred men conquered the Aztec empire is because the other Indian tribes so hated the Aztecs for their practice of capturing people from other tribes to serve as sacrificial victims.

Non-scientific inferences are also made by many people who advocate **parapsychology** as an explanation for human phenomena. One power claimed by some **psychics** is a form of extra sensory perception known as **precognition** (foretelling the future). One of the favorite examples used by defenders of precognition is the series of predictions by a French writer, Nostradamus (1503-1566), who wrote vague verses in quatrains. It would be impressive if the followers of Nostradamus got together and gave us a definitive interpretation of what he said so that we would have a clear prediction of what would happen next year. However, what the interpreters of Nostradamus do is a form of retrodiction: trying to make a quatrain fit an event that has already

occurred. So, after World War II, they searched through the quatrains to see what would fit Hitler, the death camps, the atomic bomb, and many symbols do sound strikingly parallel. After the 9/11/2001 attacks, the verses of Nostradamus were searched, and again striking parallels were found to the twin towers.

How long of a series of numbers can you remember: seven, eight, ten digits? Look at this series of just eight numbers and try to remember them

1 4 9 2 1 7 7 6

Turn away, wait for 30 seconds, and write down the numbers and see if you got them all correctly.

OK, now look at the numbers again, and see this pattern: you can remember the year that Columbus sailed (1492) and the year the Declaration of Independence was signed (1776). Now, you will never forget that series of eight numbers. Indeed, it is now impossible for you to look at that sequence of numbers and not see the pattern.

The same holds true for the "pattern" in the writings of Nostradamus. After the events have occurred, and after someone has pointed out the parallels to you, they appear so obvious of an inference. Once an interpretation is overlaid on a vague prophecy, it may be difficult to see any other possible interpretation.

The same can be said about passages in the Bible, and not just the prophetic ones. Once we have attended a Bible study group where a passage of scripture is fully interpreted and applied to modern life, it becomes difficult to see how anyone could interpret that same passage differently. The fact that different churches use the same Bible (even the

same translations) speaks to the power of different inferences. **Hermeneutics** concerns the techniques for interpreting texts. **Exegesis** is the attempt to interpret a given passage of scripture. Any interpretation of scripture, regardless of the hermeneutic employed, tells us as much about the person doing the interpretation as it does about the text being interpreted.

Optimists and pessimists look at the same reality and make very different explanations for the present (or speculations for the future, as we saw in the case of the two shoe salesmen). There is the story of a gullible man and his cynic friend who went duck hunting. The gullible man said that he had a new hunting dog he had purchased for a thousand dollars. The cynic said "That's too much to spend for a dog. What makes him so special"? The gullible man said "The fellow that sold me that dog said that he could walk on water." The cynic retorted "I'll believe that when I see it." So, the two men went hunting with their dogs. When the hunters shot at a flight of birds and several fell into the lake, the two hunting dogs ran out to the water's edge, and then both men saw the dogs get the birds: the cynic's dog swimming in the water and the gullible man's dog walking on top of the water. The cynic responded: "What's the matter, can't your dog swim?" His pessimism had locked him into an alternative inference of what he had just seen.

Argument

You have probably used the term "argument" in the interpersonal context of a verbal fight associated with anger and hostility. Perhaps your parents told you

"We weren't arguing, we were just having a discussion."

Perhaps you yourself have attempted to avoid a social argument by asserting a claim that you thought would be more likely to keep the peace. When your girlfriend asks

“Do I look fat in this dress”?

you promptly say no, hoping to avoid a disagreeable evening.

The definition of argument that we use in this book is different. An **argument** is a form of communication relying upon reasoning and proof to influence belief, value commitments, or behavior. The specific form of argument that we will study is a combination of statements designed to convince an audience.

“An argument is a connected series of statements intended to establish a proposition.”

- Monty Python

The formal argument is composed of two claims: the premise and the conclusion. The **conclusion** is the claim that the writer (or speaker) wants to convince the reader (or audience) to accept. The **premise** is the reason given for this. The conclusion is *what* should be accepted. The premise is *why* it should be accepted.

PREMISE =====> CONCLUSION

Perhaps you have noticed a parallel between inference and argument. In the former process (inference), the writer presented a fact or observation, and hoped that the audience would come to an inference as a sort of conclusion. In the latter process (argument), the writer offers a premise in hopes of convincing the audience of the conclusion (as a sort of inference).

Most arguments can be summarized in one sentence with two clauses, one for the premise and one for the conclusion. In a formal structuring of an argument, the premise is presented first and the conclusion is at the end, but in common speech, the conclusion might be presented in any part of the sentence.

The conclusion may be something the writer wants the audience to agree with (e.g., *driving an SUV is a sin*) or do (e.g., *vote for this candidate*). In addition to claims, conclusions can be commands, warnings, and advice.

The clauses for both conclusions and premises are usually indicated by certain words.

Here are some words which may begin a clause representing the conclusion :	
Accordingly	This indicates that
It should be clear that	We may infer that
We may conclude that	This points to the conclusion that
Consequently	This proves that
We may deduce that	So
It follows that	This suggests that
Hence	Therefore
This implies that	Thus

Here are some words which may begin a clause representing the premise :	
Because of the fact that	For the reason that
For	As a result of
Given that	Since
As indicated by	Is supported by
Owing to	In view of

The most common phrases used are *because* (for the premise) and *therefore* (for the conclusion).

Here are examples of complete arguments, with premise and conclusion identified.

Vote for Hillary Clinton (conclusion) because she is a woman (premise).

Since it is closer to the equator (premise), it follows that Acapulco should be warmer than Chicago in January (conclusion).

We may infer that Crafton Hills College is a good school (conclusion) as indicated by the fact that the professors send their own kids there (premise).

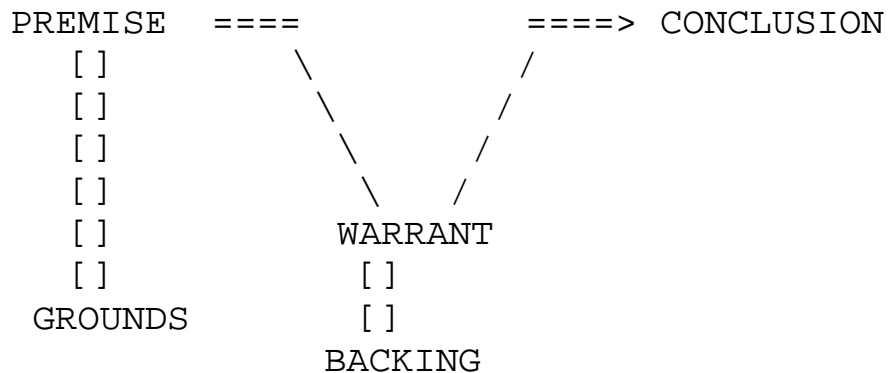
"There is a fault, but the fault is not in the reasoning; but the falsehood in fact is a fault of the premises."

- Abraham Lincoln, in the 1858 Lincoln-Douglas debates

To *make an argument* means to offer reasons and evidence in support of a conclusion. **Evidence** means proof, that which supports a claim, grounds for its acceptance. A claim not supported by evidence is merely an assumption. In addition to being backed by evidence, a premise must be carefully linked to its conclusion.

Stephen **Toulmin** is a modern philosopher specializing in logic. He has carried the analysis of the structure of the argument further, by focusing on the links between the concluding claim and its grounds (the premise). Toulmin calls this link between premise and conclusion the **warrant**: the reasoning that authorized the inference of the conclusion from the grounds provided by the premise. A warrant can also be used to link evidence to the premise it supports.

Many times, the warrant is not explicitly stated in the initial argument. If you want to defend your argument, when it is attacked, be prepared to offer a warrant and backing (evidence supporting the warrant). The grounds support the claim. The warrant ties the grounds to the claim. The backing supports the warrant.



Vote for Hillary Clinton (conclusion) because she is a woman (premise).

POSSIBLE WARRANT: *Women make better leaders.*

POSSIBLE WARRANT: *Only women can empathize with problems affecting American women and children.*

POSSIBLE WARRANT: *Men are warmongers.*

Since it is closer to the equator (premise), it follows that Acapulco should be warmer than Chicago in January (conclusion).

POSSIBLE WARRANT: *The angle of the sun's rays accounts for temperature variation.*

POSSIBLE WARRANT: *The number of daylight hours accounts for temperature variation.*

We may infer that Crafton Hills College is a good school (conclusion) as indicated by the fact that the professors send their own kids there (premise).

POSSIBLE WARRANT: *Professors highly value a college education, and know what colleges are the best.*

Refutation is the process of attacking arguments. An argument may be refuted by attacking the evidence for its premise or attacking the warrant that links the premise to the conclusion. Here is an example of an argument.

Hillary Clinton should not be elected President (conclusion) because her husband is a sexual predator (premise).

To refute this argument, Clinton's supporters could attempt to deny that he was a sexual predator by contending that the Flowers (and Lewinsky, Broderick, Jones, Willy, etc.) affairs were consensual. Perhaps Clinton supporters would have an easier time attacking the warrant: *Bill's sexual activities do not disqualify Hillary from being president, for she was the victim of his failings, not the perpetrator.*

The proponents of the original argument can strengthen it again by providing more evidence, a better warrant, or by refuting the refutation of the opposition. In the above example they could say: *A President should defend American women from sexual predators, and if Hillary will not condemn Bill's activities, she is not fit to be President.*

Independent vs. Dependent Premises

Some arguments use more than one premise to support the conclusion. This can make it harder (or easier) to refute the argument, depending upon whether the premises are configured in an independent array or a dependent array.

	INDEPENDENT	DEPENDENT
<i>Pattern</i>	Horizontal	Vertical
	Cluster	Chain
<i>Analogy</i>	Strands of rope	Links in a chain
	Suspenders	Belt
	Shotgun	Rifle
	Parallel circuit	Series circuit
<i>Each premise is</i>	Adequate	Essential
<i>Refutation is</i>	Harder	Easier

Independent premises are portrayed in a horizontal pattern, with each individual premise separately leading to and supporting the conclusion. Each premise supports the conclusion without the help of other premises. If some of the other premises are successfully attacked (refuted), any of the remaining unrefuted independent premises still does its job and supports the conclusion.

Note: Even if your parents say that they will pay for school, you still need money for the other things on the list. The conclusion is still supported.

You should vacation in Mexico (conclusion) because

1. It is cheaper than Europe (premise)
2. The people are friendly (premise)
3. The climate is warm (premise)
4. There are many interesting sights (premise)
5. The food is great (premise)
6. The nightlife is non-stop (premise)

Note: Even if you are rich enough to afford Europe, and don't care about food or nightlife, there are yet three other reasons to go to Mexico. The conclusion is still supported.

There are some errors in reasoning that people sometimes make about independent premises. A weak independent premise is not strengthened when other premises are weakened: we just come to rely on that remaining independent premise even more so.

By contrast, **dependent** premises have a vertical pattern of support. Each of the premises is essential to proving the conclusion, and if any one of them is successfully attacked (refuted), the entire argument fails. They are sometimes known as chain arguments because they are only as strong as their weakest link.

Note: If you agree that political science is the best way to get into law school, but reject #2 because you know that you can be rich and powerful by going to medical school or business school, the argument fails; if you agree that being a lawyer is the best way to become rich and powerful but reject #1 because you know that accounting is a better preparation for tax law, the argument fails. Both premises must survive in order for the conclusion to be supported.

There are some errors in reasoning that people sometimes make about dependent premises. A weak link in a chain is not strengthened by strengthening surrounding links. Indeed, the only way to improve a dependent argument is to strengthen the weakest link.

Some arguments have a **complex** structure, involving both types of arrays. Consider this paragraph.

This nation should replace the income tax with a national sales tax. One reason is that by taxing outgo instead of income, we can stimulate savings and investment, which will lead to higher economic productivity. Another reason is that a sales tax will allow us to target certain products for higher taxes and reduce their consumption. We could put higher taxes on unhealthy foods and reduce the levels of obesity, or put higher taxes on energy intensive products and reduce our dependence on foreign oil.

The first sentence was the conclusion, and everything else is an array of premises. There are two main premises: higher productivity and reduced consumption. Since each of these, by itself, is a good reason to consider the sales tax, this array is independent. However, within the productivity point, its sub-points have a dependent array, with these linked items: (1) the tax will lead to higher savings by individuals, (2) savings will lead to investment, (3) investment will lead to productivity, and (4) productivity is good. If any one of

these links can be challenged, that argument is refuted. The second main premise (reducing consumption) has within it an independent array of points: if it can reduce obesity or if it can reduce dependence on foreign oil, it is a good reason to adopt the new tax structure.

An **enthymeme** is an implicit part of an argument. An enthymeme is an unstated (but assumed) premise (or warrant linking a premise to the conclusion, or backing supporting a warrant). The enthymeme can be a critical factor, especially in dependent arrays. Here are some examples of arguments with enthymemes.

This figure is a square (premise).
Therefore, it has four sides (conclusion).

The enthymeme is *all squares have four sides*.
In this case, the enthymeme was an accepted definition.

Women are less intelligent than men (conclusion).
Women's brains are smaller than those of men (premise).

The missing warrant (or enthymeme) is *brain size is the basis of intelligence* (a claim which most psychologists doubt). Much of racist and sexist thought contains such enthymemes or unexamined assumptions.

Because of the missing enthymeme, many arguments look like a **non sequitur** (an argument in which the conclusion does not obviously follow from the premises).

Only by making explicit the enthymeme involved do we overcome the non sequitur. (Many husband-wife disputes begin because one side does not see the enthymeme of the

other and gets frustrated at an apparent non sequitur.) The right enthymeme can convert a non sequitur into a strong argument.

Conjunctive vs. Disjunctive

Some arguments blend several points by having an *either/or* or a *both/and* in the premises.

A **conjunction** requires that both of two separate claims be true, in order for the conclusion to be true. (In this sense it is similar to a dependent array of premises.) The two statements can be symbolized by the letters **P** and **Q**. The conjunction is symbolized as **P & Q**.

Here is the truth table for conjunction.

P	Q	P & Q
T	T	T
T	F	F
F	T	F
F	F	F

In other words, if either **p** or **q** is false, then the conjunction is false.

Here is an example of a conjunction.

P = Jack, the husband, is coming to the party.

Q = Jill, the wife, is coming to the party.

P & Q = The couple, Jack and Jill, is coming to the party.

If either Jack or Jill does not come, we cannot say that the couple was there.

Here is another example. You are taking two classes this semester: differential equations and organic chemistry. You want to keep up your 4.0 GPA to make you competitive for medical school. You need to get an "A" grade in both.

P = Getting an "A" in differential equations.

Q = Getting an "A" in organic chemistry.

P & Q = Getting an "A" in both classes.

If either grade is less than an "A", you cannot maintain your 4.0 GPA.

De Morgan's rule states the contradictory of a conjunction.

*Not both **P** and **Q***

is equivalent to

*not **P** or not **Q***

A **disjunction** refers to the *either/or* connection. A disjunction only requires that one of two separate statements be true, in order for the conclusion to be true. (In this sense it is similar to an independent array of premises.) The two statements are symbolized by the letters **P** and **Q**. The disjunction is symbolized as **P v Q**. Only if both claims are false is the disjunction false. If either claim is true (or both are true), the disjunction is true.

Here is the truth table for disjunction

P	Q	P v Q
T	T	T
T	F	T
F	T	T
F	F	F

In other words, only if both statements are false is the disjunction false. (Notice that if BOTH p and q are true, this counts for truth in a disjunction, just as it does for a conjunction. So, think of the meaning of a disjunction as being *at least one* of the statements must be true.) Here are examples of disjunctions.

P = Jack, the husband, is coming to the party.

Q = Jill, the wife, is coming to the party.

P v Q = At least one member of the couple will come to the party.

Only if both Jack and Jill fail to show up can we say that the disjunction was false.

Here is another example. You want to get into a fraternity and are seriously considering two: the Alpha Kappa Deltas and the Phi Omega Gammas.

P = Getting accepted by the Alpha Kappa Deltas.

Q = Getting accepted by the Phi Omega Gammas.

P v Q = Getting accepted by at least one fraternity.

Only if you are rejected by both fraternities have you failed.

De Morgan's rule for the contradictory of a disjunction is

*Not either **P** or **Q***

is equivalent to

*not **P** and not **Q***

So, we could summarize De Morgan's rules as saying that the contradictory of a conjunction is equivalent to the disjunction of its contradictories, and the contradictory of a disjunction is equivalent to a conjunction of its contradictories.

The **dichotomy** is built on an assured disjunction: *either* this *or* that must happen. In other words, there are only two possibilities. Sometimes we follow up the dichotomy by saying that either one of these would lead to the same

outcome, and therefore, that outcome is certain. Here is an example.

- Either Jack will major in chemistry or he will major in nursing.
- If he majors in chemistry, he will have a great job market.
- If he majors in nursing, he will have a great job market.
- Jack will have a great job market (conclusion).

If the guaranteed outcome is a bad one, we call this a **dilemma**. In other words, a dilemma means that we have only two alternatives, and they are both bad. The two unfavorable alternatives are known as the horns of a dilemma. Here is an example.

- For her vacation, Jill has narrowed it down to either France or Japan.
- France is very expensive.
- Japan is very expensive.
- Jill is going to have an expensive vacation (conclusion).

In order to refute a dilemma, you can either pick one of the horns and argue that it is not so bad (e.g., Jill has friends in Japan that she can stay with, eliminating hotel and restaurant bills) or you can argue that there are alternatives in addition to the two painful horns (e.g., Jill can go to Mexico).

CHAPTER THREE: CONDITIONAL STATEMENTS & ALGORITHMS

Conditional Claims

A **conditional** statement is one that holds under certain conditions. The structure of such a claim is that it unites two simple statements in an *if ... then ...* format. For this reason, conditional claims are sometimes known as **if ... then ...** statements.

Remember the Seinfeld episode where George was having such a string of failures (with women, getting a job, etc.) when Jerry said

"If every instinct you have is wrong, then the opposite would have to be right."

- Jerry Seinfeld

Then George went around approaching each situation doing the exact opposite of what he (initially) thought he should do and then he got a great job and became wildly successful with the ladies.

The claim following the *if* (usually the first claim) is known as the **antecedent**. Even if this claim comes at the end of the sentence, it is still known as the antecedent. Sometimes a different word indicating conditional status (e.g., *unless*, *until*, *when*) is used in front of the antecedent. Even though such a word might imply something in the future, it is still known as the antecedent. Indeed, the term *antecedent* does not necessarily imply the temporal sequence of an event, just that it is the logical point of beginning our reasoning. The antecedent is usually symbolized by the letter **P**.

The claim following the *then* (usually the latter claim) is known as the **consequent**. Even if this claim is put at the beginning of the sentence, it is still the consequent. Even if this claim lacks an identifier such as *then* it is still the consequent. The consequent is usually symbolized by the letter **Q**, so an entire conditional claim can be symbolized: ***if P then Q*** or more symbolically as

if P → Q

Here are some examples of conditionals. Notice that in some, the order is reversed, and in some, the indicator words might be lacking.

*If you study hard, (antecedent)
you will pass this course (consequent).*

*If John comes after 6:00 PM, (antecedent)
he will miss the last bus (consequent).*

*If you and your husband are each bringing two children
(antecedent)
we will have four children total (consequent).*

*If Tom is here, (antecedent)
then he can't be in San Bernardino (consequent).*

*When I get done here, (antecedent)
I'll come right over (consequent).*

*Until Sara earns more money, (antecedent)
she will be in debt (consequent).*

*Unless you get a car, (antecedent)
you will have to ride your bicycle (consequent).*

*Just go to the corner grocery store (consequent)
if you get hungry (antecedent).*

*I'll just hang around here (consequent),
until I get bored (antecedent).*

*That dog will get angry (consequent)
if you pull its tail (antecedent).*

*"Men will cease to commit atrocities (consequent)
when they cease to believe absurdities (antecedent)."*

- Voltaire

Perhaps some of these examples seem like arguments from the last chapter, with the antecedent looking like a premise and the consequent looking like a conclusion. Technically, conditional statements are not regarded as arguments because the antecedent does not always support the consequent the same way that a premise supports acceptance of a conclusion. (Indeed, an entire conditional claim may serve as a premise or conclusion in an argument.)

One difference is that the verb tense of a premise is usually present or past, and the tense of an antecedent is usually future or conditional: something that has not yet happened, and is therefore only assumed.

However, conditionals can be used as parts of arguments, especially in a premise of a dependent array.

Premise #1: When my husband gets a raise (antecedent), we can afford that new car (consequent).

Premise #2: Because he will be getting a raise next month,

Conclusion: Therefore, we can afford to get that new car.

Symbolically, the argument looks like this

*Premise #1: If **P**, then **Q**.*

*Premise #2: **P***

*Conclusion: Therefore, **Q**.*

Notice how premise #2 removed the conditional nature of premise #1. Because of #2, we don't have to assume **P**, we know **P**, and therefore, we can support our conclusion **Q**.

It is also possible to construct an entire argument, premises and conclusion, out of conditional statements. Such an argument is known as a **hypothetical** argument. A **hypothesis** is a prediction of what will or might occur. The conclusion of a hypothetical argument is a statement of what might occur (under certain conditions). Such an argument would take this form.

*Premise 1: If **A**, then **B**.*

*Premise 2: If **B**, then **C**.*

*Conclusion: Therefore, if **A**, then **C**.*

Here is an example of such an argument.

Premise 1: If it rains (antecedent #1),
I shall get wet (consequent #2).

Premise 2: If I get wet (antecedent #2),
then I shall have to come home to change clothes (consequent #2).

Conclusion: Therefore, if it rains (antecedent #1),
I shall have to come home to change clothes (consequent #2).

Many people might think that the part about getting wet could be safely assumed and treated as an enthymeme.

Another name for these hypothetical conditional statements would be **chained** due to the similarities with a dependent array of premises in an argument.

You might also be tempted to think of conditional statements as a cause and effect relationship, with the antecedent being the cause and the consequent being the effect. Although the term *consequent* sounds a lot like consequences (results) this is not necessarily the case.

Consider some of the aforementioned examples of conditional statements and we can see that some do look like the antecedent is a likely cause of the consequent.

"If you study hard, (cause)
you will pass this course (effect)."

"That dog will get angry (effect)
if you pull its tail (cause)."

Even the one about the rain fits that pattern.

Premise 1: If it rains (cause #1),
I shall get wet (effect #2).

Premise 2: If I get wet (cause #2),
then I shall have to come home to change clothes (effect #2).

Conclusion: Therefore, if it rains (cause #1),
I shall have to come home to change clothes (effect #2).

Other examples of conditional statements do not seem to neatly fit that causal pattern.

If you and your husband are each bringing two children (antecedent)
we will have four children total (consequent).

If Tom is here, (antecedent)
then he can't be in San Bernardino (consequent).

Unless you get a car, (antecedent)
you will have to ride your bicycle (consequent).

I'll just hang around here (consequent),
until I get bored (antecedent).

Scottish philosopher **David Hume** (1711-1776) pointed out that we never really observe a cause producing an effect: we simply observe a sequence of events and then infer a causal connection between them.

Consider the example of George Costanza doing the opposite of what he thought he should do and how successful he was. Was Jerry right that *If every instinct you have is wrong, then the opposite would have to be right?* or did George's luck just change?

In the fourth chapter we shall present more precise terminology about causation and in the eighth chapter we shall present more information on how scientists make causal inferences. At this point, it should suffice to mention that nothing we say in this chapter about conditional reasoning depends upon causal analysis.

Algorithms

Think of conditional statements as simple **algorithms** (rules for problem solving) that people, appliances, and computer programs use to make decisions or know what to do under certain conditions.

The refrigerator knows when to put the light on: when the door is opened. The algorithm is

If the door is open (antecedent)
the light goes on (consequent).

Some of these algorithms get complex, and follow a pattern of **conjunction**, working only when both of two different conditions simultaneously apply.

If **P1** (first antecedent)
and **P2** (second antecedent)
then **Q** (consequent).

The microwave knows when it should work. When the door is closed it keeps working until there is no more time left on the dial. Notice that the words *when* and *until* each introduce an antecedent. We could rephrase this to work with *if* clauses.

If the door is closed (first antecedent),
and if there is time left on the dial (second antecedent)
then keep working (consequent).

Other algorithms follow a pattern of **disjunction**, providing one consequent for one antecedent and a different consequent for another antecedent. These two conditional statements might be linked with a word like *but* or *however*.

Suppose you are a military officer. Here is the algorithm on how to salute.

When you meet an officer of higher rank (antecedent)
then you should salute him/her (consequent).

but

When you meet someone of lower rank (antecedent)
then you should wait to receive his/her salute, and then return
it (consequent).

Ever wonder how the thermos knows whether to keep something hot or cold? It follows this disjunctive algorithm.

When something hot is put inside (antecedent)
then keep it warm (consequent).

but

When something cold is put inside (antecedent)
then keep it cool (consequent).

Many computer programs are based upon such algorithms: follow this command under these circumstances, and follow that command under those circumstances.

Of course, we might find a way to rephrase these complex rules by making them more flexible single conditionals. For the algorithm about saluting ...

When two military personnel in uniform meet (antecedent)
then the one of lower rank should salute the one of higher rank,
who will then return the salute (consequent).

For the thermos, the rules can be generalized ...

If any liquid is put inside (antecedent)
preserve the temperature difference between that liquid and the external environment
(consequent).

Analyze this statement by a late Supreme Court Justice

"The layman's constitutional view is that what he likes is constitutional and that which he doesn't like is unconstitutional."

- Hugo Black

Let's try to put it in the form of a disjunctive algorithm.

When the layman likes something (antecedent)
he calls it constitutional (consequent).

but

When the layman does not like something (antecedent)
he calls it unconstitutional (consequent).

A **homeostatic** system uses an algorithm striving to preserve stability, balance, or a steady state. It achieves this using feedback and a decision of whether to increase or decrease.

If **A** is high (antecedent)
then lower **A** (consequent)

or

If **A** is low (antecedent)
then raise **A** (consequent)

One example would be a thermostat that controls the temperature inside of the passenger area of your car. Just set it to 72 degrees and it controls both the air conditioning and the heater to keep it close to that desired temperature.

Suppose you live in Big Bear (a high altitude lake that is cool all year round) but work down the mountain in Redlands (which has high daytime temperatures for much of the year). You get in your car in Big Bear one July morning about 10 AM and the inside temperature is close to the desired level of 72 degrees, so no air conditioning or heat is necessary. As you get down the mountain, and the sun gets higher in the sky, the temperature begins to rise, so the air conditioner comes on to bring it down toward 72. After a long day of work and errands in Redlands, you get back in your car at 10 PM, and the temperature is close to 72 degrees, so neither the air conditioner nor the heater has to work. But as you go up

the mountain and the night cools off, the temperature drops inside the car, so the heater comes on to bring the temperature back closer to 72.

When the temperature gets above 72 (antecedent)
then put on the air conditioning (consequent).

but

When the temperature gets below 72 (antecedent)
then put on the heater (consequent).

Notice that the thermostat is trying to move the temperature in different directions, but always toward a set point of balance (not too hot, not too cold).

Another example of a homeostatic system would be the hypothalamus of the brain. One part of the hypothalamus tells the body that it is hungry and needs to eat. Another part of the hypothalamus tells the body that it has had enough and needs to stop eating. If you have a healthy hypothalamus, and listen to it, and eat a healthy diet, you will maintain an equilibrium weight: not too skinny and not too fat. In laboratory animals that have had the satiety center of the hypothalamus destroyed, they eat and eat, not knowing when to cease. This condition, known as hyperphagia, leads to obesity. (Most human obesity is not due to lesions on the hypothalamus, but to bad eating habits that ignore the hypothalamus.)

A **heterostatic** feedback system follows the opposite algorithm. Every move away from the equilibrium set point is intensified in this kind of disjunctive algorithm.

If **A** is high (antecedent)
then raise **A** even more (consequent)

or

If **A** is low (antecedent)
then lower **A** even more (consequent)

Ever wonder why the rich get richer and the poor get poorer?
The answer is that our economic system is heterostatic system.
It is hard to climb out of poverty by your own bootstraps, but easy
to earn that second billion after you have the first.

Suppose we have two twenty year old single men: Mr. X and Mr. Y.
Suppose they start with the same set of skills and earning
potential, but no possessions other than the clothes they are
wearing. Mr. X starts off with a thousand dollars in the bank and
Mr. Y starts off with a million dollars in the bank.

Mr. X will be able to buy a change of clothes, and maybe put down
a deposit on a studio apartment on the cheap side of town. He
won't have money for school, or even for a car. He'll have to look
for work and take whatever is close by, and maybe not earn very
much.

The advantage that Mr. Y has is not just that he has a thousand
times more money than Mr. X, and can get a better apartment and
clothes, and car. Mr. Y will eat better than Mr. X: better food and
maybe more food, but he won't spend a thousand times more on
food. Let's suppose Mr. Y could live nicely on \$50,000 a year.
Mr. X cannot even find a job that pays that much, but Mr. Y can
live that way without working. All Y has to do is to invest his million
in something that pays at least a 5% return and then live on the
interest or dividends. If he can find a greater return (or live on less
than \$50,000) he will end his year richer than where he started.
Perhaps the best investment Y could make would be to put himself
through a fine private college (e.g., Redlands, Pomona) and then
on to law, business, or medical school.

Twenty years from now, where do you think X and Y will be? Unless X is vastly superior in terms of talent, ambition or frugality (or lucky enough to win the lottery), Y will still be richer, and probably by more than the \$999,000 that initially separated these two men. The heterostatic system will intensify the difference between them.

Modus Ponens

The **Modus Ponens** is a three step argument based upon a conditional first premise.

Premise #1: If **P** (antecedent), then **Q** (consequent).

Premise #2: **P**.

Conclusion: therefore, **Q**.

Here are some examples seen previously.

Premise #1: If you study hard, (antecedent)
you will pass this course (consequent).

Premise #2: You have been studying hard every day.

Conclusion: Therefore, you will pass this course.

Premise #1: If John comes after 6:00 PM, (antecedent)
he will miss the last bus (consequent).

Premise #2: John came after 8:30 PM.

Conclusion: Therefore, John must have missed the last bus.

Premise #1: If Tom is here, (antecedent)
then he can't be in San Bernardino (consequent).

Premise #2: Tom is still here.

Conclusion: Therefore, Tom is not yet in San Bernardino.

Premise #1: "Men will cease to commit atrocities (consequent)
when they cease to believe absurdities (antecedent)."

Premise #2: Education in critical thinking will enable men to get over absurd beliefs.

Conclusion: Therefore, education in critical thinking will bring about the end to atrocities.

Here are some new examples.

Premise #1: If Jack has a royal flush (antecedent),
he will win this poker hand (consequent).

Premise #2: He was just dealt a royal flush.

Conclusion: Therefore, Jack wins this hand of poker.

Premise #1: If Sacramento is the capital of California (antecedent),
then Sacramento is in the state of California (consequent).

Premise #2: Sacramento is the capital of California.

Conclusion: Therefore, Sacramento is in the state of California.

The Modus Ponens is also known as **affirming the antecedent**, affirmation mode, positive mode, or forward reasoning. It is known as the **affirmation** mode even when the conclusion is that something won't happen or will stop (as in Voltaire's example) or the word "not" is present.

Premise #1: If you study hard, (antecedent)
you will not fail this course (consequent).

Premise #2: You have been studying hard every day.

Conclusion: Therefore, you will not fail this course.

This affirmative mode does not imply that the results are "positive" or favorable.

Premise #1: If one engages in promiscuous, unprotected sex, (antecedent)
one is at risk for sexually transmitted diseases (consequent).

Premise #2: John has had several instances of unprotected sex.

Conclusion: Therefore, John is at risk for sexually transmitted diseases.

Modus Ponens is known as the **forward** reasoning mode even if in the initial presentation of the argument the premises were reversed and the conclusion is stated first.

You are at risk for sexually transmitted diseases (consequent)
because you have been engaging in unprotected sex. (antecedent)

(Here the conditional has become an unstated enthymeme.)

It is possible to string together several conditional statements into a hypothetical claim, and then convert that into a Modus Ponens by affirming the first antecedent.

Premise #1: If **A** then **B**.

Premise #2: If **B** then **C**.

Premise #3: **A**

Conclusion: Therefore, **C**

Example

Premise #1: If I study hard, I can get good grades at the community college.

Premise #2: If I get good grades at the community college, I can transfer to the state university.

Premise #3: I am studying hard.

Conclusion: Therefore, I can transfer to the state university.

What you cannot do with the Modus Ponens, the forward logic, is to run it backwards. When you do, you commit a **fallacy** (a failure to follow the rules of logic) and you open up the possibility of coming to a false conclusion (even with true premises).

Premise #1: If **P**, then **Q**.

Premise #2: **Q**.

Conclusion: Therefore, **P**.

Trying to reverse this order into a **Q**, therefore, **P** has its own special name: the fallacy of **affirming the consequent**.

Fallacious example:

Premise #1: If Jack has a royal flush (antecedent), he will win this poker hand (consequent).

Premise #2: He won the hand.

Conclusion: So, he must have had a royal flush.

Premise #1 is true according to the rules of poker. Suppose you just observed premise #2: Jack won the pot. However, a fallacy means that just because the premises are true, the conclusion is not necessarily true. He could have had a different winning hand.

Here is another fallacious example.

Premise #1: If Chicago is the capital of Illinois (antecedent), then Chicago is in the state of Illinois (consequent).

Premise #2: Chicago is in the state of Illinois.

Conclusion: Therefore, Chicago is the capital of Illinois.

The capital of Illinois is Springfield, and both cities are within the state. So, again, both premises are true, but the conclusion does not follow because of the fallacious structure of the argument. We cannot run Modus Ponens backwards because it ignores other alternative explanations, such as

Jack could have won with a pair of Jacks (as long as no one else had a better hand).

Chicago (and every other city in Illinois except Springfield) is in the state, but is not the capital of the state.

Here is another example of the fallacy.

Premise #1: If you are abducted by space aliens and probed (antecedent), you will develop scars on your body (consequent).

Premise #2: Many people have scars on their bodies.

Conclusion: Therefore, many people have been abducted by space aliens.

The first premise may be true, the second premise is definitely true, but these premises do not support the conclusion because alternative explanations have been ignored: people can get scars in other ways.

In these examples, affirming the consequent gave a false conclusion even with true premises. However, sometimes it can give a true conclusion.

Premise #1: If Albany is the capital of New York (antecedent), then Albany is in the state of New York (consequent).

Premise #2: Albany is in the state of New York.

Conclusion: Therefore, Albany is the capital of New York.

It turns out that Albany is the capital of New York, so this time we had true premises and a true conclusion. The problem with affirming the consequent is that it cannot guarantee that true premises will lead to a true conclusion. Indeed, if we had chosen any other city in the State of New York, the premises would have been true, but the conclusion would have been false.

Modus Tollens

The **Modus Tollens** is a technique of reasoning also known as **denying the consequent**.

Premise #1: If **P**, then **Q**

Premise #2: $\sim Q$

Conclusion: Therefore, $\sim P$

Remember that $\sim P$ means the contradictory of claim **P** (*not P*) and that $\sim Q$ means *not Q*. To put it more plainly, the Modus Tollens starts with the same conditional first premise that the Modus Ponens does, but then says,

If you don't end up with **Q** (as a consequent), it means that you did not have **P** (as an antecedent).

Let's look at some familiar examples.

Premise #1: If John comes after 6:00 PM, (antecedent)
he will miss the last bus (consequent).

Premise #2: The last bus was right on schedule, but John was able to catch it.

Conclusion: Therefore, John came before 6:00 PM.

Premise #1: If Las Vegas is the capital of Illinois (antecedent),
then Las Vegas is in the state of Illinois (consequent).

Premise #2: Las Vegas is not in the state of Illinois.

Conclusion: Therefore, Las Vegas is not the capital of Illinois.

The Modus Tollens is also known as the negative or **negation** mode because it denies (negates) the consequent. This does not necessarily mean that something did *not* occur, it just means the contradictory of a statement $\sim Q$ allows us to infer the contradictory of another statement $\sim P$. Here is another familiar example.

Premise #1: If Tom is here, (antecedent)
then he can't be in San Bernardino (consequent).

Premise #2: Tom is in San Bernardino right now.

Conclusion: Then he is no longer here.

Notice that premise #2 did not say that Tom no longer existed, or even that he was not somewhere. However, premise #2 was the contradictory of the consequent (giving us a double negative: Tom was not *not* in San Bernardino).

We call the Modus Tollens the negative mode even if the premises and conclusions are good things, favorable outcomes.

Here is an example of a good outcome with Modus Tollens.

Premise #1: If you have AIDS (antecedent),
it will show up on an HIV test (consequent).

Premise #3: HIV did not show up on your test.

Conclusion: Therefore, you do not have AIDS.

WRITE IT RIGHT

The terms *positive* and *negative* are quite vague because they can imply different things, from electric charges to correlations as well as good and bad. In writing for this class, avoid these terms when you wish to convey that something was good or bad, favorable or unfavorable.

We call Modus Tollens the **backward** mode of reasoning because we start at the end of the conditional (the consequent) and reason back to something about the beginning (the antecedent). One thing we cannot do with the Modus Tollens is run it forward. It is a fallacy to **deny the antecedent** and then to infer that the consequent is also to be denied. This is how the fallacy looks.

Premise #1: If **P**, then **Q**

Premise #2: **~P**

Conclusion: Therefore, **~Q**

Here are some old examples of this fallacy.

Premise #1: If Jack has a royal flush (antecedent),
he will win this poker hand (consequent).

Premise #2: Jack did not get a royal flush this time.

Conclusion: So, he must lose this hand of poker.

Jack only got four aces. Unless somebody else got a straight flush, Jack still wins. Even though the premises are true, the conclusion is false because the reasoning is fallacious.

Premise #1: If Chicago is the capital of Illinois (antecedent), then Chicago is in the state of Illinois (consequent).

Premise #2: Chicago is not the capital of Illinois.

Conclusion: Therefore, Chicago is not in the state Illinois.

Chicago is very much in the state of Illinois. Indeed, it is the largest city in the state, but it is just not the capital. Even though the premises are true, the conclusion is false because the reasoning is fallacious.

Here is a new example.

Premise #1: If John is a widower (antecedent) then he is unmarried (consequent).

Premise #2: John is not a widower.

Conclusion: Therefore, John must still be married.

John is only three years old and has never had a wife. Even though the premises are true, the conclusion is false because the reasoning is fallacious.

The fallacy of denying the antecedent, like the fallacy of affirming the consequent, fails to support the conclusion because they both ignore alternative explanations, such as

Jack could have had another poker hand good enough to win.

Chicago could be another city in Illinois.

John might have some other marital status, such as divorced or never married.

In these fallacious examples, denying the antecedent gave a false conclusion even with true premises. Sometimes, however, this fallacy can have a true conclusion.

Premise #1: If Jill is a widow (antecedent)
then she is unmarried (consequent).

Premise #2: Jill is not a widow.

Conclusion: Jill is still married.

It turns out that Jill is a retired school teacher who has been married for forty years. Her seventy year old husband is still alive and in good health. The problem with denying the antecedent, is that it cannot guarantee that true premises will lead to a true conclusion. Indeed, if we had chosen a different American female, such as Jill's 12 year old granddaughter namesake, the premises would have been true, but the conclusion would have been false.

Let's go back to a couple of antecedent indicators, *unless* and *until*. They are special because they reverse the affirming/negating roles of Ponens and Tollens. Instead of affirming leading to affirming, and denying leading to denying, these special indicators permit a denial to lead to an affirmation or affirmation to lead to denial. Consider these old examples.

Premise #1: Until Sara earns more money, (antecedent)
she will not get out of debt (consequent).

Premise #2: Sara just got out of debt.

Conclusion: Therefore, Sara must have enough money now.

Assuming that there are no alternative explanations (e.g., frugality, inheritance, winning the lottery, bankruptcy) for how Sara ended her debt, the reasoning is done correctly. Notice how we denied the consequent (the debt) and this led us to affirm that she was earning more money.

Here is another old example.

Premise #1: Unless you get a car, (antecedent)
you will have to ride your bicycle (consequent).

Premise #2: You no longer have to ride your bicycle.

Conclusion: Therefore, you must have gotten a car.

Assuming that there are no alternative explanations (e.g., better bus service, rides from friends) for why you no longer need to ride the bicycle, the reasoning is done correctly. Notice how we denied the consequent (the need) and this led us to affirm that you must have obtained a car.

We need some helpful mnemonics to remember Modus Ponens and Modus Tollens. Look at the P in Ponens: P for putting something there (affirming the antecedent). Look at the T in Tollens: T for taking something away (denying the consequent).

We also need a way to remember that Modus Ponens and Modus Tollens yield good reasoning, but affirming the consequent and denying the antecedent do not. Try remembering these sentences.

If you are an alcoholic in Washington DC, it is good to go to an AA meeting.

AA and DC are good. Modus Ponens affirms the antecedent.

Modus Tollens denies the consequent.

It is bad to steal an air conditioner (AC) because the district attorney (DA) will put you in jail.

AC and DA are bad. Affirming the Consequent and Denying the Antecedent are fallacious.

Here is a truth table that applies to arguments based upon the conditional *if P, then Q*.

Truth table for conditional statements that combines the conditional truth table with the negation truth table

<i>P</i>	<i>Q</i>	<i>P</i> -> <i>Q</i>	<i>~P</i>	<i>~Q</i>
T	T	T	F	F
T	F	F	F	T
F	T	T	T	F
F	F	T	T	T

	Antecedent	Consequent
Affirm	Modus Ponens Good reasoning	Affirming the consequent <i>fallacy</i>
Deny	Denying the antecedent <i>fallacy</i>	Modus Tollens Good reasoning

However, sometimes we have a **biconditional** statement, as indicated by an antecedent that says *if and only if*. This is sometimes symbolized $P \leftrightarrow Q$. To phrase it another way: ***Q if and only if P.***

Suppose that at your school, if you get a grade point average of 3.0 or better, you are automatically on the “honor roll” and the only way to get on the honor roll is to have a 3.0+ GPA. Then we could say: *You are on the honor role if and only if you have a GPA of 3.0 or higher.*

Now, consider all the inferences we could make from such a biconditional situation.

If you are on the honor roll, you must have a 3.0+ GPA.

If you have a 3.0+ GPA, you must be on the honor roll.

If you are not on the honor roll, you must be under 3.0.

If you are under 3.0, you must be off the honor roll.

With a biconditional statement, we can go in both directions: from antecedent to consequent, or consequent to antecedent; and it works if we are denying or affirming. In other words, there would be no fallacies in observing one thing and inferring the other.

Here is the truth table for a biconditional statement.

P	Q	$P \leftrightarrow Q$	
T	T	T	(MODUS PONENS)
T	F	F	
F	T	F	
F	F	T	(MODUS TOLLENS)

Disjunction

Arguments can also be built on pure disjunctions. This is known as an **eliminative** argument, and is similar to the dichotomy and dilemma that we discussed in the previous chapter. We start by setting out two (or any finite number of possibilities), and then eliminate all but one, which is then accepted as the conclusion. Symbolically, this is represented as (the \vee stands for *or* in the sense of one or the other must be true)

Premise #1: $P \vee Q$

Premise #2: $\sim P$

Conclusion: Therefore, Q

Here is another example of an eliminative argument.

Premise #1: I will either major in math or philosophy.

Premise #2: I just did horrible in differential equations, so it won't be math.

Conclusion: Therefore, I'll major in philosophy.

Here is one eliminative argument that has more premises, giving us an initial trichotomy (three alternatives).

Premise #1: $P \vee Q \vee R$

Premise #2: $\sim R$

Premise #3: $\sim P$

Conclusion: Therefore Q

Premise #1: For a car, I'll buy my sister's Honda, take over the payments on my brother's truck, or take that old Chevy Aunt Sue wants to give me.

Premise #2: My sister decided to take her car with her to college.

Premise #2: My brother just totaled his truck.

Conclusion: Looks like I'll have to take Aunt Sue's old Chevy.

Remember that a **disjunction** of two claims (P and Q) is true if either P or Q is true (or if they are both true). The disjunction is similar to the conditional in this sense. Assuming that the disjunction is true

If $\sim P$ then Q .

If $\sim Q$ then P .

Like Modus Ponens and Modus Tollens, we cannot reverse the order on the disjunction to say

P, therefore \sim **Q**.

Unless we are limited to just one of the two possibilities. There is a difference between saying that one alternative must exist, and that only one exists. That is the difference between at least one versus at most one, and the usual understanding of a disjunction is *at least one*.

If we specify that we have several alternatives, and *one and only one* will be true, then that allows us to reason in the following way as well.

Premise #1: **P** \vee **Q** \vee **R**

Premise #2: **R**

Conclusion: Therefore \sim **Q**, \sim **R**.

Let's try this example.

Premise #1: I will attend University of Redlands, UC Riverside, or Cal State San Bernardino next year (but only one of them).

Premise #2: I have been admitted with a scholarship to the U of R.

Conclusion: I will not attend UC Riverside or Cal State.

truth table for hypotheticals combined with negation

<i>P</i>	<i>Q</i>	<i>P</i> \vee <i>Q</i>	\sim <i>P</i>	<i>Q</i>
T	T	T	F	T
T	F	T	F	F
F	T	T	T	T
F	F	F	T	F

CHAPTER FOUR:

CAUSATION, EXPLANATION, TELEOLOGY & DETERMINISM

An **effect** is a result or outcome, an event product by (or at least influenced by) some other event or factor (the **cause**).

"What is found in the effect was already in the cause."

-- Henri Bergson

For example, if we say

That little girl is crying because she fell off of the swing.

the effect is her behavior (crying). The cause, at least the one presumed in the statement, is the fact that she had previously fallen off the swing. Causes are usually co-terminus with or chronologically precede their effects. Given our understanding of the unidirectional nature of time, it is difficult to conceive of how an effect could occur before its cause.

Causation (also known as **causality**) is the study of cause and effect relationships. **Causal** is the adjective referring to such a relationship. (Notice the spelling C-A-U-S-A-L and do not confuse it with the adjective *casual* which means informal or relaxed.) Every event can be conceived as fitting in a large causal chain: A, B, C, etc. such that A leads to B, which leads to C, and so forth. Notice that this makes event B both a cause and effect, depending upon its relationship with surrounding events. B is the effect of A, but the cause of C. Here is an example.

The husband had a hard day at work (event A) and so he was upset (condition B), and when he got home, he yelled at his wife (event C).

In this example, the affective (emotional) state of the husband was the effect of the hard day at work and also the cause of his yelling at his wife.

Scottish philosopher **David Hume** (1711-1776) was fond of doubting the "reality" of causation. He boasted that we never really observe a cause producing an effect. He acknowledged that we perceived the individual events of the series, but what he doubted was our ability to observe the connection between those events. For Hume, and many other philosophers who adhere to a strict, realist, empiricist point of view, these relationships are merely inferred. They are products of our minds, rather than something like the events themselves (i.e., observable in the natural, external world).

“Shallow men believe in luck. Strong men believe in cause and effect.”

- Emerson

Some more extreme metaphysical views would doubt that it is even possible to speak in terms of the separate events involved in the alleged process. We observe a continuous process, a unified stream of events. Just as we do not observe the individual molecules of water in a river, so we do not observe the individual events of reality as separate entities. It is our mind (perhaps illusorily) that delineates the separate events out of this process.

Perhaps the most extreme form of this view was that of the ancient Greek **Zeno** of the Eleatic School who denied that reality could be broken down into separate units. He attempted to use pure reason to prove that our view of delineated reality was a mere illusion.

For example, Zeno presented the story of Achilles and the tortoise. All the Greeks knew of the great athlete Achilles, who was very fast, but Zeno said that even the fastest person could never catch and pass the slowest of the creatures, a tortoise. Imagine that we give the tortoise a hundred yards head start, and then sound the starting gun. The fleet Achilles covers ten yards a second, and the tortoise only one yard in that same time. At the end of ten seconds, Achilles has covered the entire hundred yards, but wait, he has still not caught the tortoise, for the tortoise has put another ten yards between it and where it started from. Well, no problem for Achilles, he can cover that ten yards in just a second, but wait, he has still not yet caught the tortoise, who has now advanced yet another yard. Achilles can cover the extra distance in a tenth of a second, but in that time, the turtle has advanced another tenth of a yard. So, according to Zeno, Achilles can never catch the tortoise.

Now, of course, if the race took place in reality (instead of just Zeno's mind) we could watch both Achilles and the tortoise running and we would actually see Achilles catching and passing the tortoise just before the 112 yard line, but because it would be "logically" impossible (at least according to Zeno's reasoning), Zeno would tell us to conclude that our eyes are deceiving us, and therefore, physical reality is just an illusion.

Modern science has rejected the reasoning of Zeno, and has opted to view external reality as distinct and measurable events that can be conceived as having causal links. These events are known as **variables** because science assumes that they can change and that such variation can be measured in a quantifiable way. Science refers to the effect as the **dependent variable** and the cause as the **independent variable**. (To remember this, just think that the effect depends upon the cause, and not the other way around.)

For example, **psychology** is the scientific study of behavior. The dependent variables in psychology would be any outcome measures of behavior (e.g., **responses**, actions, speech, scores on a test). The independent variables that psychologists study would

include **stimuli** (external causes) that might influence behaviors. Other independent variables would be background factors such as heredity or early childhood experiences. In clinical psychology, prescribed treatments for mental disorders (e.g., medications, psychotherapy) would be independent variables (because they are supposed to change behavior). In industrial psychology, training would be an independent variable (because it is supposed to improve worker performance).

Psychology, as well as the other sciences, relies upon cause and effect to understand, explain, and control the world that it studies.

Let's return to our first example of causation: the little girl who was crying because she had fallen off of the swing. The fact that the girl is crying is the effect, and the previous stimulus of falling off of the swing would be the (presumed) cause. Most people would have no difficulty identifying those two specific components of the causal relation, due to the indicator word, *because*.

Perhaps you remember that *because* is also an indicator word for a premise. There are parallels between a cause-effect relationship and a premise-conclusion relationship. The premise leads to the conclusion (by supporting it) and the cause leads to the effect (by producing it). The conclusion relies upon the premise to explain why we should accept it; the effect relies upon the cause to explain how it happened.

There are some other indicator words for suggesting that a causal relationship exists. The words in the right column are questionable because they are less clear in the causal connection. They might suggest other kinds of relationships. Some indicate a mere correlation instead of direct causation (and this distinction will be clarified in the chapter on inductive reasoning).

Strong causal relationship	Some causal relationship	Questionable causal relationship
affected	activated	associated with
brought about	affected	correlated with
caused	attributed	led to
as a consequence	contributed	linked to
created	decreased	responsible for
deterred	enabled	since
effected	facilitated	
was effective	factored in	
hurt	helped	
impaired	impacted	
impeded	improved	
necessitated	increased	
produced	influenced	
resulted in	stimulated	

Terms such as *responsible for* and *since* are not clear. Take this example of political rhetoric.

The Obama administration is responsible for the situation in Afghanistan.

In one context, the statement implies that the war is Obama's fault (he caused it) even though it started before Obama was President or even a Senator. In a different context, the statement is almost true by definition. Part of the job description of the President of the U.S. is that he (or she) is responsible for conducting foreign affairs and is commander in chief of the military. So, by definition, the President is responsible (for managing and overseeing) any war that the U.S. is involved in.

The word *since* is also somewhat unclear in the causal connection implied.

Since I had to drive all the way to Santa Monica to bring something to my grandmother, I decided to spend a couple hours at the beach.

Since the cave men, people have worried about finding affordable shelter.

In the first sentence, *since* has some causal role. The fact that I had to drive all the way to Santa Monica anyway influenced (caused) my decision to spend some time at the beach. In the second sentence, it appears that *since* is used as a mere indicator of a period of time (rather than blaming current housing prices on what the cave men did thousands of years ago).

Sometimes even the context does not clearly convey a possible causal inference.

Los Angeles has not had a professional football team since Riordan was mayor.

Does this merely refer to when Riordan was mayor, back in the 1990s, or does it imply some blame on the former mayor for losing football teams to other cities, or blame on his successors (Hahn, Villarraigosa and Garcetti) for not bringing in a new professional football team?

Adequate and/or Essential

In order to understand the logical implications of causation, we have to make a basic distinction between different kinds of causes.

All rain (effect) is brought by clouds (cause), but all clouds do not bring rain.

Dogs bark (effect) at all thieves (cause), but all are not thieves at whom the dogs bark.

Notice that in the first example (clouds and rain), we can reason from the effect to the cause. We observe the rain and can infer that there must be clouds above. But, we cannot always go in the other direction with clouds and rain, indeed, most clouds don't bring rain. Notice that in the second example (thieves and barking dogs), we can reason from the cause to the effect. We observe some thieves approaching and can infer that the dogs will see, hear, or smell something out of the ordinary and commence barking. But, we cannot usually reason in the other direction, indeed, most of the time my dogs bark it is because of something other than thieves (e.g., another animal).

In order to have a guideline of when we can reason from cause to effect, and when we can reason from effect to cause, we have to make a distinction between two different types of causes: adequate and essential.

A cause is **adequate** when it is sufficient to always produce the effect. Therefore, the presence of an adequate cause guarantees the presence of the effect, and the absence of the effect guarantees the absence of all adequate causes. In the above examples, only the second shows a cause adequate to produce the effect.

Let's try to apply conditional reasoning to causation. Both the Modus Ponens and the Modus Tollens both assume adequate causes.

Modus Ponens: $C \implies E$; C ; therefore E

If an adequate cause **C** exists, then the effect **E** will follow. In the above example, if the presence of the thieves is an adequate disturbance (cause), I infer that the dogs will respond by barking (effect).

Modus Tollens: $C \implies E; \sim E; \text{ therefore } \sim C$

If the effect **E** is absent, so are all causes **C** adequate to produce that effect. In the above example, if the dogs did not bark all night ($\sim E$), I infer that no thieves passed by ($\sim C$). Indeed, I would also infer that no other adequate causes (e.g., other dogs) passed by.

Unfortunately, not all causes are adequate to guarantee the production of the effect (as we saw with the example of the clouds and the rain). However, there are some inferences we can make with causes that, even if inadequate, are nevertheless essential.

A cause is **essential** when it is always necessary to produce the effect, therefore, the absence of any essential cause guarantees the absence of the effect, and the presence of the effect guarantees the presence of all essential causes. Having clouds is essential for rain, but merely seeing a single white cloud in the sky is not adequate for rain. So the reasoning is now reversed from what it was with adequate causes.

$c \implies E; E; \text{ therefore } c$

We observe the effect (rain, symbolized by the **E**) and know that there must have been some clouds (symbolized by the small **c** for essential cause).

When we observe that an essential cause is absent (clouds, symbolized by $\sim c$) and we know that there will be no rain (symbolized by $\sim E$).

$c \implies E; \sim c; \text{ therefore } \sim E$

Here is another example of an essential causal relationship. In order for your car to work (**E**), many individual components must be working: the engine (**c1**), the transmission (**c2**), the differential (**c3**), etc. It also needs to have fuel (**c4**).

$c \implies E; E; \text{ therefore } c1, c2, c3, c4$

I observe that you have just driven in from Palm Springs so I know that your car must be working **E**. I then infer that everything essential to your car's performance must be OK, that your engine, transmission, and differential worked, and that you had enough fuel. I reasoned from the presence of the effect to the presence of all causes essential to produce that effect.

Now, let's assume that the opposite had happened, that although I had been expecting you to show up for class, you did not arrive. I know that you are a responsible person and that if your car was working you would have arrived, so even assuming that I could figure out that the reason for your absence was car trouble, I could not guess that it was your transmission as opposed to some other essential component of your car.

With essential causes, I can reason from the presence of the effect to the presence of all essential causes, but I cannot reason from the absence of the effect to the absence of any particular individual essential cause (because some other essential cause might be lacking).

But then out in the parking lot after class, I observe a hole in the bottom of your gas tank. Since fuel is one of the essential things

your car needs to run, I can infer that the absence of fuel ($\sim\mathbf{C4}$) will mean that will have the effect of your car not running ($\sim\mathbf{E}$). The absence of any essential cause ($\sim\mathbf{C}$) prevents the effect ($\sim\mathbf{E}$).

$$\mathbf{c} \implies \mathbf{E}; \sim\mathbf{c} \text{ therefore } \sim\mathbf{E}$$

The reasoning with essential causes seems very different from what we did with adequate causes, which closely paralleled the Modus Ponens and the Modus Tollens. It almost seems that we are going in the opposite direction (and we are). When we reason from the presence of the effect to the presence of an essential cause

$$\mathbf{c} \implies \mathbf{E}; \mathbf{E}; \text{ therefore } \mathbf{c}$$

this is like affirming the consequent.

When we reason from the absence of an essential cause to the absence of the effect

$$\mathbf{c} \implies \mathbf{E}; \sim\mathbf{c}; \text{ therefore } \sim\mathbf{E}$$

this is like denying the antecedent.

Here is why we are now justified in this kind of reverse logic. The fatal flaw of trying to reason by affirming the consequent (or by denying the antecedent) was a failure to take account of alternative explanations, other causes that could have produced the same effect. Remember the case of the poker player. If he has a royal flush, we can infer that he will win the hand (because a royal flush is adequate to beat any other hand). But we cannot infer that just because he won, he must have had a royal flush, since in most

games, there are many other hands adequate to prevail. However, if we said that the only way our poker player can win is to have a royal flush, and he does win, we may infer that he had a royal flush. Once we say that a given cause is essential, we no longer have that worry about competing adequate causes.

Now let's try a new example and see if we can identify it as an essential cause and/or an adequate cause. Let's stick with the topic of rain, but move down the sequence of events and see what happens after it rains. So now, we consider rain as a cause, and see what it brings about, wet streets, which would be the effect. Is rain sufficient to make the streets wet? Yes, so rain has the role of adequate cause (with respect to the effect of wet streets). Is rain the only way that the streets can get wet? No, there could be a burst water main that could account for wet streets, so rain is not an essential cause of wet streets.

Notice how this affects the process of reasoning. With rain being an adequate cause of wet streets

Modus Ponens: $C \implies E$; C ; therefore E

when we see that it is starting to rain heavily (C), we know that the streets will get wet (E). We can also perform

Modus Tollens: $C \implies E$; $\sim E$; therefore $\sim C$

when we see that the streets are not wet ($\sim E$), we know that it has not been raining ($\sim C$). But since rain is not an essential cause of wet streets, we cannot say that

$c \implies E$; $\sim c$; therefore $\sim E$

since it has not been raining, the streets will be dry (for that would be like the fallacy of denying the antecedent). Nor could we say that

$c \implies E; E; \text{ therefore } c$

since the streets are wet, it must have been raining, because that would be like affirming the consequent. Only when we have essential causes can we reverse the directions of causal reasoning.

This kind of causal reasoning is used in forensic science: criminalistics. Consider the case of the fictional detective, Sherlock Holmes, the master of reasoning. He often called it deduction, but it was not the kind of formal deductive reasoning that we will describe in chapter seven. Holmes would observe various clues (effects of a crime) and then infer something about the cause (how the crime took place). In one of his most famous cases, he used some reasoning similar to the above example of the barking dogs. When a murder was committed late one night, Holmes was intrigued by the fact that the dogs had not barked.

$C \implies E; \sim E; \text{ therefore } \sim C$

The absence of an effect (barking) means the absence of all causes adequate to produce barking. So, no stranger came by that night to disturb the dogs. Holmes reasoned that the murderer must have been someone known by the dogs. From this and other clues, Holmes was able to catch the real murderer.

The concept of adequate and essential causes should remind you of our discussion of independent and dependent arrays of premises back in chapter two. Essential causes are like dependent arrays of premises. Just as each linked premise is necessary in order to

support the conclusion, so each essential cause must be present in order to produce the effect. Adequate causes are like independent arrays of premises. Just as each independent premise is sufficient by itself, without the help of other premises, to support the conclusion, so each adequate cause is sufficient to produce the effect on its own.

Suppose that a given cause is both adequate and essential for producing an effect. In other words, this factor always, all by itself, causes the effect, and only this factor has this capacity. When a cause is both adequate and essential, both kinds of reasoning apply (just like a biconditional statement, *Q, if and only if, P*).

You can then reason from the presence of the cause to the presence of the effect, because the cause is adequate.

C ==> E; C; therefore E

You can reason from the presence of the effect to the presence of the cause, because the cause is essential.

c ==> E; E; therefore c

You can reason from the absence of the cause, to the absence of the effect, because the cause is essential

c ==> E; ~c; therefore ~E

You can reason from the absence of the effect, to the absence of the cause, because the cause is adequate.

$$C \implies E; \sim E; \text{ therefore } \sim C$$

In other words, when a cause is both adequate and essential, both the cause and the effect will be present, or both cause and effect will be absent.

One more thing about our discussion of adequate and essential causes, when we redefine cause and effect as their opposites, we switch around the type of causal connection (from adequate to essential, or from essential to adequate).

For example, the opposite of a healthful substance is poison, the opposite of life is death. So, healthful substances like nutritious foods (cause) are essential to preserve life (effect), but poison (cause) is an adequate cause of death (effect).

	May reason from presence of	May reason from absence of
Adequate cause	Cause to infer presence of effect	Effect to infer absence of cause
Essential cause	Effect to infer presence of cause	Cause to infer absence of effect

Advanced Theories of Causation

Aristotle (384-322 BCE) was very interested in the notion of causation and its complexity. He set forth the idea that there were four different types of causes (although by modern standards, he was using the concept of cause too broadly). He called them final,

formal, material, and efficient causes. Let's illustrate each of these four causes with respect to a specific effect, in this case, the construction of a new house.

The **final cause** of something referred to the end purpose or goal of that thing. The final cause of a house would be its purpose: so that people can have a place in which to live.

The **formal cause** of something is the form or structure that the thing will take. On this point, Aristotle was influenced by his teacher, **Plato** (428-347 BCE) who developed an elaborate model of the ideal forms which influence all objects in the real world. In our example of the house, the formal cause would be the ideal structure that a house would take: something akin to the architect's blueprints.

The **material cause** was Aristotle's way of saying the materials out of which a thing is made. So, the material cause of most U.S. tract homes would be wood, of most Mexican homes concrete, and of most "mobile" manufactured homes: metal, plastic, and fiberglass.

The **efficient cause** referred to the agent that brought all the other elements together, and made the effect happen. In the case of building a home, the efficient cause would be the builder.

English philosopher **John Stuart Mill** (1806-1873) suggested several techniques for identifying causes. This was one of the most sophisticated formulations for the century prior to the development of a truly experimental study of the social sciences. However, these techniques can lead us to confuse essential with adequate and to even identify some non causes as major factors.

One of Mill's approaches was the Method of Agreement: find out which individual causes are always preceding the effect. For example, suppose five friends go out to lunch at a buffet

restaurant. Each of them ate a different combination of the available foods. That evening, two of the five friends fell ill. Mill's approach would try to isolate what those two, and only those two (A and B), had in common. See if you can figure out what it was.

	Mr. A	Ms. B	Ms. C	Mr. D	Ms. E
Salad	Yes	No	Yes	No	Yes
Fish	Yes	Yes	No	No	No
Stew	No	Yes	No	No	No
Vegetables	No	No	Yes	Yes	Yes
Pie	Yes	Yes	Yes	No	No
Sherbet	Yes	No	Yes	Yes	No
Coffee	No	Yes	Yes	Yes	No
Tea	Yes	No	No	No	No
Coca Cola	No	No	No	No	Yes
Got sick	Yes	Yes	No	No	No

To figure out what caused the illness in A and B, but not in C, D or E, using Mill's method, you would conclude that it cannot be the salad, stew, sherbet, coffee or tea, because one of the two ill people had it and the other did not. It could not have been the vegetables or the coke, because neither A or B had them. It could not have been the pie that made them sick, because C also had a slice of that same pie and did not get sick. The most likely culprit would be the fish because both A and B had fish and got sick, and no one else had fish and no one else got sick.

Of course, there might be other interpretations of these data. Maybe A and B have some connection other than eating the fish at that meal. Perhaps they were exposed to the same viral or bacterial infection in some way other than the fish. Another way to view the above data would be to reverse the causal connection and speculate that perhaps it was the absence of something that led to the illness. Both A and B failed to eat the vegetables, while all of those who ate vegetables remained healthy that night.

Perhaps the most advanced theories of causation come from the fields of medicine and public health. **Etiology** refers to the origin or causal nexus of disease. Let's take the case of mental disorders, of which there are many different kinds (e.g., schizophrenia, dementia, bipolar, dissociative). Each of these has its own etiology. If we view the disorder as the effect, then each of these disorders has a very different system of causes behind it. It is not as simple as one virus causing dementia and another virus causing schizophrenia. In some disorders, there appears to be no causal role for viral infection. Similarly, genetics plays a major role in some disorders (e.g., schizophrenia, bipolar), a minor role in others, and no apparent role in still others. The same can be said of traumatic experiences in early childhood or exposure to toxic substances.

To understand the complex and varying role of different causes, we need a model of multiple causation. Any mental disorder can be analyzed in terms of four types of causes: principal, predisposing, precipitating and perpetuating.

Principal causes are those having the most impact. They are usually essential and sometimes adequate. Even if they are not essential, they contribute more to the onset of the disorder than do any of the other causes.

Predisposing causes are found in the distant background (e.g., heredity, early parenting, culture), and make the patient more susceptible (vulnerable or "at risk") for certain disorders. These predisposing causes are sometimes essential, but never adequate. Indeed, many individuals with these predisposing backgrounds do not get the disorder, but demonstrate great resilience.

Precipitating causes are those occurring just before the disorder and trigger it. They are never adequate, and only rarely essential.

Let's pause with these first three types of causes and give some examples of how they could be used in a non-mental health field.

Effect: The camel's back broke.

Principal Cause: The heavy load of wheat the camel was carrying.

Predisposing Cause: The camel is old and has a weak back.

Precipitating Cause: The last straw of wheat was just too much.

It is obvious that the major cause was the heavy load, not the last straw, but the camel's back did not break until the last straw was piled on. Notice the importance of the predisposing cause. If the camel had a stronger back, it might have been able to tolerate that heavy load.

Notice the chronological sequence of these four events. The first thing to occur was the fact that the camel had a weak back (predisposing), then the heavy load was piled on (principal), and then the last little straw (precipitating), and then its back broke (effect).

Here is another example of the roles of these three types of causes.

Effect: an explosion

Principal Cause: the dynamite that had been stored in the shed

Predisposing Cause: the site was dry

Precipitating Cause: the spark

It is obvious that the major cause was the dynamite, not the spark, but the explosion did not happen until there was that spark. Notice the importance of the predisposing cause. If the shed had been

damp, this might have prevented the explosion. Notice the chronological sequence of these four events. The first thing to occur was the dry shed (predisposing), then the dynamite was stored there (principal), and then that little spark (precipitating), and then there was the explosion (effect).

Returning to the topic of mental disorders, a major dynamic for many of them are factors that keep the disorder going, even making it stronger over time. These **perpetuating causes** actually come about after the onset of the disorder (and may be themselves results of the disorder). These causes tend to reinforce the disorder in a kind of **vicious cycle** (a **heterostatic** system) that can make the disorder get stronger over time. Here are some phrases describing such a relationship between two variables, X and Y.

X reflects and reinforces Y

X derives from and contributes to Y

X is both an effect of and a cause of Y

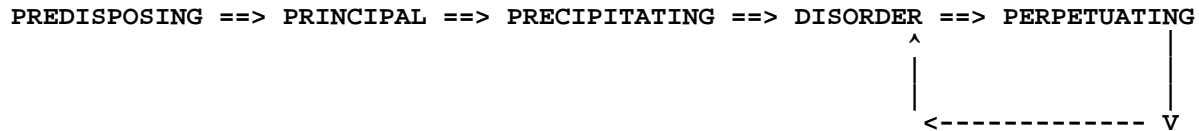
X stems from Y and leads to Y.

X is born of Y and breeds Y.

This table summarizes the roles of each type of cause.

<i>Cause</i>	<i>Essential?</i>	<i>Adequate?</i>	<i>Role?</i>
Principal	Usually	Sometimes	Major
Predisposing	Sometimes	Never	Minor
Precipitating	Sometimes	Never	Minor
Perpetuating	Never	Never	Varies

Here is how these causes relate in chronological order.



Let's illustrate this with a case of clinical depression.

Case Study: Ms. W, age 64

Effect: She suffered from major depressive disorder.

Principal Cause: Although psychologists disagree about the major cause of depression, the consensus is that the interpretive style of the patient's personality plays a major role. In the case of Ms. W, she had high expectations about what she was "owed" from life and felt cheated. She would get upset when one of her brothers or friends seemed to be lucky or successful with less effort than she had put forth. "Life is unfair" was her favorite phrase. Whenever she got a new possession, she was quick to find a defect. When she went on a vacation, she always found something not to her liking, and complained about it endlessly. Her son once remarked about her "She wouldn't stop complaining if they gave her a front row seat in heaven."

Predisposing Cause: Ms. W had a difficult childhood, and never felt loved by her parents. She claims that in one family portrait, both of her parents and all of her brothers and sisters are there, but that she had been intentionally excluded because her parents did not love her. Nevertheless, she adored her father, but when she was eight, her father died unexpectedly.

Precipitating Cause: Her husband passed away from a heart attack six months ago. Most widows emerge from their bereavement before a major depressive disorder occurs, but given Ms. W's personality type, she was more vulnerable. Mr. W had born the brunt of her complaints for over forty years, and with him gone, she had one less thing to complain about and a major target for her anger was absent.

Perpetuating Cause: Since developing the major depressive disorder after her husband's death, Ms. W has withdrawn from her social circles. She no longer goes out to parties or movies. She does not even go to the senior center for her aerobics classes. This lack of physical and social activity can exacerbate a depression.

It is only by looking at all four types of causes that we can comprehend the complexity of this disorder in Ms. W.

Teleology

Teleos is the Greek word for end or purpose. **Teleology** is the study of ends, goals, purposes. Think of causation as the study of the links between external events in order to come up with an explanation for why things happen. Think of teleology as dealing with internal motivations in order to come up with an explanation for why things happen. Harkening back to Aristotle's four fold theory of causation, teleology speaks to the final cause: the reason why something was done (e.g., the house was built in order to provide a place for people to live), its purpose for being. It is teleology that explores the internal world of desire and effort.

Perhaps the simplest teleological system to comprehend is the means-end relationship. Both of these terms require some clarification because they have multiple meanings.

In teleology, the **end** is the great goal or purpose for which we strive, even if we do not strive for it in a direct path. This end gives us a reason why we strive for other events as intermediaries.

In teleology, the **means** is a vehicle by which we can attain the desired end. The end is a question of *why*. The means is a question of *how*. Here is an example.

I want to become wealthy (end), and in order to do so, I shall pursue a career with the best chance of earning a lot of money, high finance (means).

Just as a cause-effect sequence can look at a given event as the effect of those events that came before it and the cause of those events that came after it, so a given event can be viewed both as means to other ends and as a worthy end for which we require means. Staying with our initial example, we could probe further, and search for the end to which wealth would lead.

Why do you want to become wealthy?

The answer may be something like

I want to become wealthy (means), so that I can live in comfort (end #1), travel (end #2) and fund those charities about which I deeply care (end #3)."

Notice: the why question converted the goal of being wealthy from an end, to a means to some other end(s).

We can also go in the other direction in this teleological sequence: taking a means and seeing which other means might lead to it as an end. Staying with our initial example, we could probe backward, and search for the means that would lead to a career in high finance.

How will you develop a career in finance?

In order to land and develop a career in finance (end), I should go to a great business school like Wharton (means).

Notice: the *how* question converted the means into an intermediary end, itself requiring other means. We could even keep going backward with another how question. Moving back further takes us from the macro level of strategy to the micro level of tactics. Both are important to success.

*"Strategy without tactics is the slowest route to victory.
Tactics without strategy is the noise before defeat."*

-Sun Tzu

Staying with our initial example,

How will you get into Wharton?

In order to get into Wharton (end), I need to have good grades (means).

How are you going to get good grades?

In order to get good grades (end), I need to study hard (means).

"If I had 8 hours to chop down a tree, I'd spend 6 hours sharpening my axe."

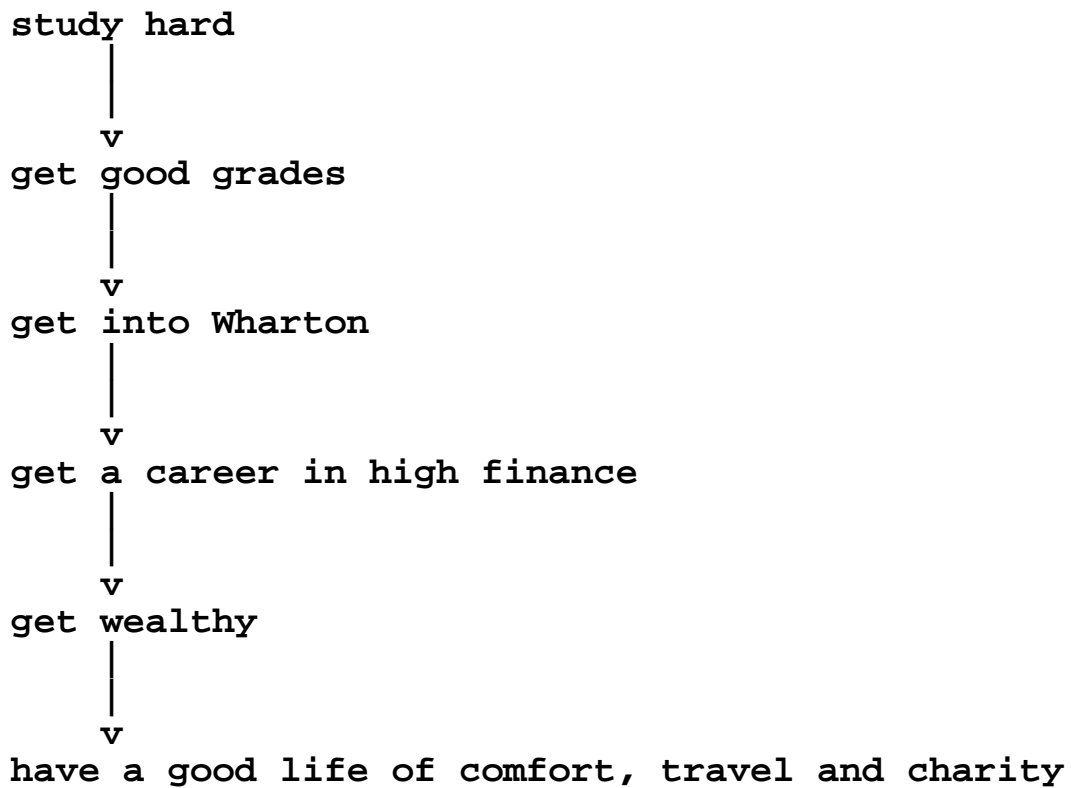
- Abraham Lincoln

So, we need to have a vision of the final goal, but put our efforts on the right means to get there.

This is beginning to look like a hypothetical chain of reasoning.

Premise: If P, then Q.
Premise: If Q, then R.
Conclusion: If P, then R.

To tie it back to this example.



It makes sense to start our deliberations with the end, sort of like a map of our destination, so that we can plan the best route. Before we set out to do the job right, let us make sure that we have set out on the right job to do.

Decision must always take into account the dynamics of causation, for means are the causes we seek to manipulate in order to generate the ends as effects.

"Wisdom denotes the best ends by the best means."

- Frances Hutcheson

With causal analysis, it was important to discern which causes were essential and which causes were adequate (or both, or neither). The same typology is useful with means. If a given means is essential to attain the desired end, no other means is adequate but if a given means is adequate to attain the desired end, no other means is essential. *The spider has eight legs, and as long as any one of them is holding on to the web, the spider will not fall.* Each of those spider legs is adequate to hang on to the web, so none of those legs is (individually) essential.

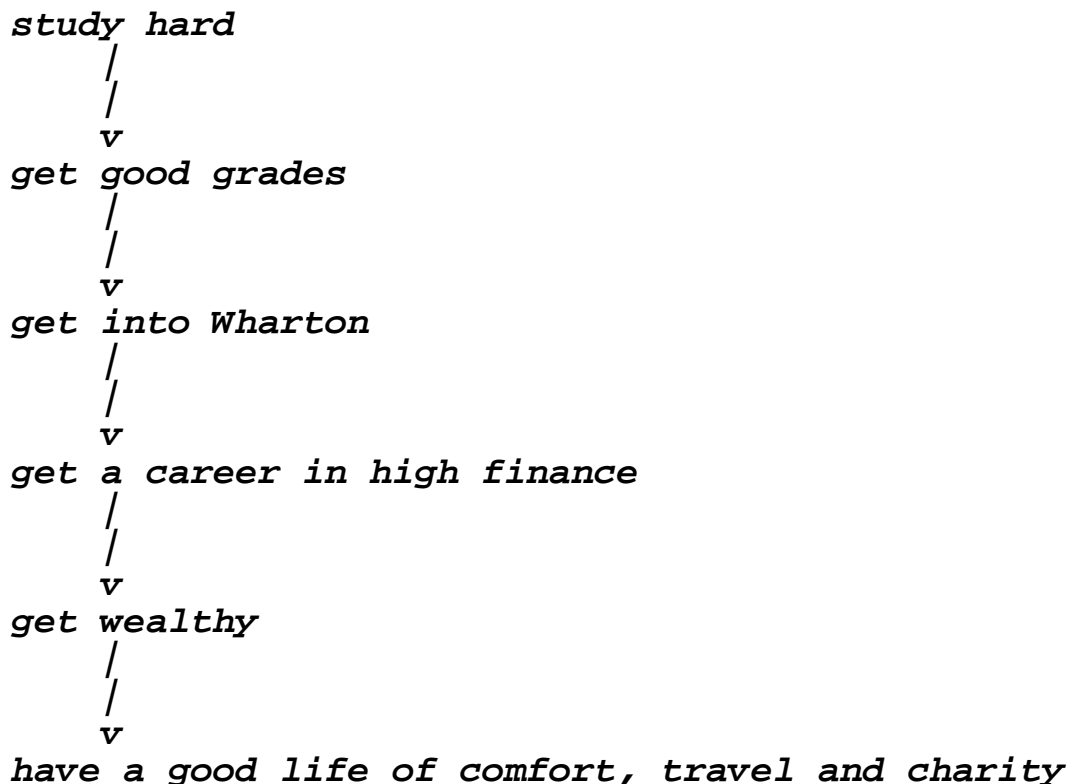
Here is another example of having several adequate means. I show up in Juarez, Mexico, with one pocket full of 20 dollar bills, and another pocket full of 100 peso notes, and I have a thousand dollars in traveler's checks, an ATM card linked to a Mexican bank and a VISA credit card. I have five different ways (means) to pay my hotel, restaurant and other expenses (ends). If one establishment does not take my credit card, traveler's checks, or dollars, I still have *moneda nacional* (Mexican money) and can get more at the ATM.

With adequate means, if any one of them succeeds, the end is attained. Only if they all fail, do we fail to attain the end.

With essential means, only if they all succeed, is the end attained. If any one of them fails, we fail to attain the end. Now go back to a previous example of going to Wharton and getting rich.

Do we really have to go through all these steps in order to arrive at the good life? We do if each step is an essential means to the end that it serves. If not, there may be some shortcuts (inheritance, the lottery), or at least some alternative routes using other means (e.g., going to medical school).

Are we really guaranteed that if we study hard will get us the good life? The answer is only if each step is an adequate means to the next step (i.e., if studying guarantees us good grades, and good grades guarantee that we get into Wharton).



Means-end analysis can also help us understand some of the disagreements people have with each other. Sometimes people

disagree on the ends (where they want to end up in life) and therefore also disagree on the means. But this does not always happen. Sometimes people may have two different ends, but agree that the same means would help toward either end. My end may be another vacation home, and my wife might want to expand the size of our present home. We may disagree about these goals, but agree that either one of these will require more money (the same means).

Sometimes people agree on the ends but disagree on the means because of different estimates as to the efficacy of those means. Suppose a husband and wife both agree that they need more money (end) but disagree about the best way to achieve this goal. Perhaps the wife wants to pursue an advanced degree in order to increase her salary (means) while the husband thinks that the best approach would be to start his own business (means).

Many of people's personal problems can be understood in terms of the ineffective use of means-end analysis. One of these is that people keep asking *why* a problem started instead of *how* can it be solved. All of us carry baggage due to past problems. Some of us cannot stop asking *why*.

Why do I have this problem?

Why did this have to happen to me?

Some people just strive to explain or label the problems of life, rather than solve them. Rarely is this kind of causal analysis fruitful. Wisdom means being less concerned about the *why* behind problems, than with the possible *how* in front of you, of moving on to solutions. Focus on the means you need to move on to your ends. To get to your destination, you have to stop spending all your time looking at the rearview mirror. We should focus on the problem only inasmuch as it is relevant to the formulation of the solution.

Beyond this, a focus on the origin of the problem becomes fixation on the problem.

In saying this, I realize that I fly in the face of many pundits who are convinced that the following statement is a self-evident truth:

The solution to a problem lies in the removal of its cause.

(Indeed, it is the third noble truth of Buddhism.) This leads some people to procrastination, since if we are uncertain about the cause of the problem, then we cannot determine how best to seek a solution. My years in clinical work have led me to doubt this approach. I have seen it used by too many chronically depressed and anxious individuals. In so many cases the cause was not apparent (especially to the patient). In others, the cause may have been crystal clear (e.g., heredity) but there was no way to remove the cause (but effective solutions did exist). Indeed, I concluded that the perpetuating cause of the problem was that the patient was focused on these irreversible causes, and not on the solutions.

Another kind of fruitless obsession is when individuals become totally focused on a (non-essential) means. It is difficult to see the big picture when you are inside of the frame. This often manifests itself in terms of obsessions. Let's take the case of neatness. Neatness is a very useful means to attaining many ends. For some ends, neatness may be essential. However, neatness is never adequate and rarely the most important means to any end. Imagine an automobile mechanic. It is nice to have one that is neat, and gets very little grease on his clothes or hands, but neatness alone is not the mark of a good mechanic. Making the car run is the key criterion, and some people fret too much about neatness to ever be good mechanics. One study of white collar workers found that among those making less than \$35,000, two thirds described themselves as neat freaks, but among workers

making more than \$75,000, only one in ten described themselves as neat freaks. A concern for neatness didn't help them rise in the organizational structure (and it may have hurt them, if it diverted their attention from other matters).

Yet another problem is a goal that is set in an unrealistic way.

"The perfect is the enemy of the good."

- Dennis Prager

Holding out until things are perfect prevents real progress and contentment. There are special names for this kind of people.

- Those who wait for just the right job to come along, and find some fault with each opening they hear of: this one does not pay enough, that one is the wrong industry, and that one has no chance for advancement (the name for these people is *unemployed*).
- Those who find some fault with each house they are shown by the real estate agent: one is too far from my job, one is too small, one is in the wrong neighborhood, one is the wrong color (the name for these people is *renters*).
- Those who find some fault with each potential mate they meet: that one is too short, that one is bald, that one is fat, that one does not have enough education, that one is boring (the name for these people is *single*).

Because life is so precarious, and the best laid plans oft go awry, it is best to have backups. Always have a backup means to arrive at

a backup goal, and always have a backup goal to fit your current means, so that if you do not accomplish your primary goal, at least you can say that you are striving for something.

One place where I have seen this quest for perfection cause major harm is in the area of student assignments. Each semester I have many students who simply do not turn in their term projects, even though they know that they will not pass the course as a result. Having worked with many of these students all semester, I can attest that some of them are quite capable and that their research projects were going well. The problem comes when such students realize that their projects are not perfect (e.g., that there is so much more library research that could be done, and that all the mechanics of APA writing style are impossible to master the first time around). So, these students procrastinate, and keep delaying the actual writing of the paper (under the rationale that they need more time to do more library research and to master the APA format). In the end, the paper just does not get written, and that is worse than submitting a satisfactory, though imperfect project.

Here is the best antidote to such perfectionistic procrastination. Realize that your first empirical research project (or even your doctoral dissertation) is imperfect, and will never be perfect. Your only hope is to start writing something, make some improvements on it, hand it in by the deadline and hope that it is good enough for a passing grade. Even if it gets an "A" it was not perfect. This becomes obvious when you write an article for a professional journal. Almost none of these articles are accepted "as is" without a request for revision. Even after they are published, some respondents will continue to find faults for years to come. But that is how you grow and learn. Hey, I have been working on some of the concepts in this book for forty years, and if I waited until I understood them perfectly, this book would never get done. So, I have put it together the best I can and hope that student and colleague comments will lead to improvement in the next edition.

In couples counseling, I have seen many examples of where people become stuck on means that are not only ineffective, but are actually counterproductive to the ends that the individual hopes to attain. I assume that most spouses want a pleasant, cooperative, attentive, and affectionate spouse (the end). The chief means employed by some husbands (micromanaging and controlling) is woefully ineffective, driving their wives to rebellion; as is a major technique of some wives: whining.

THINK ABOUT IT

"Men will cease to commit atrocities when they cease to believe absurdities."

- Voltaire

Now, try to put the above statement in a means-end relationship. The goal is to get people to stop committing atrocities (end) and the way to do this is to get them to stop believing absurdities (means). We then ask, how do we get them to stop believing absurdities (end) and the answer is critical thinking (means). It diagrams out like this.

people start using critical thinking

|

|

v

people stop believing absurdities

|

|

v

people stop committing atrocities

Humanists such as Voltaire thought that these means were adequate. I doubt that, but I agree that they are probably essential, and so therefore, I am committed to pursuing them.

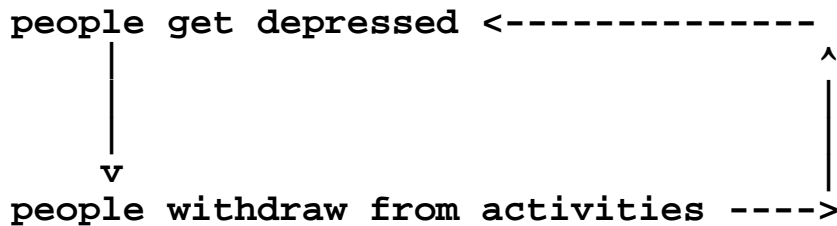
We need to ascertain which means and which ends are inconsistent and cannot be simultaneously pursued. For example, I enjoy living in Long Beach and I enjoy living in Acapulco. If I can juggle my schedule to spend the best season in each, January in Acapulco and July in Long Beach, I have no real conflict, but I have to choose where to be because I cannot be two places at the same time (I have what Lewin referred to as the approach-approach conflict).

Now, let's consider a couple of advanced techniques for teleological analysis by applying the advanced causal analysis of the previous section.

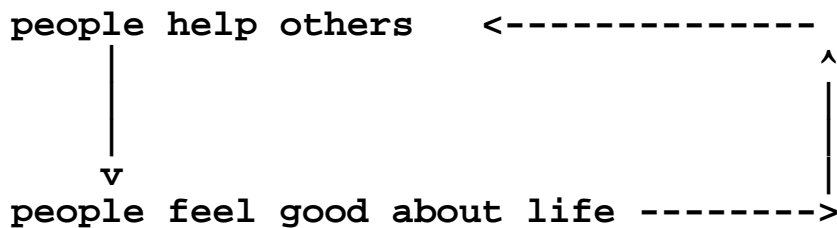
One is to do a multi-causal analysis of the problem, but instead of focusing on the predisposing or precipitating causes (the way that most patients themselves do), let's focus on the perpetuating cause. In other words, we need to stop thinking of some problems as events (done deals that we are doomed to live with), but rather as ongoing vicious cycles that we can attempt to disrupt.

With depressive patients, that means getting them to be active again, starting with physical exercise. Experimental data indicate that patients assigned to vigorous physical exercise report lower levels of depression compared to those assigned to placebo activities (or their usual inactivity). Many other problems are like clinical depression in this way. We cannot go back in time and undo which sperm got together with which egg to create the heredity, or reverse the unfortunate events of early childhood. What we can do is focus on the perpetuating cause that keeps the depressive cycle going.

The other approach is to apply the heterostatic dynamic in the other direction. Instead of a vicious cycle of depression leading to withdrawal from activities, which in turn leads to more depression



we need to get patients on a **virtuous cycle** where we have perpetuating causes reinforcing a good effect. In the case of depression, the virtuous cycle is being active, engaging in creative activities, and getting patients feeling better about themselves.



"The virtuous cycle: happy people are more creative, and creative output makes them more happy."

Sonja Lyubomirsky

Explanations & Speculations

Descriptions tell us what is. Explanations probe further in search of a *why* behind the *what*. We can explain the why of human actions in terms of the motives behind those actions. For external events, the explanation is more of a causal analysis. Explanations are synthetic and causal, beginning with the effect, and looking for the cause.

That which we attempt to explain is known as the **explanandum**. That which does the explaining is the **explanans**.

One of the main difficulties in causal explanations of events is making certain that we have the cause and effect ordering correct. *Did X really cause Y or was it more of Y causing X?*

For example, when Franklin Roosevelt was elected president, only half of American households had a radio. His decision to launch the fireside chats was not based upon universal radio ownership, but may have encouraged it.

When it comes to certain institutions or locations having a transforming impact on human behavior, it is also possible that these institutions merely attracted or selected certain individuals. After World War I, a poor neighborhood in Vienna was home to Adolf Hitler, Benito Mussolini, Lenin, and Leon Trotsky. Vienna did not create these future authoritarian leaders, but merely attracted them. Both Sigmund Freud and Karl Marx died in London, but that city did not create them, but attracted them as they fled Europe.

Perhaps fine undergraduate educational institutions do not deserve all the credit for the future successes of the students to which they grant diplomas. Perhaps a Harvard degree is less a cause of your future success than a sign that you were so favored by talent and connections that you were able to get into Harvard.

Of course each could be causing the other in a heterostatic system of self-intensification, like Kim Kardashian who got famous because she was rich, and then got richer because she was famous.

Let's also consider creative reframing of some of the *why* questions that lead of a quest for explanation. For example, one of the favorites for historians is why Rome fell. Instead of looking at external factors or barbarian advance or internal factors of decay, perhaps the question needs to be reframed as how did Rome manage to last for a thousand years?

Speculation tries to answer questions about where something is headed in the future. Speculations are synthetic and causal, beginning with the cause, looking for effects.

"The past consists of the universe of conditions which can be known, but not influenced. The future consists of the universe of conditions which can be influenced, but not known."

- Rodney Stark

Determinism

The interest in explanation and speculation, especially that offered by the sciences, has led some theorists to contend that all events, even human behaviors, are thoroughly predictable because they are merely effects under the sway of external causes. Just as we can predict which way a billiard ball will travel, once we know how it was struck and the layout of the table, so if we are given the right background information about an individual, we can know the predetermined path of choices and behaviors. This theoretical approach is known as **determinism**.

There have been many deterministic schools of thought in philosophy, theology, and psychology throughout the history of ideas. Some, like **sociobiology** have emphasized the role of genetics. Sociobiologists contend that the answers to questions of why men are more sexually promiscuous than women can be found in the dynamics of natural selection: promiscuous guys end up impregnating more women, passing along their genes to future generations of promiscuous guys. Sigmund **Freud** and his school of **psychoanalysis** have emphasized the power of internal, unconscious drives, such as sex and aggression, for explaining every behavior and fleeting thought, no matter how inconsequential on the surface. The **behaviorist** school of psychology developed by J.B. Watson and B.F. Skinner emphasizes the power of the environment to determine all action and thought through stimulus-response conditioning. Karl **Marx** and his dialectical materialist philosophy underlying communism argued that a person's consciousness was merely a reflection of the underlying socio-economic conditions in which that person existed. When applied to theology, 16th century theologian John **Calvin** contended that man lacked the will to repent of his sins and turn toward Christ for salvation; even man's "faith" is but an external gift of a God who has decided to be merciful to some sinners and predestinate them for salvation through no will or act of their own.

Determinists would argue that, when we perceive ourselves as having free will, this is just as much as an illusion as when the schizophrenic patient imagines herself to be Marilyn Monroe, Joan of Arc, or the Virgin Mary. Determinism assumes that you are no more than a marionette, a puppet who cannot be blamed for its actions, for someone else is pulling the strings. Deterministic theories only disagree as to the identity of the puppeteer: God, demons, genetics, stimulus-response, the sexual and aggressive drives of the unconscious id?

“Determinism's greatest promises are universal predictability and universal control: if we can identify which causes lead to which effects, then we may observe those causes and predict the forthcoming effects; if we can control those causes, then we can control those effects. “

- Skinner, B.F.

Opposing determinism is the assumption that **free will** really does exist: the idea that you as an individual have the ability to choose a course of action despite the influences of heredity and environment. Free will is also a main tenet of Roman Catholic and Mormon theology, as well as most Jewish, Islamic, and some Protestant thought. For example, Christian theologian **C.S. Lewis** referred to such deterministic views of the mind as *nothing buttery*: the mind is nothing but a ...

Free will has been championed by **humanism** the idea that people are essentially good and have the capacity to make decisions. This approach has been at the core of humanistic psychology since Alfred **Adler** broke with Freud in 1912.

I am not neutral in this debate between determinism and free will, so I find it quite hard to be objective when I am so completely committed to one side. I support the doctrine of free will, and do so for many reasons. Some of these go back to my old interests in philosophy and theology, but many are directly tied to my interests in psychological research.

First, the human mind is not a passive product of external forces. Rather than our perception of the environment determining our agenda, it is our agenda that determines our perception. The perceiving self is not passive, but actively choosing which stimuli should be attended to. Perception is certainly influenced by previous experience, and that is the explanation for most illusions. However, the choice of what we are looking for determines what we are most likely to see.

David Hume and other empiricist philosophers have contended that the delineated causal sequence that we perceive in nature is not really something inherent in nature that we observe, but is actually imposed on nature by the human mind. So (forgive the rhetorical question) how then can we say that the human mind has been caused by natural forces external to it? If the mind determines causation, how can causation determine the mind?

Second, the determinist goal of perfectly predictable human behavior is not that close. When we study the movement of billiard balls, molecules, and DNA strands, it seems to closely fit the mathematical models built from previous observations: causal inferences seem to pay off in terms of testable hypotheses. When we look at our ability to predict human perception or memory, we get high correlations (of about .8, meaning that about a third of the variance is still unaccounted for). When we move into areas such as social or industrial psychology (e.g., using aptitude or interest tests to predict on the job performance) we often have to be content with low correlations (below .2, which means that over 95% of the variance might remain unaccounted for).

Third, the kinds of examples (e.g., hypnosis) cited by some determinists do not rule out free will. The hypnotized subject appears to be under the complete control of the hypnotist, with the actions, thoughts and feelings determined by this external power, but we could counter that the subject initially consented, of his own free will, to be hypnotized. Indeed, it is those subjects least capable of the rational exercise of free will (e.g., schizophrenic and Alzheimer patients) who are the least hypnotizable.

Although my clinical experience with hypnosis is limited (due mainly to the fact that I worked with the least hypnotizable of patients), my work in dream analysis has been more extensive. Over the past thirty years, many investigators have shown that much of the content of dreams can be influenced by external stimulation (illusions) or internal hallucinations (metabolic

disturbances brought about by food or medicine taken before sleeping). However, I have helped patients desirous of changing their dreams do so by means of psychotherapeutic intervention and rehearsal exercises. (Free will works in dreams just as it does in real life.)

Fourth, while determinists dismiss free will as an illusion, we could dismissively view determinism as a defense mechanism, perhaps as a form of denial or rationalization. If you say that your actions are merely the results of forces beyond your control, this is a denial of responsibility and a rationalization against the pangs of conscience. You may choose to drink alone or with friends. You may choose to stay sober alone, or with a support group. You may have a genetic code predisposing you to alcohol abuse, but you choose to drink or not. Just never blame your choices on someone else, fate, demonic possession, DNA, and especially don't blame God for your own bad decisions. Keep making wise choices, and accept responsibility for them. More than that, I should ask of no one. Less than that, I should not accept of myself.

Fifth, we need to ascertain if determinism is the best foundation upon which to live our lives. We should subject it to the same type of means-end analysis or decision making process that we do for other alternatives. Unfortunately, determinism gives us the mindset of victims, not victors. It focuses us on the analysis of past problems, not on the creation of future solutions.

"Victimism gives your future away."

- Steven R. Covey

Determinism is about blame, or at least excuses, while free will focuses on the development of future opportunities. Buying into determinism gives you these "life scripts," an algorithm for interpreting one's successes and failures.

When something bad happens (because of our foolishness or inattention), we are to say "It just happened." When something good is not attained (because of our foolishness or inattention), we are to say "It wasn't meant to be."

This is the track of that downward, self-reinforcing, heterostatic system I see in depressed patients.

"I do not believe in a fate that falls on men however they act; but I believe in a fate that falls on them unless they act."

- G.K. Chesterton

Sixth, the doctrine of determinism is paradoxical. In the first chapter we learned that paradoxes are self-referential statements that are internally inconsistent. Remember the examples like *I am lying*. Now try this one ...

All of my thoughts, emotions, and actions are determined by forces beyond my control.

If all of my thoughts are determined by factors outside of my own control, then my very notion of determinism is merely determined by factors beyond my control (such as how I was brought up). Therefore, my words have no transcendent meaning, and no claim to truth, and this entire discussion is just the irrelevant playing out of two minds set in motion by different backgrounds, no more of a truth quest than two billiard balls coming from opposite sides of the table and striking, and the only relevant question is limited to the prediction of where they will go after the collision, not which one was right or wrong. We can dismiss Freud's deterministic claims as mere results of his own unresolved Oedipal conflicts, Skinner's as

due to the way he was conditioned, and Marx's on the basis of his own socio-economic background. The sociobiologist's explanations have no more of a claim on truth than the peacock's strutting: both activities are involuntary responses to genetic programming.

Seventh, we must commit ourselves to behave as if we had free will. We can keep up the determinism vs. free will argument for the rest of our lives. Do humans have free will? Does the dog? Does the rat? Does the ant? Does the tree? The dog decides to move to a certain spot on the rug. Was that a free will choice, or a mere reaction to conditioning and instinct? If humans make better choices than the dog, it may be because the former has superior talents to remember their own experiences, and to learn from the mistakes of others, and to predict consequences. Humans have a better capacity to reason about cause and effect, means and ends.

So, let us accept that choice is inevitable.

*"You have brains in your head
You have feet in your shoes
You can steer yourself
Wherever you choose."*

- Dr. Seuss

"When you have to make a choice and don't make it, that is in itself a choice."

- William James

The question is not whether individuals should have freedom. People do have freedom, in terms of free choice, the power to decide which behaviors to employ. The question for governments is more one of liberty: what kind of influence and guidance should governments have on how people choose to act? Laws and

punishments are the most obvious attempts to limit certain choices (e.g., murder, theft) but education can also be used to change people's reference frames and give incentives for certain actions. To say that people must choose (and act as if they had free will) does not deny the influence of a myriad of external factors.

Example: a young man in 1971 receives a notice from the Selective Service that he is classified 1-A (likely to be "drafted" for compulsory military service). He can nervously wait for another letter (fairly certain to come within a few weeks) to report for induction, or he can pre-empt the process by voluntarily enlisting (and perhaps get a better role within the military). Alternatively, he could attempt an appeal of his 1-A classification, flee the country (Canada was a popular destination for "draft dodgers" of that era), accept a prison sentence, etc. The choice was his, but the government, his family, friends, and community were all influences on that decision.

Some people see themselves as the mere result of the past. Others see themselves as the instrument of the future. The choice is yours: see yourself as having no choice, or as having choice. Is the course of human life a journey down a winding road, on which we make choices at every fork, or is the course of life the trajectory of a rocket, such that we had no choice over the fuel, guidance system or launching point? These are two maps, the two models of your life, and you must choose which one to use. (Of course, my phrasing of the problem indicates my choice: free choice.)

"We are not free to will not to be free."

- W.H. Auden

CHAPTER FIVE:

DEFINITIONS, THEOLOGY & ETHICS

Sometimes the boundary between fact and definition is not always perfectly clear in philosophy. Even supposed debates about the facts wind up involving definitions.

Did **Galileo** actually observe the earth revolving around the sun? From our naked eye view here on earth, we observe what appears to be the sun revolving around the earth. Even with his telescope, Galileo could not have seen the earth revolve around the sun, just as drivers cannot directly observe their own cars go down the street. (What the driver sees is that the road appears to be moving, and so the driver infers that, since he assumes the road to be stationary, it must be the car that is moving).

The idea that the earth revolves around the sun is an inference based upon the premise that the earth rotates. The revolution of the earth around the sun does not account for day and night, but for the seasons. A key element in all of this is the definition of what it means for the earth to rotate and revolve.

"Man acts as though he were the shaper and master of language, while in fact language remains the master of man."

- Martin Heidegger

"Like everything metaphysical, the harmony between thought and reality is to be found in the grammar of language."

- Ludwig Wittgenstein

"The limits of my language mean the limits of my world."

- Wittgenstein

Heidegger and Wittgenstein were on the right track. Much of modern philosophy, including logic, boils down to language. Theological and ethical discussions show us the limits of linguistic structures for comprehending God and morality.

Language is a socially institutionalized sign system. It has two functions, one external and one internal. The external function is interpersonal: communication with others. The internal function is intra-personal: the facilitation of concept formation. It is this latter function that is of greatest interest to us in this chapter.

Sometimes language can get out of touch with reality, especially when definitions are assumed to take the place of facts. Consider these two jokes from different states.

1. Alabama state troopers were closing in on a speeding car when it crossed into Georgia. Suddenly, the officer behind the wheel became extremely frustrated and sent this message: "Because of the change of time zones, the fugitive is now a full hour ahead of us."
2. A farmer's land stretched across the Minnesota/Iowa state line. Surveyors came down from St. Paul and up from Des Moines to settle the boundary dispute. They then told him that his farm was going to be in Iowa. He was greatly relieved, "I wouldn't want to go through another Minnesota winter."

But to say that language is a completely inadequate vehicle to pursue the truth, approaches a paradox undercutting itself to the point of self-contradiction. To say that language is inadequate, but

can be improved as a vehicle in the pursuit of truth is not a self-contradiction, but a challenge to participate in the improvement of language.

Denotative vs. Connotative Meanings

The meanings associated with words can be **denotative** and/or connotative. When we focus on what a word denotes, we strive for objectivity and precision. When we extend the denotative approach, we start coming up with examples that fit the category. The denotative approach to language is based more upon cognition than affect.

What a word connotes is less precise, and certainly varies from individual to individual. This is going to be more subjective and emotional. It is this **connotative** side that is more associated with emotional response (and creativity). Connotative meanings suggest attributes rather than examples.

Let us take the term *athlete*. The denotative approach would lead for an objective understanding of the term, such as, *a person who performs physically in the context of a sport*. Extending to examples, we could denote Babe Ruth, Kobe Bryant, Muhammad Ali, Jim Thorpe, Wayne Gretzky, and Ronaldinho as famous athletes. The term athlete also connotes favorable attributes such as talented and dedicated, as well as some unfavorable stereotypes such as overpaid.

In some attempts at persuasion we see flagrant **hyperbole**: exaggerated overstatements and verbal puffery. When advertisers want to guard against charges of false advertising, they may retreat from hyperbole and employ **weasel words**, which still sound good, but obfuscate the underlying claims. Here are some examples of the favorite weasel words used by advertisers.

- new and improved
- extra strength
- heavy duty
- deluxe
- extra special
- beyond your dreams
- shows you what it can do

In order to think clearly and critically, we have to get beyond the hyperbole and weasel words. We need clarity of terminology.

Types of Definitions

There are different approaches to defining a word. Some are more denotative, and others more connotative. While most can be neutral in the determination of an argument's truth, some approaches to definition attempt to stack the deck in favor of one side or the other. Such definitions are **loaded**.

Lexical definitions are the type that would appear in the **dictionary**. They are very true to the denotative approach, striving for objectivity.

Synonymous definitions use the strategy of finding some other word that means just about the same thing (a synonym). Synonyms can be found in a reference book known as a **thesaurus**.

Neither lexical definitions nor synonymous definitions will be very helpful if they end up being **circular** (being defined in terms which are, in turn, defined by the term we began with).

What is a car? ... a motor vehicle.

What is a motor vehicle? ... a car.

Some are circular definitions are a little more elaborate.

Police are the enforcers of the law. The law is what is enforced by the police.

Science is what is studied by highly educated professionals known as scientists. Scientists are highly educated professionals who study science.

Precising definitions go even further than what lexical or synonymous definitions do in attempting to provide more detail in order to distinguish a term from other terms that share some similarities. So, a precising definition for a *convertible* might be

a passenger automobile with a removable top, usually made out of a soft and flexible material such as canvas, plastic or vinyl; unlike a sun roof, a true convertible has no permanent side supports under the roof

The **genus** approach starts with a larger category and then attempts to narrow it down by specifying more about the particular term. Here are some examples of definitions making use of a genus.

A son is an offspring (genus) that is a male.

A wife is a spouse (genus) that is a female.

A cat is a feline (genus) that is small and usually found domesticated as a household pet.

A home is a building (genus) used as a residence for a person or family.

A college is an educational institution (genus) above the secondary level, and is usually capable of granting a degree (e.g., associate, bachelor, master, doctorate).

Etymological definitions go back to the history of the use of the word. Etymology is the study of word origins. English, for example, is a blend of Celtic (e.g., Cornish) and Germanic (e.g., Saxon) dialects, influenced at times by conquerors who spoke Latin (the Romans) or French (the Normans). Following an etymological approach, a word might be traced back to its Saxon roots, and then through old and middle English to its present usage.

Ostensive definitions point to one specific instance.

A political scandal is like when the Clintons had this business deal called Whitewater.

Or imagine you are driving with a friend who is a foreign student from another country still learning English. She wants to know what a *convertible* is, and just as you are about to explain, a Mustang with the top down passes you on the left, and so you say *Right there, that is a convertible, that white Ford Mustang.*

Enumerative definitions offer several examples. *Clergy* means someone like a Catholic priest, a Jewish rabbi, a Buddhist Zen master, a Baptist minister, an Islamic mullah, etc.

Operational definitions are used in science. While definitions are, at least in theory, analytic, the operational definition anchors a concept in some observable test result. For example, a chemist might define an *acid* as a fluid that can turn blue litmus paper red. So, the operation that a chemist would perform in order to determine if a fluid were an acid would be the litmus test. A psychologist would define a *genius* as someone who scores over 130 on the Wechsler Adult Intelligence Scale (an IQ test). The psychologist would define *depressed* as meeting the criteria for major depressive disorder according to the Diagnostic and Statistical Manual (DSM).

So far, all of these definitions have striven for objectivity and did not necessarily reflect any motive to convince or deceive, but this is not the case with all definitions.

Stipulative definitions are created in order to deal with new things, or to come up with a new definition of an old thing. Sometimes the motive is innocent enough, but other times there is an intention to gain an advantage by controlling the definition. Some of these stipulative definitions are attempts to come up with prefabricated ideas impervious to fact or reason.

In one of his famous debates with Abraham Lincoln, Stephen A. Douglas was trying to make a point about definitions, and he used the following analogy.

“Mr. Lincoln, how many legs does a cow have”?

Abe answered four.

"But suppose we were to call the cow's tail a leg, then, Mr. Lincoln, how many legs would a cow have"?

Douglas expected a quick reply of "five" but Abe took some time to think about it and then responded

"Calling a tail a leg does not make it a leg."

and thus Lincoln resisted the imposition of a stipulative definition.

There are many examples of where politicians have successfully used stipulative definitions to greatly redefine an issue. Shortly after coming to power in 1997, Tony Blair's Labour government announced that 35% of British children lived in poverty. When this statement was not justified by any of the previously used measures of poverty, it was found that the statement could be justified if poverty was redefined as having a household income less than 60% of the median. (This is almost like saying that 50% of children are mentally subnormal because they have below average IQs.)

Sometimes political movements manage to appropriate a great self-defining slogan. Since the 1960s, the disarmament movement has gotten away with calling itself the *peace* movement. The opponents of nuclear disarmament in the 1980s were not anti-peace or pro-nuclear war, but advocates of Peace through Strength, but they were not the first to call themselves the peace movement.

How did the anti-abortion movement get labeled anti-choice? It could be argued that the opponents of abortion are defending the right of the fetus to be born so that he or she can make some choices in life. A dead fetus cannot choose anything.

Persuasive definitions are even worse than stipulative definitions. Persuasion is the attempt to change the attitudes of others. Sometimes persuasive definitions are loaded with extra terms to

make a concept seem better (or worse) than it is. The persuasive definition is like having the definition all rolled up with a premise designed to get you to accept a given conclusion. It tries to do the work of an argument.

"Faith: belief without evidence in what is told by one who speaks without knowledge, of things without parallel."

-Ambrose Bierce

Here, Bierce is doing more than giving a definition of *faith* he is using the opportunity to take a poke a religion.

It is the persuasive definition that ignores the purely cognitive and moves off in the direction of the affective. This is the field of **rhetoric**, tailoring our message so that it is the most convincing. One tool of persuasive definitions is the use of dysphemisms, euphemisms and politically correct terminology.

TERM	DYSPHEMISM
Evangelical Christian	Bible thumper
Homosexual	Sexual deviant
Conservative	Fascist Reactionary
Political activists	Agitators Rent-a-Mob
Anti-War	Peacenik Defeatist
Public servant	Bureaucrat
Government assistance	Socialism

To use a **dysphemism** is to intentionally speak of something in an unfavorable way. Here is a list of common dysphemisms. Notice how the dysphemisms try to substitute for a premise by immediately bringing in an unfavorable affect. Notice that some of these terms border on hate speech. Many racist, sexist, homophobic and xenophobic terms began as dysphemisms or stereotypes (e.g., *wetback* for illegal immigrants from Mexico).

TERM	EUPHEMISM
Lobbyist	Advocate Consultant Representative
Cost	Investment
Taxes	Revenue enhancement
Deficit	Revenue shortfall
Regulate	Level the playing field
Destroy	Pacify
Retreat	Strategic withdrawal
Poor nation	Developing nation
Long court battle	Due process of law Justice
Letting ignorant people vote	Democracy
Objection	Concern
Capitalism	Free enterprise
Flip flopping on the issues	Reinventing herself Evolved Matured Listened to the public
Sneak attack	Pre-emptive military strike

At the other end of the extreme are the **euphemisms** that try to put a happy face on sub-optimal reality, a tolerable, even laudable, connotation. These are sometimes called *hooray* words because it is hard to be against something that sounds so nice. One example is when Hugo Chavez named the new Venezuelan currency the *fuerte* (which in Spanish means “strong” or “fort”). In 2010 it was devalued 50% against the U.S. dollar. Calling it strong did not make it strong.

What has become known as **politically correct** terminology is similar to the use of euphemisms in that it attempts to present things in a favorable light. Specifically, politically correct terminology strives to be inoffensive, bending over backwards to avoid terms that might be considered disparaging or offensive to certain groups.

QUESTIONABLE TERM	POLITICALLY CORRECT TERM
Crippled Handicapped Invalid	Disabled, Challenged, Differently abled, Special
Retarded Moron Imbecile Idiot Subnormal	Developmentally disabled, Intellectually challenged, Special
Illegal immigrant	Undocumented worker
AIDS victim	Person with AIDS
Refugees	Evacuees
Homosexual	Gay
Negro Colored	Black African-American Person of Color

Related to these extreme uses of language would be the rhetorical practice of exaggerating the opposition's claims, to frame them in the worst possible light. Some debaters intentionally mock, belittle, and exaggerate. Someone who opposes some aspects of modern technology should not be portrayed as advocating going back to the cave. Someone who advocates the theory of evolution is not saying that your great grandparents were apes.

Ambiguity

The most common cause of vagueness is an **overgeneral**, lazy definition that is not adequately precisizing.

Where did you go last night?

Out.

What did you have for dinner?

Food.

What did you buy at the mall?

Stuff.

What did the minister preach about?

Sin.

What did he say about it?

He was against it.

Some of these definitions are almost circular:

Out is where we go when we leave the house.

Food is what we eat.

Ambiguity is when there are multiple possible meanings, so we don't know how to take an ambiguous sentence, and this may allow some schemer to try to take it the wrong way. Most ambiguities are based upon the meaning of a specific word or phrase. Many old jokes are built on **semantic** ambiguities.

A couple shows up at a hotel and discover that it is not as elegant as the brochure had led them to believe.

DESK CLERK: "Do you have reservations."

WIFE: "Yes ... but I think we'll have to spend the night here anyway."

The joke depends on the double meaning of reservations: a prearranged commitment to rent a room at a set price and growing qualms about fulfilling that arrangement

Many radio comedians used ambiguity as their stock in trade: Burns & Allen, the Marx Brothers, but perhaps the best was the team of Abbott & Costello. Once Abbott tried to convince Costello that he was not really there in the studio.

ABBOTT: *"You are not here today for our radio broadcast."*

COSTELLO: *"But I am right here."*

ABBOTT: *"Don't you agree that something is either in San Francisco, or Chicago, or somewhere else"?*

COSTELLO: *"Sure, that's only logical."*

ABBOTT: *"Are you now in San Francisco?"*

COSTELLO: *"No."*

ABBOTT: *"Are you now in Chicago?"*

COSTELLO: *"No."*

ABBOTT: *"So if you are not in Chicago or San Francisco, you must be somewhere else, and if you are somewhere else, then you can't be here."*

The joke depends on the double meaning of the phrase *somewhere e/se*. In one sentence it meant "not in San Francisco or Chicago" but in the other sentence it meant "not here" so this allowed the wily Abbott to get Costello to admit that he was not there. Here is another example, which one professor claims he received from a student on a logic test.

God is love.

Love is blind.

Stevie Wonder is blind.

Stevie Wonder is God.

- R.A. Burke

The term love may be used in different ways in the first two sentences. The term blind is used metaphorically in the second sentence and literally in the third.

The error committed here, and also by Bud Abbott, was the practice of **equivocation**: using a given term in two different ways in different parts of an argument. Here is another example.

MAJOR PREMISE: Only man is rational.

MINOR PREMISE: A woman is not a man.

CONCLUSION: A woman is not rational.

Most people would accept each of two premises, if it were uttered in isolation, just like we would accept the lines from Burke's student, or just as Costello answered each of Abbott's questions about Chicago and San Francisco. It is only when we get to the conclusion of the argument that we see the devious attempt to trick us. The meaning of the term *man* shifts from generic human in the major premise to *male* in the minor premise.

MAJOR PREMISE: You can live free in America.

MINOR PREMISE: Free means that it costs nothing.

CONCLUSION: You can live in American without money.

Here the verbal trickery is based on switching the meaning of free from *liberty* to *without cost*.

MAJOR PREMISE: A law comes from a law giver.

MINOR PREMISE: The law of gravity is one of the most basic and important of all laws.

CONCLUSION: The law of gravity must have a law giver, God.

While I applaud the intention of this argument, it too relies on verbal sleight of hand: equivocating between law in the scientific and legal sense.

"The superior man is catholic and no partisan. The mean man is partisan and not catholic."

- Confucius

Did the Chinese sage have a deathbed conversion and pledge allegiance to the Pope? That would have been difficult since the Chinese sage died five hundred years before Jesus. The equivocation here is the meaning of the word catholic (which here is used as an adjective meaning tolerant and universal).

WRITE IT RIGHT

The example of Confucius shows why capitalization is so important: the name of the church uses a capital C. The lower case c catholic is just an adjective. So, remember to capitalize the names of religious denominations and political parties. Members of both the Democratic and Republican parties are committed to democratic processes and a republican form of government.

Unfortunately, many terms frequently used in critical thinking contain some ambiguity.

Cause is an ambiguity, for it can mean what produces an effect and also the ends for which we strive (which actually makes it the effect of our actions).

Because can indicate a premise or an explanans.

Thus can indicate a conclusion or an illustration.

Since can indicate a premise, an explanans, or a temporal event.

Since Morse invented the telegraph, there have been many more advances in electronic communication.

In this sentence it is unclear if the writer is merely indicating 1844 as a date to reference the start of electronic communication or if the writer is implying that Morse's invention had the major role in bringing about subsequent advances.

Another kind of ambiguity is built on the context of language. **Syntactic** ambiguity refers to how the whole sentence is structured. The individual words may convey one meaning, but the way they are put together may be suggestive of another. Fluent speakers of a language must know more than the dictionary definitions, but also the common **idioms** used in day to day conversations. The meaning of idioms cannot be understood by a denotative dissection of the words, but only from familiarization with the connotative context. Otherwise some embarrassingly funny misunderstandings result.

Although English is one of the most precise languages on earth, many foreign speakers with a limited mastery of English (or a limited experience using it with Americans) have come up with some strange written messages for travelers.

Drop your trousers here for good results.

- Bangkok Dry Cleaner

Ladies are requested not to have children at the bar.

- Norwegian Cocktail Lounge

Go Away!

- Barcelona Travel Agency

Without understanding the proper context (of what came before in the discussion) some phrases are extremely hard to figure out.

Mary shot the man with the gun.

Was Mary stalking the man and then used her gun on him? or was she a police officer dealing with an armed and dangerous suspect who held a gun?

"Heaven is easier to get into than Arizona State."

- Ned Flanders

Was Ned consoling his son, Todd, after the boy did not make it into ASU? or did Ned just die and go to heaven and see Homer Simpson there? Unless we know the context, we do not know if Ned Flanders thinks that ASU is easy or hard to get into.

The havoc wreaked on critical thinking due to such use of such language was colorfully described by one of the godfathers of modern science, Sir **Francis Bacon** (1561-1626). This contemporary of Shakespeare referred to the imprecise and careless use of language as the *Idols of the marketplace*. He also decried the fact that some people tinker with the language in order to represent words of their own creation after an unreal and scenic fashion, and this he terms *Idols of the theatre*.

Logic functions best when it uses clear terms like *all*, *only* or *no* in its premises. Even these words can sometimes be ambiguous. The word *all* can sometimes imply essential and at other times adequate.

All I want to do is tell you is I love you.

This comes close to meaning *the only thing I want to do is to tell you I love you* but it does not mean that I have to say it constantly, or to the exclusion of all other communications.

I want to tell you I love you all the time.

This comes close to meaning *I want to remind you frequently of that fact* but I might also say something about other things as well.

Let's try this vague example.

The purpose of all schooling is to help you think.

Does that mean that the only purpose of schooling is to help you think, or does it mean that critical thinking is a (very important but not the only) purpose at all levels and types of schooling?

The terms *no* and *nothing* can be misunderstood.

WIFE: I hope you like the eggplant I made for dinner tonight.

HUSBAND: Nothing would please me more.

ANGRY WIFE: OK, you will get nothing, go hungry for all I care.

Nevertheless, *all*, *only* and *no* often represent some of the most precise terms that we have to deal with in critical thinking. Here are some other terms that convey those meanings.

- always: all times, whenever
- everyone: all people, whoever
- everywhere: all places, wherever, anywhere
- whatever: all things
- never: no times
- no one: no people, none, not a single
- unless: not, if not
- nowhere: no places

Inductive logic (chapter eight) can also work with *some* statements.

- not every: some are not, not all
- except: none but

The economy of some of the phrasings of the English language might best be undone to rewrite some sentences into two or more logically digestible sentences.

Only John has the key.

Break this down into two claims.

John has the key.

No one else has the key.

Or try this one.

All except Jane are coming.

Break this down into two claims.

Jane is not coming.

Everyone else is coming.

The following example is more complex.

All must show a passport except for military personnel in uniform.

This is better understood as separate claims, a disjunction with an implicit algorithm.

1. Each person is either military or non-military, as indicated by whether or not the person is in uniform.
2. If military personnel, then there is no need to show a passport.
3. If non-military personnel, then there is a need to show a passport.

Superlative statements build in an implicit comparison using terms such as: *older, higher, better*. For logical purposes, most of these could be broken down into two statements.

Hydrogen is the lightest element.

Consider this revision.

Hydrogen is an element.

Hydrogen is lighter than any other.

Many simple commas build two claims into a short sentence.

His father, Sir Edward, is 80 years old.

Two things are being claims here: that Sir Edward is his father, and that Sir Edward is 80 years old. The truth of the entire compound sentence is therefore a conjunction in which both parts must be true.

This is one reason why punctuation is so important in critical thinking. The place of a mere apostrophe before or after an s changes the meaning

boy's something pertaining to one boy

boys' something pertaining to several boys

One major point of debate between Jehovah's Witnesses and Evangelical Christians is whether someone goes right to heaven at the point of death. Evangelicals cite the *Gospel of Luke* for the story about the thief on the cross who asked Jesus to remember him in His Kingdom. Jesus responded

“Verily I say unto you, today you will be with me in paradise.”

Luke 23:43

The implication is that the thief will get there with Jesus as soon as they both die. The Jehovah's Witnesses do not object to the words but to the syntax. They re-punctuate the verse as

“Verily I say unto you today, you will be with me in paradise.”

New World Translation

They could have rewritten the passage as saying (if Jesus had enough time and breath)

Now, as we are both hanging here dying, I'm going to tell you how it's going to be in the future. You will be with me in paradise (not today or tomorrow, but when I come again and you get resurrected for the New Kingdom).

Here is another example. A simple country church was known for its flamboyant but controversial pastor, known as Brother Lee. Here is the sign it had outside.

Christ
is the answer!
... Brother Lee

Some vandals came along and did not change a single word, but just the punctuation.

Christ!
is the answer
Brother Lee?

Values

Nowhere is language more challenged than when it moves out of the purely cognitive domain and attempts to extend the rule of reason into the affective dimension of values. Perhaps the relativists don't want us to venture into the area of values.

I have my feelings and you have yours, and who are you to say that my feelings are wrong?

If the relativists are right, we cannot criticize anyone for having his or her "feelings." We cannot say that

- Hitler was wrong for his feelings of anger against the Jews.
- Anti-abortion protestors are wrong for blocking Planned Parenthood clinics.
- Osama Bin Ladin was wrong for 9/11.

- People with greenhouse gas belching SUVs are wrong for global warming.
- The Ku Klux Klan was wrong for its lynchings.

Perhaps everyone is entitled to his or her feelings, but when those emotions become transformed into actions, they start hurting other people's feelings and that is where rational people and just societies must make decisions based upon reason, decisions to limit certain behaviors.

The idea that other people have the wrong values and we need to change them underlies political campaigns and the zeal of religious missionaries. Indeed, the U.S. "nation building" efforts in both Iraq and Afghanistan presumed that the values of democracy, secularism, and individual freedom are better than forcing women to wear burqas and settling disputes by beheadings.

Axiology is the branch of philosophy dealing with the study of values. Let us begin by clarifying some of the values we hold. Clarification is necessary, because in many arguments about what to do, the values are as implicit as enthymemes.

I want to go to New York on my vacation (conclusion)
because it is such an exciting place (premise).

The enthymeme was the implicit value statement: *excitement is good*.

If we can agree that we share some of these values in common, then we can agree to formulate joint means so that we may pursue these common values.

Here are some common values, or what psychologists have recognized as human needs.

Achievement	Fairness	Order
Autonomy	Forgiveness	Patriotism
Change	Freedom	Prudence
Compassion	Generosity	Rationality
Competition	Gratitude	Respect for persons
Courage	Harmony	Responsibility
Creativity	Honesty	Safety
Duty	Justice	Security
Empathy	Liberty	Spontaneity
Equality	Loyalty	Tolerance
Excellence	Nurturing	Tradition
Excitement	Obligations	Wisdom

The acceptance of, and commitment to, these values varies from epoch to epoch, culture to culture, family to family, and individual to individual. However, since values are so important, and since our value choices impact others, we owe it to each other to state our values and seek a kind of harmonious mutual fulfillment of our values.

The problems come when values conflict: my value of comfort driving down the road in my big Lincoln might conflict with your concern about global warming. The value you place on a tasty hamburger conflicts with my valuing animal rights. Our nation's valuing of national security conflicts with our stated values of justice and due process. Value conflicts can even be internal to the individual: such as when your boss is doing something to rip off the customers or the stock holders or the government, but he offers to cut you in on the loot if you keep quiet. You love the excitement of

sky diving, but are worried that since you now have children, whether you should be jeopardizing their security for a few moments of your thrills.

Ethics is the study of right and wrong actions. Most ethical dilemmas are similar to those above, a competition between two value hierarchies: trying to decide between two things which are both good, and trying to wisely choose the better of the two (or the lesser of two evils). Ethics would be so easy if every decision was clearly the call of the good versus the easily identifiable temptations of pure evil.

The mark of wisdom is when a person has examined his actions and placed them in conformity with his values. This is the process of prioritizing, of saying that some values are more important than others.

"With coarse rice to eat, with water to drink, and my bended arm for a pillow;-- I have still joy in the midst of these things. Riches and honours acquired by unrighteousness, are to me as a floating cloud."

- Confucius

For Confucius, who gave up his seat at a royal court in order to spend the rest of his life teaching future generations, power luxury, and material wealth were not the highest values.

When Alexander the Great paid a visit to the Stoic, Diogenes, the young conqueror found the old wise man sitting alongside the barrel that was his home. As the emperor quietly approached, the old philosopher recognized who it was, but replied only "Get out of my light."

For those who are brave in times of danger, the explanation is not that they lacked fear, but that they were more committed to values higher than their own safety.

"Courage is not the absence of fear, but rather the judgment that something else is more important than fear."

- Ambrose Redmoon

A couple of years ago, one of the television networks had a interesting contest that kept viewers tuning in several weeks. Viewers could vote on who was the greatest American of all time. The program started by revealing a list of the top 100, and then having the viewers vote to make the final decision. There were most of the "founding fathers" together with great reformers, inventors, authors, performers, athletes, and contemporary celebrities. This was ultimately not a debate about the facts (what had each person accomplished in his/her life) but about affect: what kinds of virtues did the Americans (the ones who did the voting) prize above all others. The statesman (Reagan) beat out other forms of achievement, perhaps because he did the best job of resonating with American values, or at least the values that had guided Americans as they did their voting.

Theology

Religion is a system of doctrines, ethics, rituals, myths, and symbols for the expression of ultimate relevance. Some of these components (rituals, myths, and symbols) are purely in the affective arena, and have few intensions of conveying cognitive content. These elements of religion are intended to be more evocative. For more discussion of religion and these elements of it, consult my other book, *Ways to the Center* (Cegage, 2013).

"The ink of the scholar is more holy than the blood of the martyr."

- Muhammad

The two elements of religion in which there is some attempt at precisising would be doctrine and ethics. It is in these areas that critical thinking must take place.

Theology is a tool, not a goal. It is polemics applied to religious dialog. **Theology** is the attempt to apply critical thinking to elaborate upon, reconcile, and defend claims tied to religious doctrines. In this latter, defensive role, theology is known as **apologetics**.

Doctrines are statements about deities, salvation or afterlife. Here are some statements of doctrine.

"There is only one God."

- Zoroastrianism, Judaism, Christianity, Islam, Sikhism

"Our savior is His only Begotten Son, Jesus Christ."

- Christianity

"144,000 will be in this New Kingdom."

- Jehovah's Witnesses

"The way of nature is the way of our fulfillment."

- Daoism

"With good deeds, you get good karma, and a better reincarnation."

- Hinduism, Jainism, Buddhism

The aforementioned are simple statements of doctrine, but theology goes beyond that to attempt to develop a comprehensive and rationally satisfying explanation that ties in what God is like, and why things are as they are in the spiritual realm. Theology is not satisfied with *God wills it* as the end of deliberation (but may take that as the beginning point of elaboration).

I am intentionally putting this discussion of religion in this chapter on definitions because doctrinal statements (although essentially prescriptive) come closer to being analytic rather than synthetic. The statements of religious doctrine cannot be tested empirically.

- We cannot see God with a microscope or telescope.
- We cannot verify that Jesus was the Son of God by doing a DNA test for paternity.
- We cannot use hypnosis as proof of reincarnation (past lives regression may be simple fantasies induced by the hypnotist)
- We cannot use near death experiences as proof of heaven (for these might be hallucinations induced by chemical changes in the brain as it experiences death).

Furthermore, when we try to perform such empirical tests, we seem to be missing the main point about religion. (And here you may notice that I am discussing religion right after the topic of value claims. That is because I see religion as being more prescriptive than descriptive.)

Reason has a place, but a limited one, in religion. Most religious doctrines (e.g., the trinitarian formula that one God is in the form of three persons: Father, Son and Holy Spirit) are not the product of empirical observation or even of pure reason. The source of

doctrines is revelation from a prophet or scripture. Reason merely seeks to make doctrines consistent with each other, as well as with the other components of religion.

If a person claims to be a new prophet with a new message from God, we should use reason to compare his or her claims to what we already know. Wisdom is a balance between knowledge and doubt, between trust and the need for proof.

Nevertheless, many theologians throughout the centuries have offered some pretty convincing arguments for the existence of God, especially the cosmological, teleological and ontological.

One of the oldest arguments for the existence of God is known as the **cosmological**. It is based upon the concept of a causal chain stretching further and further back in time. Each event in reality must have had a cause, a previous event that led to it. But that previous event can also be viewed as an effect, and so must have had some previous event serve as its cause. So, back we go in what seems like an endless chain, but how did it get started? There must have been some first event. Some scientists call this the "Big Bang" that started off the universe, but rather than being a definitive answer that just begs the question. What or who made the Big Bang go bang?

This argument is similar to reasoning from the existence of an effect (the existence of the universe) to the existence an essential cause (God). For **theists** (those who say that a personal relationship with God is possible) and **deists** (those who accept God's role in creation, but doubt that a personal relationship is possible), the answer is that the essential, first cause of the universe was God.

Given the definition of God as a spiritual, rather than a material being, we don't have to ask what caused God. Indeed, given that God is understood to be eternal, He has no beginning. God is not another event in time (to be explained by a previous event) but the creator of all subsequent events, time itself, and even causation.

Although the cosmological argument talks about the physical universe, and draws inferences from its existence, it is not really a synthetic argument. It really boils down to how we define such terms as *cause* and *God*, and is therefore within the realm of the analytic, and should be fairly impervious to the details of recent and future discoveries in astronomy.

Instead of reasoning backwards from the existence of the effect in the physical world, through a long causal chain, back to the assumption of God as an uncaused, first cause in the spiritual realm, perhaps what has really occurred is that people accepted God as an uncaused spirit capable of having effects in the physical realm, and that led to a consciousness of causality. Instead of a knowledge of causation leading us to the existence of God, perhaps the existence of God led us to a knowledge of causation. The existence of God was more of a premise than a conclusion. (Clearly, we did not get a notion of causation from science. Scientific endeavors presume a causal connection between the events of the natural world.)

Some theists like 18th century Anglican Bishop **Paley** assumed that the existence of God could be argued from a more synthetic point of view. Paley suggested a **teleological** argument, based upon the word *telos*, which means purpose or end. We can observe the great design of the natural world and infer that there exists a great designer, God. The structure and apparent organization of the planetary bodies and the intricate structure of physical organs indicates a great purpose behind the grand design. Paley's analogy was this rhetorical question: *if you were walking along a desolate and deserted beach, but found a gold watch in the sand, would you infer that it had simply come together on its own due to the random motion of the waves against the rock and sand, or would you infer that it had been created by a skilled watchmaker?*

This argument is similar to reasoning from the existence of an effect (the great design in the universe) to the existence an essential cause (God), or what Aristotle would call an efficient cause (a conscious agent who put it all together) according to some final cause (an end or purpose).

However, if the design can be explained by another factor, then God is not essential. Given the synthetic nature of the teleological argument, it is more vulnerable to the ebb and flow of scientific theories as competitors for explanations of apparent order in nature. The big challenge in the last century and a half has been Darwinian evolution, which attempts to explain at least the complexity and functionality of physical organs.

But maybe we are using backward thinking again with this argument as well. The teleological argument starts by trying to explain the complexity of the order of the natural world. However, complexity and order are never observed, but merely inferred. Maybe our knowledge of God led us to look for such order in His creation.

Even if we were to accept the theory of evolution as an acceptable explanation for anatomical design, this does not require that we eliminate God from the picture. Many religions (e.g., the Roman Catholic) accept evolution and say that the *Genesis* stories are myths that have to be taken symbolically, and that God merely chose to use the mechanisms of evolution for His creative work.

Indeed, if evolutionists argue against religion, they open themselves up to an interesting contradiction. Since the development of religious consciousness and religious activity in humans is, like all other human mental processes and thought, a product of the forces of natural selection, then religion has helped the human species survive, and we would be going against the process of evolution to deny the force of religion.

Other theists like French mathematician Rene **Descartes** assumed that the question of God's existence was so purely analytic that we could completely ignore the physical universe and just start with the definition of God.

- God is defined as a perfect being
- One of the qualities of perfection is existence
- so therefore, God exists

(This is known as the **ontological** argument for God's existence, proving by definition.)

The first response to the ontological argument that most students have is that it sounds circular, as if we are really assuming what we are trying to prove. So, if we don't know in the first place that God exists, can we really start off saying that he is perfect (given that existence is one of the components of perfection)? Indeed, the way most people hear the argument, the first premise is "God is a perfect being" and most people accept that part before they hear the second part about perfection including existence. That makes Descartes' version akin to the equivocation we heard in the Abbott and Costello routine. We think that *perfection* means one thing in the first premise, and so we agree to it, but then we learn in the second premise that it includes existence.

However, the ontological argument is older than Descartes, going all the way back to **Anselm** a thousand years ago. Anselm spoke of God as a being greater than that's which could not be imagined. That would mean that God was all powerful (**omnipotent**), all knowing (**omniscient**) and purely good (**beneficent**). But such a being existing only in the imagination would not be as great as one that existed in reality. Therefore, God exists in reality.

Many of the modern formulations such as Plantinga's *maximal greatness* and Hartshorne's modalism of *necessary existence* are quite impervious to most objections: they have defined their terms to the point of invulnerability.

Again, the ontological argument may be leading us in the wrong direction when it comes to our perception of perfection and our knowledge of the existence of God. Instead of the ontological argument reasoning backwards from the definition of perfection to the existence of a perfect being, it would be more appropriate to say that our attempt to understand the nature of God led us to contemplate the concept of perfection. The whole concept of perfection is an ideal value, not a physical property. God is not short of perfection, but our knowledge of Him is (as is our knowledge of all things in science as well). The question that remains is: how do we respond to that imperfect knowledge? Theists say we should commit ourselves to know Him better.

The greatest frustration I have with all three of these arguments is that they miss the point about religion as a value-laden set of activities (rituals and ethics) and try to bring it down to the level of acknowledging an equation like $2 + 2 = 4$. When we get to the pearly gates, I don't think that the admissions test for heaven is going to be multiple choice, with those souls demonstrating an academic knowledge for doctrine gaining entrance and those failing being consigned to the flames.

*"At the day of judgment,
we shall not be asked
what we have read,
but what we have done."*

- Thomas A Kempis

Look at these arguments as means to an end. If your goal is to deepen your spiritual life, I doubt they are as effective as other means (e.g., prayer, participation in ritual, following an ethical code). If your goal is to proselytize and convert others, these arguments are generally ineffective. The most effective missionaries in the world, be they Evangelicals, Catholics, Mormons, Jehovah's Witnesses or Muslims, know that what wins converts is witnessing about values and life styles, not the ontological argument.

Atheists (those who deny the existence of any gods) and **agnostics** (those who say we must be doubtful about God because the existence of God cannot be "proved") have developed their own set of arguments.

One is that the very notion of an omnipotent God is self-contradictory. Consider this rhetorical question.

Can God make a rock so heavy he cannot lift it?

Some questions fail in the asking. This is like asking if can you decide that you will not make a decision. That question does not prove the non-existence of free will, but just gets tied up in the meaning of words and loses relevance. The relevant point is: God can make rocks so heavy that His creatures cannot lift them, but more importantly, God can lift up our spirits no matter how heavy they are burdened with the troubles of this world.

A more powerful argument for atheism is that of **theodicy**. It is as old as the ancient Greeks, and is also known as the problem of evil. It works something like this. God is defined as omniscient (all knowing), omnipotent (all powerful) and beneficent (supremely good). Why then is there any evil in the world? God cannot say He is not aware of it (if He is truly omniscient). God cannot say that He

is unable to do anything about it (if He is truly omnipotent). God cannot say that it does not bother Him (if He is truly beneficent). Therefore, an omniscient, omnipotent, beneficent God must not exist.

Most people might respond to this argument with a fatalistic reply about evil: *God wills it*. But this is not an explanation, but an excuse for not having an explanation.

One theistic response is that maybe our experience of evil and suffering is good for us because it so powerfully illustrates good and bad, and helps us grow spiritually. If the world had been made free of suffering, man would have had no motivation to develop either the science to comprehend the world nor the compassion to alleviate its suffering. If the world had been made "evil proof" so that no one could ever do anything wrong, that would have removed the need for ethics. Some religions would then say that we would have no basis for deciding who would get into heaven.

Another response is that evil exists because God has permitted that humans have free will. He allowed Adam and Eve to eat the fruit of the tree of knowledge. He did not prevent Hitler or Stalin or Osama Bin Ladin from doing the evil that their hearts were intent upon. Theists can retort with an interesting rhetorical question: if God is supposed to prevent evil by limiting the free will of humans, are the atheists willing that He start with them, and that their free will be revoked every time they are tempted to commit a sin? Of course, if God totally prevented all exercise of human will contrary to His own will, there would be no atheists to begin with, for all humans would worship God. When God created free will, He gave us creatures the power to sin and the right to doubt. Christian doctrine contends that God has already solved the problem of evil. He sent His Son to die on the cross for human sin.

Some atheists still argue about non-human caused evils such as the suffering brought about by such things as a tsunami, an earthquake, a hurricane, or even the daily physical sufferings that

so many of us endure, or the untimely deaths of our loved ones.

The theistic response is that compared to life eternal in heaven, the physical sufferings of this world are miniscule and fleeting. An even more thoughtful response was offered by British theologian C.S. Lewis. He reflected on his younger years when he too had been a doubter.

"My argument against God was that the universe seemed so cruel and unjust. But how had I gotten this idea of just and unjust? A man does not call a line crooked unless he has some idea of a straight line. ... If the whole universe has no meaning, we should never have found out that it has no meaning; just as if there were no light in the universe and therefore no creatures with eyes, we should never know it was dark."

- C.S. Lewis

The whole idea that real moral evil (not just suffering) exists represents a consciousness of values that Lewis attributed to the awareness of God. Instead of our realization of evil in the world leading us to infer that God must be absent, it was our assumption that there is a God, an absolute value, which enables us to perceive evil in the first place. If there is no God, then there is no evil, only physical pain.

I would go one step further than Lewis. If we recognize evil in the world as a problem (as those who argue theodicy do), then the question becomes, what is the best approach we can take in coping with evil? Perhaps having the support of God, from consolation for daily suffering, to ethical guidance, to a paradise in the hereafter, is part of the solution, not part of the problem. Indeed, if religion can bring about the brotherhood of man under the fatherhood of God, then it might be the best possible response to evil.

"Human reason, without any reference whatsoever to God, is the sole arbiter of truth and falsehood, and of good and evil."

-- proposition condemned by Pope Pius IX, 1867

Wittgenstein was right that all modern philosophy, including logic, boils down to language. Theodicy and the ontological argument show us the limits of linguistic structures for comprehending God and evil.

Although religion uses language, it transcends the limits of language. Religion is all about the value-laden decisions we make. The decision to participate with God is comparable to the decision we make to participate in other activities (e.g., the peace movement, environmental movement, helping the poor). Wherever we take a stand, we commit ourselves to action. We choose to be responsible for the solution in areas in which we were not responsible in terms of causing the problems. Everyday we make a decision to behave as if we have free will, or to behave as if we do not have free will. Likewise, we must decide every day to behave as if God exists, or as if God does not exist.

Ethics

Theology ends with theodicy. Ethics begins with theodicy. Whenever you discover a problem or question about human decisions, you enter the area of ethics.

Ethics requires free will. Without free will, there is no room for ethics. There is no guilt, no blame, only the insanity defense of an irresistible impulse. Determinism focuses on efficient causation: how things happen. Free will focuses on final causation: why things happen. In order to construct scientific explanations, we must

operate as if every action has a cause that can be discovered. In order to construct an ethical system, we must operate as if every action can be influenced by an appeal to a higher motive.

Ethics is critical thinking about morality, rules for right and wrong behavior. Ethics originated in religion, and has been a central component of religion. If there is a moral law giver (God), then we have ethical obligations to follow those laws. However, to say that we sense a moral obligation, and therefore we must accept the existence of a moral law giver sounds like the fallacy of affirming the consequent (if there are other possible sources for ethics).

Some evolutionary theorists have suggested that a moral sense is a product of natural selection: those tribes that had a kind of morality were more likely to survive, reproduce, and have their young survive and reproduce. While most human societies fit this rule, and have developed complex approaches to ethics, there are many examples of where certain groups of people allow and even applaud selfish behavior that hurts the group (e.g., Ik, Dubuans). So, whether ethics can persist in the absence of religion is still a matter of some debate, and will not be resolved here.

The analysis of ethics apart from religion began in ancient Greece. The **Sophists** began attacking ethics rooted in custom and tradition, but they did not present a clear alternative. **Socrates** (469-399 BCE) tried to portray ethics as more than personal choice or convenience. We must use questioning to develop a universal system of ethical guidelines. **Aristotle** (384-322 BCE) gave the matter thorough attention, advising us to pursue virtue through intelligent conduct.

"We ought to desire what is really good for us, and nothing else."

- Aristotle

This almost sounds like the circular reasoning of a tautology: we ought to desire what is good, and what is good is what we ought to desire. At the bare minimum, Aristotle's advice begs the question of what is really good.

David Hume (1711-1766) reminded us that in trying to decide what is really good, we cannot rely upon purely factual information. You cannot derive an **ought** statement from an **is** statement, a **prescriptive** from a purely **descriptive** one.

"There are no moral phenomena, but only a moral interpretation of phenomena."

- Nietzsche

There are two basic approaches to ethical guidelines: deontological and utilitarian. The **deontological** approach is rule based, and more closely tied in with religion and other social traditions. A moral action is one following a set of pre-ordained ethical guidelines (such as the ten commandments of Moses). The Hindu tradition has clearly championed this approach in the *Bhagavad Gita*: what is right is to do your duty (as defined by your caste). This duty focused approach was also advocated by Confucius, who defined duty in terms of non-reciprocal social roles (e.g., father and son). Islamic ethics are firmly deontological. The Islamic tradition holds that human reason is incapable of making correct moral judgments without the guidance of God. In Islam, every human action needs to be classified as fitting into one of five categories.

1. Morally obligatory: something that an individual must do in order to obey God (such as pray five times a day and give alms to the poor)
2. Morally laudable, good, but not obligatory. It was a noble act to free slaves, but it was not considered obligatory in classical Islam.

3. Neutral: matters which could not be called good or evil, and which were therefore permissible.
4. Unapproved, but not prohibited, such as driving a hard bargain in business.
5. Morally prohibited. The Koran is very clear that numerous activities are unacceptable to God: infanticide, gambling, alcohol, usury.

Compared to other major religions, Islam has less elaborate doctrine, but a more comprehensive moral code, the *sharia*, which actually becomes a non-secular legal code in many Islamic nations.

Of post Enlightenment Western philosophers, the clearest formulation of duty based ethics comes from Immanuel **Kant** (1724-1804) who boiled down the central concept of duty to a categorical imperative. In all situations you should act

"As if the maxim of your action were to become by your will a universal law of nature (to be obeyed by everyone)."

- Kant

(that does sound like the Golden Rule) and

"Always treat every human being ... as an end in himself, and never merely as a means to an end."

- Kant

These were the only guidelines he recognized as pertaining in all situations, all times, and all places, and permitting of no exceptions.

The modern deontological approach includes these more elaborate, but flexible approaches:

- establish value hierarchies
- avoid harm to others
- do not violate the rights of others
- be as honest and transparent as feasible
- employ democratic means
- adhere to the rule of law and due process

The alternative approach to ethics is known as **utilitarian**. It has its roots in Greek schools such as the Cyrenaics & Epicureans, but really gained a systematic approach under English philosophers of the Enlightenment, such as Locke, Mill and most importantly, Jeremy **Bentham** (1748-1832). What this approach advocates is the greatest good for the greatest number. In practice, this means attempting to estimate the impact of your actions downstream, how they will affect the next person, and the next generation.

While Kant and Hume would agree that we cannot get a prescriptive ethical statement from descriptive premises. Bentham's approach gives some consideration to synthetic, descriptive premises. The outcomes of our actions are empirically observable (but a prescriptive enthymeme is always present: the greatest good for the greatest number).

Perhaps chapter one left you with the idea that there are three types of claims: analytic, synthetic (descriptive), and prescriptive.

Perhaps we should see synthetic-analytic as one dichotomy, and prescriptive-descriptive as another, so we can see the interaction of these dichotomies in a two-by-two contingency table.

	Descriptive	Prescriptive
Analytic, <i>a priori</i>	Definitions, Math	Deontological ethics
Synthetic, <i>a posteriori</i>	Empirical data	Utilitarian ethics

Kant was able to derive his deontological ethics in a purely a priori fashion, but for Bentham's utilitarianism, we have to estimate the impact of our actions on the real world (i.e., on other people and the environment).

There is more similarity between these systems than there is distance separating them. For the vast majority of actions, both the utilitarian and the deontological approaches would agree that the selfish action is probably wrong and the action that seeks to respect the rights of others is usually right.

The deontological approach is concerned with goodness, but instead of viewing it as a final result to be produced by a series of means and intermediary ends, it assumes that the goodness of God is the foundation for all behavior.

"Happiness is a byproduct, not a goal."

Dennis Prager

The utilitarian approach is not resistant to guidelines for behavior, indeed, guidelines would be in the best interests of all since our ability to estimate the impact of each of our acts is extremely limited.

The ethical process is similar for each of the two main approaches.

- study the details of the case
- apply relevant criteria
- determine courses of action
- decide which is most ethical

Here's how each might approach a difficult case, such as ending the life of someone who is in pain, is totally confused, has no chance for recovery, and is a burden on his family and society at large.

The deontological approach would search for the right rules to guide us, such as *Thou Shalt Not Kill*. Kant's guideline would come into effect here: can a person in that state still be considered an end in himself? Should we have a guideline of prior consent which would enable people to agree to be killed (a sort of assisted suicide) if they reach that point?

The initial utilitarian position is easy to predict: persons in this condition are now obvious burdens to others, and killing them has obvious benefits and no real pains. However, looking further down the road at the impact of such an action, are we comfortable with the chain of events that this might set off, such as killing other burdens: the retarded, disabled, lazy, etc.?

In the end, both approaches would caution against the widespread use of such a policy and suggest some strong guidelines for its employment.

Taken by itself, either ethical guideline has its limitations. At its

extreme, each it is unacceptable, for the utilitarian says *It doesn't matter what you do as long as no one gets hurt* and the deontological approach says *It doesn't matter who gets hurt as long as you follow the rules*. Perhaps both of these criteria need to be factored in and used to set limits on our behavior.

One difficulty with ethical judgments is that the law of bivalence may not apply. We cannot always say that a given action is either totally right or totally wrong. From a utilitarian point of view, the difference in impact between two courses of action may be small or difficult to assess. From a deontological point of view, different courses of action may each violate some ethical constraint, thus putting us in an ethical dilemma of having conflicting duties.

Since ethical questions do not have one clear guideline for their resolution, therefore, we need deliberation, discussion, dialog, debate, in order to avoid some of the most common errors of ethical decision making:

- ethnocentrism: the ethics of my people (ethnic group, culture, religion) is better
- double standard: this is what is permissible for me, but not for other people

Although human reason alone is not sufficient for ethical deliberation, cognitive psychologists such as Lawrence **Kohlberg** have shown that as our capacity to reason grows, our ethical choices get better (or at least, more complex).

But more than most kinds of critical thinking, ethical decisions require a dialog. This is most obvious with utilitarian ethics: we don't know of the impact of our actions upon others until we hear from others. If we have a deontological approach, then we have an analytic approach emphasizing definitions. We must make sure that our definitions are not stipulative or idiosyncratic.

WRITE IT RIGHT

Many people, including both theists and atheists, use terms like *faith* and *belief* when referring to religion, but the terms are so vague, very little understanding takes place. An atheist seems to be using these terms as if they were mere foolishness and gullibility: accepting a proposition as true in the absence of any proof. Theists are using an entirely different understanding of *faith*: a trusting, committed relationship. It turns out that the theists are closer to the etymological meaning of *faith*. The term was *pistis* in Greek and *fides* in Latin, and would be best translated as *loyalty*. Even at the time of Shakespeare, *faith* described a trusting, committed relationship (faithfulness). About that time, King James authorized a Protestant translation of the Bible into English. It used the terms *faith* and *belief* copiously, and led to the sort of confusion cited above.

You may have noticed my limited use of the verb *to believe* and the noun *belief*. Specifically, I resisted referring to doctrines about deities as *belief* in God, and I did not refer to ethics as *beliefs*. That is because I see the term as highly ambiguous. What does it mean to say *I believe*?

ACCEPTANCE OF A FACT

- *that Columbus voyaged to the Western Hemisphere in 1492.*
- *that it rained yesterday.*

ESTIMATE OF A CERTAIN LEVEL

- *that it is now 68 degrees in this room.*
- *that it rained half an inch.*

PREDICTION OF A FUTURE STATE

- *that it will rain tomorrow.*

CAUSAL INFERENCE IN THE FORM OF SPECULATION

- *that the rain will cause a flood.*

GENERALIZATION

- *that rainfall is more irregular nowadays.*

VALUE STATEMENT

- *that rain is good.*

I prefer to confine the terms *believe* and *belief* to synthetic statements rather than the acceptance of definitions, doctrines, value hierarchies or ethics.

Some relativists want to accept all *beliefs* as *valid*. I see this as a real problem for many reasons.

1. Some *beliefs* are immoral:

- the Crusades
- the Holocaust
- al Qaeda

2. Some *beliefs* are unscientific:

I believe that the earth is flat.

3. Some *beliefs* are illogical.

I believe in square triangles.

Maybe we should add one more *belief* for the relativists: *the belief that all beliefs are valid*. Do you see a paradox coming? That statement is reflexive, commenting on its own truth, perhaps by being forced to accept its own refutation. Is it self-contradictory? Suppose I say

I believe that that statement is not true.

Such a statement must also be valid, and would contradict the first statement, that all *beliefs* are *valid*.

Here is my suggestion for a more fruitful dialog. Realize that religion is not about *beliefs* and not about determining their *validity* in the same way that we would for a mathematical equation or scientific hypothesis.

Religion is a system of doctrines, ethics, rituals, myths, and symbols for the expression of ultimate relevance. It is that last word, **relevance**, that identifies what religion is really about *truth* in the form of values (not validity). There is no relevance without a value or a threat to a value.

Instead of referring to religious doctrines as *beliefs*, realize that one chooses to accept (or not accept) doctrinal statements about deities, salvation and afterlife.

Instead of referring to ethics as *beliefs*, realize that one chooses to follow (or not follow) a certain ethical guideline.

Instead of referring to rituals as *beliefs*, realize that one chooses to engage (or not engage) in these ceremonies.

Instead of referring to myths as *beliefs*, realize that one chooses to retell (or not retell) these stories about the past because these stories are so laden with values.

Instead of referring to symbols as *beliefs*, realize that one chooses to revere (or not revere) these emblems evoking values.

Instead of using the vaguest of modern terms, *faith*, to describe any aspect of religion, consider rephrasing with a precisifying term like **denomination** (for affiliation), **commitment** (for religiosity) or **doctrine** (for a theological formulation).

WRONG: John is a member of the Catholic faith.

RIGHT: John is a member of the Catholic denomination.

WRONG: Sara prayed and her faith increased.

RIGHT: Sara prayed and her commitment increased.

WRONG: The Trinity is a part of Christian faith.

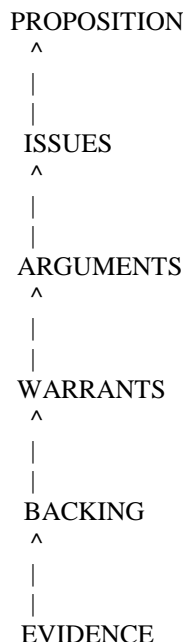
RIGHT: The Trinity is part of Christian doctrine.

CHAPTER SIX:

PROPOSITIONS, PROOF & FALLACIES

Propositions

When a formal debate takes place, it focuses on a specific **proposition**. The proposition (also known as the **resolution**) is the big point (the topic of the debate) that all the little arguments are about. Between the little individual arguments and the big proposition there are the intermediary **issues**. Think of the issues as the key points identified by the proposition. Many a debate has been lost, not because of a preponderance of evidence on one side, but because one side was not clear in how the issues linked to the proposition. The arguments support the issues and the issues support the proposition. The proposition requires the support of issues, the issues require the support of arguments (and the arguments require **warrants**, and the warrants require backing).



WRITE IT RIGHT

The previous page gave the proper definition of the term *issues* for this course. Over the past ten years there has emerged a tendency to use the term *issue* to describe any kind of problem. It began in counseling where it was used as a euphemism for a psychological complex (e.g., “he has issues with his mother”). Now the term is sometimes used to describe computer glitches and traffic jams. In this class, confine the use of *issues* to these elements of argument found in discussion and debate.

By looking at the proposition we should be able to infer which points are **topical** (pertinent to the proposition being debated). An **extratopical** point is an attempt by either side to divert the debate to some other issue not central to the resolution of the topic before us.

Traditionally, the resolution comes more as a statement than as a question, and the debate proceeds with one side (the **affirmative**) supporting the resolution and the other side (the **negative**) arguing against the resolution. There are several different types of resolutions, each with its own type of claims and evidence.

Propositions of fact just ask *what is true* in a descriptive sense. They are principally within the realm of science. Here are examples of propositions of fact.

- Resolved that Nevada is the fastest growing state.
- Resolved that a trend of accelerated global warming is taking place.
- Resolved that there is life on the planet Mars.

RESOLUTION	CLAIMS	COMPONENT	CHANGE	ISSUES	PRESUMPTION	EVIDENCE
Fact	Synthetic	Cognitive	Belief	Data & interpretation	Null hypothesis	Statistics Experiments
Definition	Analytic	Cognitive	Acceptance	Categories & language	Tradition Consensus	Authority Poll
Value	Prescriptive	Affect	Priorities	Value hierarchies Criteria	Tradition Authority	Analogy
Theology	Prescriptive Analytic	Affect & cognition	Acceptance	Deities, salvation, afterlife	Tradition Agnosticism	Revelation
Ethics	Prescriptive Descriptive?	Affect, Cognition, Behavior	Action	Guidelines	Liberty Prudence	Authority Analogy Statistics?
Policy	Prescriptive Analytic Synthetic	Behavior	Action	Need Plan & Advantages	Status Quo	Experts Statistics Experiments
Criminal	Analytic Synthetic	Cognitive	Action	Guilt Insanity	Innocence Reasonable doubt	Witness Physical
Civil	Prescriptive Analytic Synthetic	Affective	Action	Damage Responsibility	Not liable	Witness Expert Statistics

Most **factual propositions** take less time to discuss and resolve than do other debate topics, because they are more "cut and dried." The focus in most factual debates is on the kind of evidence coming from statistics (or better yet, experiments, if they are available). But frequently the statements of authorities in the field (**experts**) are used to present a summary of the data, or to make sure that our interpretation of the data is correct. Just who is an authority depends upon the topic in question. On the first factual resolution (i.e., Nevada) it would be an expert in demography, perhaps someone associated with the office of the census. In the second resolution (i.e., global warming), an expert would be a climatologist or meteorologist. In the third resolution (i.e., Mars), the expert would be someone associated with the sciences of biology or astronomy, or perhaps with space travel.

Definitional propositions boil down to the best definition of a word. Here are examples of definitional propositions.

- Resolved that computers be defined as devices for the input, storage, manipulation, and output of data.
- Resolved that aerobics should be defined as a sport.
- Resolved that planets should be defined as quasi-spherical bodies, at least a tenth the diameter of the earth, maintaining an orbit around the sun.

Unless we are working at a company that publishes dictionaries, purely definitional debates are pretty rare. Frequently, the biggest debates on definitional propositions occur within a larger public policy or legal arena, and the major issues within a definitional change are what impact the change would have. *If we define skateboards as vehicles, what will be the effect of extending the laws?* However, all resolutions require some reflection on the definitions involved because all resolutions use words. If you go back to the resolutions introduced as examples of fact, you can see that each of them requires some key terms defined.

Resolved that Nevada is the fastest growing state.

Need to define: "fastest growing" as meaning net increase of population or percentage increase

Resolved that a trend of accelerated global warming is taking place.

Need to define: "trend" as indicating a pattern differing significantly from normal variation as seen over a period of several thousand years

Resolved that there is life on the planet Mars.

Need to define: "life" as animal, plant, or microbial forms

Propositions of **value** ask *what is really good* and are principally within the realm of axiology. Here are examples of propositions of value.

- Resolved that chocolate is better than vanilla.
- Resolved that San Francisco is a more beautiful city than New York.
- Resolved that Shakespeare was the most talented poet in the history of the English language.

These propositions are sometimes called matters of taste or personal preference because the standards for judging are less precise, and vary more from individual to individual or time to time. The most difficult task is to establish the criteria (the issues). In the case of the first resolution, it is probably simple gustatory appeal. In the second resolution, we will probably hear a listing of the beautiful sights in each city, and then try to prioritize whether buildings or natural scenery is more important. The third resolution will probably focus on the standards for judging that a poet is "talented." We tend to hear more analogies in resolutions of value than we will in purely factual propositions.

Theological propositions are actually combinations of definitional and values claims, but they are focused on issues of doctrine (claims about deities, salvation and afterlife).

- Resolved that God is in the form of three co-equal and co-eternal persons, the Father, the Son and the Holy Spirit. (Christian)
- Resolved that after death, the human soul is reincarnated into other physical bodies according to the individual's conduct in the previous life. (Hindu)

- Resolved that Jesus will come again and establish a millennial kingdom for 144,000. (Jehovah's Witness)

Most theological discussions are (and should be) impervious to factual evidence. The familiar structure of the Trinity cannot be confirmed in a DNA lab. Heaven cannot be seen with a telescope. Reincarnation cannot be proved by fantasies of *deja vu*. The Jehovah's Witnesses may have slipped when they said that the millennial kingdom would occur by 1914. Otherwise, theological debates are largely about which values that we choose, and if these models of deities and afterlife are consistent with what we have from previous revelations (e.g., scripture, tradition).

Ethical propositions focus on whether specific actions can be justified as right or criticized as wrong. Here are examples of ethical topics.

- Resolved that premarital sex is wrong.
- Resolved that a minimum of a tenth of our income be given to charity.
- Resolved that eating warm blooded animals is wrong.

These topics call for a change in behavior: action (e.g., don't have sex before marriage, give more money, stop eating meat) not just an acknowledgement of facts or values. The main issue is always the values hierarchy to be applied to the specific behaviors in question. The main support for arguments within these propositions is the analogy. *Since we know that killing other people is wrong, killing a turkey or a cow would be wrong.* In the case of **deontological** ethics, the resolutions may encompass definitional, values,

and theological components (e.g., premarital sex is wrong because it is a sin). In the case of **utilitarian** ethics, the resolutions may encompass facts about probable outcomes, along with definitions and values (e.g., premarital sex is wrong because it leads to risks of pregnancy and disease).

Policy propositions are those usually found in formal debates. They call for a change in public policy, away from the **status quo** (present system) and to adopt a plan that embodies a new way of doing things. Here are examples of policy resolutions.

- Resolved that the federal government should establish a comprehensive system of health care for all residents.
- Resolved that the United States should negotiate a free trade agreement with Cuba.
- Resolved that the cultivation, processing, transportation, possession, and use of marijuana should be legal.

These resolutions are a blend of facts, definitions, values, and ethics. For example, we would have to define key terms such as *comprehensive* or *free trade* in the first two resolutions. In the last topic, we would have to clarify if *use of marijuana should be legal* would imply that people should be able to smoke it anywhere, including those areas where smoking (of tobacco) is currently prohibited. The issues for these propositions are quite complex, and will be discussed in the last chapter.

There are several types of **legal** topics. Criminal trials focus on the guilt or innocence of an individual. The debate is between the prosecution (usually the district attorney) who tries to show that there is sufficient evidence and argument

to convict the accused individual, and the defense (which may be a public defender, a high priced legal firm, or the accused defending himself without legal counsel). The issues are based in definitions (of the law) and the facts (of what happened) and focus on was a crime committed, and if so, was it the defendant who did it? **Insanity** is not a psychiatric diagnosis, but a legal judgment that an individual should not be held criminally responsible for his actions. This type of evidence includes the testimony of witnesses who may have seen or heard something pertinent, and then the physical ("circumstantial") evidence from the crime scene.

Civil trials are usually **torts**: claims of damages and responsibilities for those damages. In addition to factual and definitional evidence, there is also the admixture of values, especially the need to quantify damages (pain, suffering, loss of reputation) into a compensatory amount of money.

Audience

Debates take place in front of an audience. Political campaigns take place before an electorate. Advertising is pitched to a potential marketplace. In other words, the **audience** is constituted by the people that we are trying to convince about the proposition or argument.

"Of the three elements in speech making: speaker, subject, and person addressed, it is the last one, the hearer that determines the speech's end and object."

- Aristotle

When can an argument be said to have been successfully proved? The answer is that it depends upon the audience.

The audience can be described as whom the argument intends to convince. It may be composed of readers of a newspaper editorial, listeners to a radio talk show, viewers of a television program, visitors to a website, or the panel of judges at a formal debate.

This process is known as persuasion. **Persuasion** is the attempt by a speaker or writer to get the audience to accept (or identify with) a particular point of view. Audiences differ greatly, so what it takes to persuade them will also differ.

Just as marketers profile consumers in order to determine which niche to target with advertising for products, so we must profile the audience who will hear our arguments to determine the message that will be most convincing.

Aristotle (389-322 BCE) first suggested a rule of thumb based upon the age of the audience. He suggested that the young too readily had their passions inflamed; the old were too stubborn to consider change; and that it was adults in the prime of life who are the best candidates to be convinced by reason. Modern marketing research seems to confirm this, especially with respect to the middle aged "Baby Boom" generation who are some of history's most sophisticated consumers. To market effectively to them, the key is good copy writing and addressing issues that less sophisticated ages may not think of (e.g., the cost of ink replacement cartridges in owning a printer). Political consultants tailor their candidate's message to match the concerns, personalities, and demographic variables (e.g., geography, gender, social class) of potential voters. An audience analysis should strive to know their values hierarchy, knowledge of the facts, and powers of analysis. People with a vested interest (financial or political or religious) have a resistance to anything that threatens their interest.

"Man prefers to believe what he prefers to be true."

- Francis Bacon

"There is no way of proving your point to someone whose income or position depends upon believing the contrary."

- Sidney J. Harris

People with little education or a limited professional perspective will be less knowledgeable about, and less capable of understanding certain issues.

"The layman's constitutional view is that what he likes is constitutional and that which he doesn't like is unconstitutional."

- Supreme Court Justice Hugo Black

The less sophisticated the audience, the simpler the vocabulary and the shorter the sentences (e.g., always try to stay under a dozen words).

Burden of Proof

Since it is the audience that must be convinced, it is the audience that sets the de facto **burden of proof**. This is the level of proof that the advocate of an argument must meet before we can say that he has succeeded in proving his point and winning the argument or the entire debate. In general, the more that the argument is consistent with the audience's knowledge and world view, the easier the burden

of proof. A corollary of this is that the more that the argument exceeds the audience's knowledge and/or powers of analysis, the higher the burden of proof.

"It is a sickness natural to man to believe that he possesses truth directly; and from that comes the fact that he is always ready to deny everything that is incomprehensible to him."

- Blaise Pascal, 1645

The side of the argument that does not have the burden of proof has the advantage of **presumption**. In practice, presumption is where the audience starts at (and remains until a burden of proof is met and the verdict changes). The side with the burden of proof must construct a **prima facie case**, the bare minimum that it would take to overcome presumption (even assuming that the opponents of the argument did nothing to challenge what the proponents said).

The burden of proof boils down to the question of what happens when there is not sufficient backing to prove anything. This is not like a soccer match where we call it a zero-zero tie. This is not like a baseball game where it goes into extra innings until one side scores. If the side with the burden of proof has not presented a prima facie case, the side with presumption wins. The nature of the burden of proof and presumption depends upon the proposition being debated.

On factual propositions the burden of proof lies with the side asserting a new fact, or relationship between facts (e.g., a causal hypothesis). Presumption rests with what is called the **null hypothesis** (which states that any observed instances must be attributed to random variation, pure chance). So, if

the affirmative team argued that a trend of global warming exists because the average temperature during each of the last three decades was hotter than the previous decade, the negative team could point out that these data are not statistically significant because over the course of many centuries, the trend of three successive decades of warming temperature is commonly seen (due to random variation). Part of a prima facie case on factual propositions is usually a statistical analysis to show that the probability of random variation accounting for the data is so low (usually less than .05) that we should reject that explanation and accept the alternative that a real trend (or causal relationship) does exist.

On propositions of definition, value, and theology, most audiences operate as if presumption lay with tradition, and the burden of proof was upon the side that advocated a new definition, a change in values, or a new theological formulation. The predilection is that when there is no need for change, there is a need for not changing. Arguments in this field of value laden ideas are known as **polemics**. The branch of theology devoted to the defense of one's doctrines is called **apologetics**.

On theological matters, some people assume that presumption lies with the doubting position of agnosticism: that in the absence of a prima facie case for God's existence, we should simply doubt. Most people are religious and assume that presumption should rest with tradition: the acceptance of God. This disagreement about the nature of presumption and burden of proof has made many theological debates frustrating. Exchanges such as the following are common.

AGNOSTIC: "I'm still not convinced by the ontological argument. I still have my doubts that you proved God exists."

THEIST: *"Well, I have my doubts about your theodicy argument. You have not proved that God does not exist."*

AGNOSTIC: *"OK, so neither one of us has overwhelming proof, so we should just continue to doubt God's existence. We should just be agnostics until we get better proof."*

THEIST: *"uh UH, if neither one of us has overwhelming proof, we should just continue to worship God. If we wait until we die or until Jesus comes again, it will be too late!"*

In such cases, perhaps the entire debate format is inappropriate. In chapter ten we shall see an alternative approach, the dialog.

On ethical propositions there are two different approaches to presumption. One says that our starting point should be prudence. In other words, any proposition that seeks to loosen human behavior should meet a burden of proof, and if a prima facie case is not established, and we end with doubt, we should err on the side of caution and not allow ourselves to do that which is of questionable morality. The other approach says that our starting point of presumption should be liberty. Any proposition that seeks to limit human behavior should meet a burden of proof, and if a prima facie case is not established, and we end with doubt, we should not constrain freedom.

In formal debate on policy issues the burden of proof theoretically goes to the side advocating a change from the **status quo** (present system of doing things). Since resolutions are customarily phrased in order to advocate a change, the burden of proof falls upon the affirmative team and it is the negative team that has presumption. The prima facie case of the affirmative must be to show a need for

change, a workable plan by which the change can be accomplished, and that the adoption of the plan would be, on balance, beneficial (i.e., that the plan would solve the problems for which it was created without bringing about too many new problems in the process). We will examine these issues more thoroughly in chapter ten.

For now, let's give our attention to one argument frequently (perhaps excessively) used in such debates. It is sometimes called the **appeal to ignorance**. This is saying *Well, my point stands because no one has proved to the contrary*. A lack of evidence on either side does not prove the points of the side that first mentioned the lack of evidence. The lack of evidence proves nothing. The real question that remains in such cases is: who has the burden of proof?

In the U.S. and British systems of criminal justice, the burden of proof rests on the prosecution. The defendant starts off with a presumption of innocence. In order to overcome that presumption, the prosecution must present a prima facie case showing that a criminal act has occurred, and that the defendant committed that act. The defense may attack either of those points. For example, in a murder trial the defense may question whether a murder has even taken place. Perhaps there is no body to indicate that the victim is really dead (and not just missing). Perhaps the defense will argue that the homicide was justifiable (e.g., George Zimmerman's defense in his trial for the murder of Trayvon Martin). Usually the defense focuses its arguments on the issue of guilt, trying to establish an alibi (to show that the defendant was not available to commit the crime at that point in time) or an alternative scenario of who the real culprits might be.

In the U.S. criminal justice system, the prosecution has a very high burden of proof: beyond a reasonable doubt. This is why some American defense attorneys do not even bother

to put on an elaborate case, but merely question whether the prosecution has put forth a prima facie case, and many times this is sufficient to have the judge dismiss the case at that point. Combined with a jury system in which the audience making the decision is not composed of experts on either testimony or scientific evidence, we can begin to understand some of the verdicts in celebrity trials. In O.J. Simpson's murder trial, the jury could not understand the power of DNA evidence, but the standard of proof had been clarified by closing defense attorney Johnny Cochran: *If the gloves don't fit, you must acquit*. In the wake of such trials, many judges are now issuing clarifying instructions about the nature of burden of proof, presumption, prima facie case, and reasonable doubt. For example, one judge told the jury *If you were told that the real killers were space aliens who came down, killed the victim and escaped in their spaceship without anyone else seeing them, that doubt would be a little beyond the reasonable*.

Although the reasonable doubt standard used in the American criminal justice system is evolving, it still rests upon a tradition, and that tradition is not universal. In France, for example, someone arrested for a crime is guaranteed a trial (in front of a panel of judges, not a jury) and the presumption is one of guilt, not of innocence. In other words, it is the accused who must present a prima facie case in order to meet the burden of proof.

Even in U.S. civil cases (e.g., torts) where the burden of proof is on the one bringing the claim (the plaintiff) the prima facie case does not have to overcome a reasonable doubt: preponderance of the evidence is all that is required.

Skepticism is an approach in philosophy that says that knowledge isn't knowledge unless it is beyond any possibility of doubt. This is a more rigorous standard than the *reasonable doubt* standard of American jurisprudence. A

skeptical audience imposes such a presumption that a prima facie case may be impossible.

One ancient philosopher named **Zeno** was extremely skeptical about the existence of the physical world. He contended that things such as perceived motion were mere illusions. He tried to rely upon his powers of reasoning to create doubts. For example, he presented the story of Achilles and the tortoise. All the Greeks knew of the great athlete Achilles, who was very fast, but Zeno said that even the fastest person could never catch and pass the slowest of the creatures, a tortoise.

Imagine that we give the tortoise a hundred yards head start, and then allow the fleet Achilles to start. He will cover ten yards a second, and the tortoise only one. At the end of ten seconds, Achilles has covered the entire hundred yards, but wait, he has still not caught the tortoise, for the tortoise has gone ten yards between from where it started. Well, no problem for Achilles, he can cover that ten yards in just a second, but wait, he has still not yet caught the tortoise, who has now advanced yet another yard. Achilles can cover the extra distance in a tenth of a second, but in that time, the turtle has advanced another tenth of a yard. So, according to Zeno, Achilles can never catch the tortoise.

Now, of course, we could watch the race and we would actually see Achilles catching and passing the tortoise just before the 112 yard line, but because it would be logically impossible, Zeno would tell us that our eyes are deceiving us, and therefore, physical reality is just an illusion.

Wisdom is a balance between knowledge and doubt. In practice, we must make decisions, we must seek means for ends, and therefore we must choose and we must act. If Achilles doesn't start running until he has a good refutation for Zeno, Achilles will never catch the tortoise. Achilles only wins the race by running.

Refutation

Refutation is the process of attacking the argument or the opposition's entire case behind the proposition. The noun refutation comes from the verb to refute. An argument can be refuted in several ways, by attacking the facts of the premise or the warrant linking the premise to the conclusion.

Some arguments are self-refuting. In the first chapter we looked at reflexive statements that were paradoxical (i.e., that challenged themselves). Some arguments seem to refute themselves with premises that violate their own apparent conclusion.

- I am the most humble person around, so much so, that I may justly brag about it.
- I am remaining silent, and I shall continue to repeat that.
- It is so crowded that no one goes there anymore.
- The most important guideline for success is never to disclose your most important guideline for success.
- "I can't speak a word of English" he said with perfect pronunciation.
- *"I am still an atheist, thank God."*
- Luis Bunuel
- *"If a man is the ultimate creator, the one who values, then the worst of all crimes is the acceptance of the opinions of others."*
- Objectivist Ayn Rand

The fatal flaw of Rand's argument is that she is telling people to accept her "opinion," and anyone who accepts her view would therefore be condemned by that same view.

Some arguments are so elaborate that one part refutes the others. A neighbor borrowed a lawn mower and returned it with a broken handle. When asked about this he responded.

I have three points to prove that I am innocent.

- First, I never borrowed it.
- Second, it was broken when you gave it to me.
- Third, it was still fine when I returned it.

Other arguments refute themselves because they call for us to do something impossible given the limits of the order of time or location.

- If you do not get this message, let me know.
- *"See places that no longer exist."*
- Travel Ad
- *"Always go to other people's funerals; otherwise, they won't go to yours."*
- Yogi Berra
- Today, the hundred years war began. (How does the writer know that it will last a hundred years?)
- The secret to making money in the stock market is to buy a stock, wait for it to go up and then sell it. If it doesn't go up, don't buy it.

- I'll wait and start when I am finished.
- *"1. The new jail will be built on the site of the old jail, using the materials of the old jail. 2. The old jail will be used until the new jail is finished."*
- Canton city Council resolution
- *"If the rich could hire others to die for them, the poor could make a nice living."*
- Yiddish proverb
- Your impatience is unbearable. I'll be ready in five minutes, just like I have been telling you for over half an hour.
- *"P.S. I was going to send you some money, but I had already sealed the envelope."*
- a mother's letter to her son away at college
- *"All appointments will be made during office hours. All office hours will be by appointment only."*
- sign on a professor's office
- If you have any problems on the internet, send us an email.

Another variation on this theme of self-refuting arguments comes in the form of people's deathbed statements.

"Get out of here and leave me alone. Last words are for fools who haven't said enough already."

- Karl Marx

And then Marx died, with those being his last words, having admitted that he was a fool who had not fully expressed himself in his writings.

THINK ABOUT IT

Is this argument self-refuting?

Democracy is the best form of government. If it ever ceases to be the best form of government, then people can vote to end democracy and institute some other form of government.

One other time based refutation of an argument is to show that it is a moot point. A **moot point** is one that has become irrelevant, because the value can no longer be actualized, or the issue is now only hypothetical. The decision would not make any difference. Moot questions may have an answer, but they are not necessarily worth finding it out. Here are some examples of moot points.

- *Instead of going to Europe, and spending all your money, you should have gone to Latin America where the dollar goes farther. WHY IT IS MOOT: You already went and spent my money, and cannot afford to go to Latin America now.*
- *We are going to retry the case of Socrates to see if he was really guilty. WHY IT IS MOOT: Too late, he was already executed 2,300 years ago.*
- *What are you going to major in when you enroll in Stanford? WHY IT IS MOOT: You didn't get into Stanford.*

Imagine a fictional debate among the mayoral candidates from the four main political parties in Acapulco. They are

deeply divided on one issue concerning endangered species in the Bay.

The candidate of the Socialist Convergence Party says: "I cannot save every penguin in the Bay."

The candidate of the Revolutionary Democratic Party says: "I will not try to save any penguins in the Bay."

The candidate of the Trotskyite Workers Party says: "I shall leave no penguin in our bay unsaved."

The candidate of the Institutional Revolutionary Party says: "The voters of Acapulco have more important concerns."

All spoke the truth in this fictionalized example.

WHY IT IS MOOT: There are no penguins in Acapulco Bay.

Another flaw of irrelevancy in arguments is that some are **non-sequiturs**. To put this in Toulmin's terms, there is no warrant linking the premise to the conclusion. The conclusion simply does "not follow" (which in Latin is *non sequitur*) from the premise.

- I shall write this slowly because I know you cannot read very fast.
- It takes three or four miles, depending upon the traffic.
- I fooled those gouging oil companies. They keep raising the price of gasoline but I still only put in \$20 dollars worth of gas in my tank.

- Could leap year be switched from Feb 29 to June 31 so we could have one more day of summer and one less day of winter?

Many people would look at the argument

Vote for Hillary Clinton (conclusion) because she is a woman (premise).

as a non-sequitur because they would not be convinced that there is a sufficient warrant linking these two statements.

Non-sequiturs frequently occur on issues of policy or values, if premises are purely factual (descriptive) and the conclusion deals with values (prescriptive). When premises are descriptive, a prescriptive conclusion is a non sequitur, as David **Hume** reminded us over two centuries ago.

Since abortion entails killing the fetus (premise), therefore, abortion is wrong (conclusion).

This argument needs something linking the two statements, something like

The fetus is a person, and an innocent one at that, and deliberately killing an innocent person is murder, and murder is wrong.

Until we stated the last word of the above warrant, we had not linked the string of facts and definitions to anything in the world of values (normative, prescriptive statements).

Some debates about arguments have questionable relevance because they have an argument that is so structured as to be true regardless of the truth of the premises. Such an argument is known as a tautology, and it is similar to the idea of a reflexive statement that is internally consistent and supportive. A **tautology** is true by definition, or at least assumes what it is trying to prove, so that the conclusion also supports the premises.

God exists because the Bible (the word of God) says so.

"You can observe a lot by watching."

- Yogi Berra

"The president (Bill Clinton) has kept all the promises he intended to keep."

-George Stephanopolous

"Darwinian theory is tautological. What survives is fit; what is fit survives."

- George Gilder

Not all tautologies are so obvious. Consider this famous dictum usually touted as a great proof.

"I doubt therefore I am"

- Descartes

Here Descartes actually assumes what he is attempting to

prove. If he does not exist, he cannot doubt. Perhaps we should require him to prove that he exists before we take his doubts seriously.

There is no self-refutation in tautologies: just the opposite. However, neither is there any external support beyond the conceptual system of the starting point.

Mathematician Kurt **Goedel** (1906-1978) pointed out that this limitation was to be found in all mathematical and philosophical systems. In any formal system there is a formula such that neither it nor its negation is derivable from the axioms of the system. In other words, every logical system, including mathematics, is dependent on premises that it cannot prove and cannot be demonstrated within the system itself, or be reduced to it. Therefore, no theory, model, or theology should be criticized for starting with unproved assumptions, but only for persisting after those assumptions have been disproved.

Proof & Fallacies

Whether or not something is effective as proof, or whether it should be regarded as a fallacy often depends on how something is done. **Fallacies** are flawed attempts at reasoning. They do not follow the cognitive guidelines of logic. Even fallacies can be effective, with the right audience, but we should think twice before using them, lest we get a tarnished reputation for trickery.

While the specific techniques of proving a point will differ by audience and by the type of proposition, there are some general rules about what types of evidence are best. For propositions involving definition or value claims (e.g., deontological ethics, theology) I would quote a **credible source**, someone that the audience will accept as an expert

(and whose values are acceptable to the audience). I would quote the New Testament to Evangelical Christians; the Talmud and the Torah to a Jewish audience; the Book of Mormon to Latter Day Saints; Popes, Augustine and Aquinas to a Catholic audience; and former Supreme Court Justices to a legal audience. Concerning those propositions involving fact (e.g., policy, utilitarian ethics) I would cite experiments and statistics. Credible sources would be experts who were both knowledgeable and whose integrity was above reproach.

Unfortunately, much of the proof cited in debates leaves much to be desired. Either it is barely adequate or downright fallacious.

Introspection literally means looking within and refers to a process of self-reflection: examining one's own thoughts, feelings, and actions. Here are some examples of introspection.

Proposition of Fact: Is it hot today? I feel warm, therefore it is hot.

Proposition of Definition: What is fairness? As a landlord, I think of fairness as getting the rent paid in full, on time, as long as the house is maintained.

Proposition of Value: What is more important: national security or privacy? I want national security. I don't need privacy. I have nothing to hide.

Proposition of Policy: Should the U.S. adopt a system of national healthcare? No, I'm satisfied with my doctor.

Most of us are just too close to one aspect of the problem in order to comprehend the big picture. If you want to study water, don't ask a goldfish.

The use of such introspective evidence may even fail as a prima facie case. It even falls to subjectivistic refutation such as *that's just your opinion and it may be true for you, but it is not true for everyone.*

One form of introspection is where we justify our choices.

I am a fan of the Cubs, therefore, they are the best team.

I am a Methodist, therefore, it is the best church.

I am a Democrat, therefore, that party's policies are right.

I am an American, therefore, we are the good guys.

I am a bartender, therefore, it must be an honorable occupation.

I am married to Joan, therefore, she must be a good wife.

I live in Cleveland, therefore, it must be a nice city.

The enthymeme is always: *I would not choose something bad.* People who engage in such thought tend to be happier, because they are not discontent with their choices, but this is hardly objective proof for the conclusions.

Sir Francis **Bacon** (1561-1626) the philosophical father of modern science, noted several problems of reasoning that stood in the way of the development of modern science. People assume that truth is entirely inside themselves and not dependent upon objective observation of the external world. Each person lives in his own cave, so to speak, with his unique biases and frames of reference.

Another difficulty with introspection is that the observer is the observed. You have to think about what you are thinking about. This process of observation changes the process being observed. Knowing that I am self-reflecting changes the material that I reflect on.

Although introspection was the principal method of research among the earliest psychologists (including Wundt, James, and Freud) there arose a great distrust in the method, beginning with the behaviorist John **Watson** and the neuroscientist Santiago Ramon y Cajal.

"The unique method of reflection ... involves exploring one's own mind or soul to discover universal laws and solutions to the great secrets of life. Today, this approach can only generate feelings of sorrow and compassion - - the latter because of the time wasted in the pursuit of chimeras, and the former because of all the time and work so pitifully squandered. The history of civilization proves beyond doubt just how sterile the repeated attempts of metaphysics to guess at nature's laws have been. Instead, there is every reason to believe that when human intellect ignores reality and concentrates within, it can no longer explain the simplest inner workings of life's machinery or of the world around us."

- Santiago Ramon y Cajal

So, introspection is generally considered to among the weakest forms of evidence. I would temper that judgment by saying that it is an acceptable starting point, but it should never be the end point of your search for evidence.

Another form of evidence would be a specific example illustrating a point. Examples may come in the form of vignettes or **anecdotes**. Historians assemble biographies while physicians and psychologists do clinical case studies.

The biggest problem with examples is that they can lead to the fallacy of **hasty generalization**: coming to a sweeping conclusion on the basis of a handful of isolated (and perhaps overly emotionalized) examples. An argument supported solely by examples is easily refuted by calls for more examples and questions about the typicality of the examples. As the number and representativeness of those examples increases, we move into the type of scientific evidence discussed in chapter eight (statistics and experiments).

Perhaps the worst type of hasty generalization would be the stereotypes used in hate speech. **Stereotypes** are overgeneralizations that are said to apply to all persons in a certain category. Some stereotypes are favorable, but most are not, leading only to prejudice, discrimination, and scapegoating.

Another problem with examples is that their very presentation is so qualitative, that they are vulnerable to bias. Case studies are barely more objective than introspection. The person constructing the case has his own set of biases that influence not only the writing of the case, but the very search for the information going into the case. Take two different biographers of Joseph Smith (founder of the Church of Jesus Christ of Latter Day Saints), and have one be a Mormon and one be an Evangelical Christian, and you will see two drastically different portraits emerge of the same man.

My judgment on case studies is that, like introspection, they really don't meet the burden of proof for most propositions. They are useful for illustrating a point, and with many audiences that might be essential, especially on propositions of value, ethical issues, or American juries. However, examples alone are not adequate proof for most purposes.

The analogy often serves as evidence, but it is really more of a warrant for an example. The **analogy** is based upon the reasoning that because two things are similar in several aspects, they are similar in some further aspect (leading to the truth of a claim). Here are some examples of analogies

Proposition of Fact: Is it hot today? As the water in a kettle heats up the longer it has been on the burner, so the longer the sun is in the sky, the hotter it gets.

Proposition of Definition: What is fairness? Fairness is to justice what determination is to an athlete: something essential that must never be lost.

Proposition of Value: What is more important: national security or privacy? As I build stronger walls around my house, I find that I have more security and more privacy.

Proposition of Policy: Should the U.S. adopt a system of national healthcare? Yes, we have a system of free, publicly funded education.

On all of these propositions, the analogy helps us establish a frame of mind for comprehending the problem or the issue to be considered. Analogies are good for understanding a theory or process, but they are quite limited as evidence to prove a point.

Advocates of **astrology** often use this analogy: the moon has great influence on the ocean tides, so the human body (which is mostly water) must also be influenced by the moon and other planetary bodies. Notice how this point is easily refuted by a series of questions.

How do the distant stars have as much influence as the moon?

How would changes in bodily fluids impact personality, choice, behavior, and external situations?

Why is the time of birth, rather than present geographical location, more associated with the impact of these heavenly bodies?

How do we know that ancient astrology is the best theoretical model for understanding the impact of the heavenly bodies on human life?

The real question about analogies is the degree of similarity and applicability. The side which uses an analogy has the burden of proof to show that the analogy is pertinent, and more than a mere metaphor. The analogy itself is more of a warrant linking the two things, and is in itself in need of backing.

One variant of analogies would be fallacies of **composition** and **division**. Unfortunately, what is true of the parts, is not necessarily true of the whole, and what is true of the whole is not necessarily true of the parts.

"The particular cannot be the model for the whole."

- Goethe

The best example of the fallacy of composition that I ever heard was in a lecture I attended fifty years ago by health guru Jack LaLanne. He told the audience to go out and exercise every day and we would become stronger, and if we were all stronger, American would be stronger against communism. Here is another fallacious example heard in a joke: *if one woman can make a baby in nine months, nine women could make a baby in one month.*

The fallacy of division uses the analogy in the opposite direction.

The U.S. Senate is over 200 years old. Orrin Hatch is a member of the Senate. Orrin Hatch must be over 200 years old.

This machine is heavy, therefore each of its parts must be heavy.

The football team is well rounded, good at passing, running and kicking; therefore, each player can pass, run and kick.

Another questionable form of evidence is reliance on the past, through tradition or precedent. In the world of science and facts, data are always changing. In the quest for the best definitions, we must realize that language is a living system, and that is why dictionaries are updated. Our value hierarchies must change as our priorities change. In the area of policy, yesterday's successful programs may be formulas for failure in the future.

"There is nothing quite so out of date as an earlier era's vision of the future."

- Rebecca Lemov, 2004

In most fields of debate, appeal to tradition or precedent it has a role similar to that of introspection: a good starting point, but no place to end one's research.

In the legal field, precedent has a special role, given the presumption of **stare decisis** (let previous decisions by other courts stand unless there is a compelling reason to reverse those decisions). This is based upon the legal

rationale that, things being otherwise equal, it is best to preserve a consistency of judgment from court to court.

However, let's look at this approach over the long run. An overly zealous commitment to stare decisis would have kept decisions like *Dred Scott* and *Plessy* on the books longer, and would have prevented *Brown vs. Board of Education* from ending segregated schooling. The rule of law is not just coming up with judicial decisions that are respectful of past decisions rendered through precedent. The rule of law is also about coming up with judicial decisions that will be take notice of the aspirations of future generations, who will seek to use what we do today as precedents for their decisions. Under the present legal system, the Supreme Court does more than merely serve as the final arbiter of existing legal cases. By articulating the reasoning behind its decisions, the court sets the foundation that will serve as the basis for all future legal decisions. In so doing, the court not only sets a bias for future cases that it cannot even imagine, but it sets down behavioral guidelines for future generations that wish to avoid legal complications.

Reliance on tradition assumes that something is favorable because of its long history. A fallacy in the opposite direction is the assumption that something is bad because of its origin. Attacking an idea or a plan on the basis of its origin, is not that far removed from attacking a person on the basis of national or religious origin.

One interesting form of this **genetic fallacy** (that something is bad because of its origin) is common in homophobic arguments: contending that something is bad because it is "unnatural." I'm not so sure that homosexuality would qualify as "unnatural" in most senses, but what would clearly be unnatural is the idea of making electricity run through wires or injecting people with some moldy substance named penicillin, yet those proved to be quite helpful for the advance of humanity.

"An expert is someone who knows some of the worst mistakes that can be made in his subject, and how to avoid them."

- Werner Heisenberg

Although I support the use of expert statements, there are better and worse ways of doing this, and there are appropriate and inappropriate refutations. The weakest way to introduce expert views is to start off by saying "they say." Sometimes it is in the form of a vague citation.

- *"the experts know that ..."*
- *"studies show ..."*
- *"Time Magazine reports ..."*
- *"a website shows that ..."*

What is really required here is relevant documentation, especially if scientific studies are cited, we want to be able to get more information about those studies, so that we may appraise the research methods, results, and statistical analyses. If an expert person is cited, we need to get an indication of a specific person as author so that we may better appraise the level of expertise and bias. **Bias** (noun) is a motive that the source might have for shading the truth. A barber may be an expert on cutting hair, but don't ask him if you need a haircut. Dracula may be an expert on blood, but don't have him guard the blood bank. Perhaps the poorest authorities are the one that the advertisers frequently use to pitch their products: paid celebrity endorsers. They usually have no expertise in the field and

their motivation is obviously to serve the interests of their sponsor. The only reason I can think of why Larry King is paid so much to pitch vitamins is that the ads must be working.

Attacking lack of expertise or biased motive is a legitimate refutation of the credibility of a source. Some debaters look for other ways to attack sources. **Ad hominem** ("against the man") attacks often drag up irrelevant scandal.

How can you trust that scientist's views on global warming? He is an atheist and convicted wife beater.

If those charges are true, maybe I would not want my daughter to marry him, but he still might be a credible expert on global warming.

In its worst form, the ad hominem attack is a form of hate talk. It diminishes the contributor to the point where we do not even see the value of the contribution he brings to our knowledge.

Sometimes debaters even turn this name calling on the opposition with a technique known as **tu quoque** ("look who's talking"). Here the accusation is one of hypocrisy. It is, at best, a diversionary tactic away from the argument in question.

While pointing out the lack of expertise, or the biased motive of the source of a quote is sufficient to refute that evidence, it is not proof in the opposite direction. Just because Larry King advertises a certain product, I should not infer that it does not work.

"One must accept the truth from whatever source it comes."

- Maimonides

Truth is not responsible for who utters it.

Some debaters think that they can get an audience to totally reject a proposition if they can associate someone despicable with one of the opposition's points. In this extreme form of the ad hominem, we have refutation by association.

You sound just like Hitler (or a communist, or Bin Ladin).

This is a reverse analogy, and if the only similarity between the source and the disparaging parallel is the statement in question, then it is a weak analogy indeed.

Corroboration (having additional evidence saying the same thing, but from a different source) is the best way to preempt an attack on an authoritative source. Corroboration works best when sources are from different backgrounds. On global warming I would try to quote people from several branches of science and from different nations. On U.S. domestic policy, I would try to demonstrate bipartisan support for a point (as well from experts "outside the beltway").

Sometimes the "they say" is alleged to be common knowledge or common sense. My own definition of **common sense** is that it is what is widely assumed without sufficient evidence.

"Common sense is a collection of prejudices acquired by age 18."

- Albert Einstein

One of the worst variations of "common sense" is to say that a point is *self-evident*.

"Self evident: evident to one's self and no one else."

- Ambrose Bierce

Another of the favorite forms of the "they say" approach is the use of proverbs, old sayings, and the kind of slogans that appear on bumper stickers and lapel buttons. Many of these reiterate traditional ideas, and use analogies.

"Sticks in a bundle cannot be broken."

- Bondei Proverb

Another variation on this approach is an appeal known as *ad populum*, the **appeal to popularity**. The assumption is that an idea must be true if it is widely accepted, or a product must be good if it is gaining in sales, or a candidate must be preferable because she is surging in the polls. (This latter instance is also known as the **bandwagon effect**, and refers to the fact that old political campaigns used to travel through town with a band on a wagon and try to get everyone to follow down to campaign headquarters.)

Many fallacious arguments are based upon affect rather than cognition. *Ad misericordium* is the use of an **appeal to pity**.

In the wake of the summer race riots of the late 1960s, door to door magazine sales teams recruited young African American males to go around middle class suburban neighborhoods with this pitch: "Please help me earn an honest dollar and stay out of trouble this summer." It fit the stereotype and played on the white guilt.

Another effective tool for selling high end products is the **appeal to vanity**. Also known as "apple polishing" this flattering approach is hard for certain customers to resist.

"We swallow greedily any lie that flatters us, but we sip only little by little a truth we find bitter."

-- Denis Diderot

Perhaps the most dangerous form of emotional appeal is to that of anger. This is generally known as the **appeal to indignation**. It convinces the audience that action is needed now because something (or someone) has violated some of our dearest values. When medieval passion plays re-enacted the part of the *Gospel of John* where it says "And the Jews said, 'crucify him'" many mobs would head for the ghetto and start smashing shop windows. When the Klansmen began to insinuate that a Black man had an inappropriate relation with a white woman, a lynching was not far off. When Bin Ladin repeated the story about a Koran flushed down the toilet at Guantanamo, new suicide bombing recruits showed up.

Perhaps the most common emotional appeal would be to that of fear: **scare tactics**. Perhaps the most famous was an ad in the 1964 presidential campaign. An ad for the Johnson campaign just showed a little girl picking flowers when a nuclear blast hit, playing on the public's fear that

Goldwater would get us into a nuclear war. Even more ubiquitous campaigns play upon fears of social rejection to sell deodorant and teeth whiteners.

Related to fear would be the fallacy of *reductio ad absurdum* (carrying the argument to its extreme). This is also known as the **slippery slope** or "thin entering wedge." The camel gets his nose under the tent, and before you know it, the camel is completely in the tent. The slippery slope is often used by the affirmative team when they can't document much of a need for change yet, so they argue that we should act now before the problem gets any bigger. An example of this occurred when the Johnson administration urged U.S. military involvement in South Vietnam, because if that nation fell to the communists, the rest of Asia would fall like dominoes.

The slippery slope is frequently used when the negative side does not have a good argument against the scope of the affirmative proposal, so they try to exaggerate that the plan could just be a first step to something much worse. For example,

If we have the federal government take over our health care, what will prevent the government from socializing other industries every time some people are impatient for the marketplace to correct inequities? We will have socialized banking, socialized oil, socialized automobiles, socialized electronics, socialized everything.

Another questionable tactic is that of intentional distraction away from the issues. (Indeed, the ad hominem comes close to that.) Perhaps the most famous criminal defense attorney in the early 20th century was Clarence Darrow. His power of logic was usually sufficient to win his cases, but he was not above the shameless use of rhetorical, even theatrical

devices to get his clients off. One time he had a special cigar made with internal wires so that the ash would not fall off. Darrow waited for the long winded prosecutor to begin his final summation, and then Darrow lit his cigar. After awhile, the entire jury became transfixed by the long ash on the cigar, waiting for it to fall, and had been completely distracted from the prosecution's summation.

A specific argument advanced to distract the audience and divert their attention from the real issues is known as a **smoke screen** or a **red herring**. A herring is a particularly smelly fish, and if criminals were fleeing the scene of a crime, with blood hounds in pursuit, they would sometimes try to confuse the dogs by dragging a sack of herring along the trail.

Another form of distraction is the **straw man** technique. This is the rhetorical device of presenting a simplified, incomplete or weak version of the opponent's arguments, because such arguments are easier to refute.

Another form of dubious proof used by some advocates of an argument would be the raising of questions. Let me be clear on the role of questions in debate: questions are an excellent technique for the side that has presumption, as a way of clarifying that the burden of proof has not been met by the opposition. But, questions themselves are not proof.

*"I keep six honest serving men.
They taught me all I knew.
Their names are what and why and when
and how and where and who."*

- Kipling

Of course in the legal system, questions are the principal way that evidence is introduced to the court. It is important to remember that the questions themselves are not the evidence; the witnesses' testimony elicited by the questions would be the evidence.

What is sometimes used by debaters (and politicians) is a dubious tactic known as the **rhetorical question**. It is raised not so much to get an answer from the opposition but to get the audience to infer that a point has been proved (when it has not). Here are some examples of rhetorical questions.

Imagine a politician who has just been hit with a scandal.

My opponent has accused me of having an extramarital affair with my campaign manager. I ask you to compare the moral behavior of two candidates, and ask yourself the question: would you rather have an adulterer or a child molester?

Notice that the politician did not deny the extramarital affair. He offered no proof that his opponent was a child molester, and indeed, did not even directly state that his opponent was a child molester, but his question could have led to the audience to infer that his opponent was a child molester.

In a small town there was once a GMC truck salesman who was losing a lot of business to his major competitor, a Nissan dealer. The customers thought that the Nissans were better trucks at a better price. This GMC salesman found that he could boost his business by asking potential customers what other trucks had they considered. If they said Nissan, he would ask the rhetorical question "Did they ever get those hoods fixed"? Nobody ever answered him, because nobody had ever heard anything about Nissans

having a problem with their hoods. But the very question was sufficient for customers to wonder if they would be driving down the freeway in a new Nissan and the hood would fly up.

A bumper sticker on a recreational vehicle traveling along the I-10 in Arizona read *Eternity: smoking or non-smoking?* I imagined the driver to be an Evangelical Christian, and the message being one of choose heaven or choose hell. Notice that the bumper sticker offered no proof that heaven and hell existed, or that his way was the best way to get saved. The rhetorical question only plants an idea, then relies upon the audience's own imagination to do the rest.

The rhetorical question is a powerful device for controlling the framing of the issue, and avoiding the burden of proof. If you are in a debate and your opponent has hit you with a rhetorical question, respond by reframing the question, and then giving an answer.

Unlike my opponent, who asks the wrong questions, and gives no answers, I shall give you the right questions and the right answers.

Another abuse of the questioning format would be the use of **loaded questions**. These are like persuasive definitions, a premise is snuck in where it is not expected. Loaded questions are when the purpose is not to get an answer, but to use the act of questioning as a ruse to pack an argument for one side of the other. I frequently get mailers from political candidates and sometimes these pretend to be a survey soliciting my "opinion" on various topics. The phrasing uses such hyperbole that it is obvious which way the author of the survey wanted me to vote. Or, more probably, the author thought he knew my predilection and is hoping that the survey will resonate with me so that I form

an ideological bond with the candidate.

Do you support Congressman Snort's continued heroic efforts to protect our borders from drug smugglers and terrorists?

Do you support Congressman Snort holding the line on wasteful spending so that we can lower the deficit and return more of your hard earned dollars to you in the form of a tax cut?

Another abuse of questioning occurs with the use of an apparent *yes or no* question that is actually a compound of two steps. So, the question ends up assuming a condition not in evidence. He who answers steps into a dilemma, and looks bad either way.

Have you stopped beating your wife?

YES: Then you admit that you beat her in the past.

NO: You are still beating her, then.

Where did you hide the money you embezzled?

THERE: You admit to embezzlement!

NOWHERE: So, you have already spent the money you embezzled!

The honest approach to this would be to do one step at a time.

Did you ever beat your wife?

If so, do you continue to beat her?

Another abuse of the question is when people continue to ask questions as a mere stalling technique, rather than as a sincere attempt to get answers. Perhaps there is no foolish question, but fools raise more questions than can be answered, and they tend to do this when there is more need for action than answers.

CHAPTER SEVEN: DEDUCTION

Deductive Syllogisms

Deductive reasoning takes general rules and applies them to individual instances. This kind of reasoning works with **analytic** statements such as definitions and math. These are not usually dependent upon empirical verification, but are **a priori** (knowable without observation of the external, sensory world).

Outside of theoretical pursuits like mathematics (e.g., geometry) and theology, the chief applications of deductive reasoning are in law and ethics. Statute and administrative law is primarily deductive, concerned with applying the rules to individual cases. *Did the actions of the defendant constitute a crime, as defined by these guidelines?* A similar line of reasoning is used in ethical judgments. The deontological approach requires the use of deductive reasoning: stating broad general principles and then applying these guidelines to specific cases. (In the next chapter we will see how utilitarian ethics requires a different approach.)

Deductive reasoning is sometimes called **categorical** logic because the statements involved assert the existence of analytic categories (rather than observed facts). So, it might be said that this is reasoning about how things are to be classified. The usual way that these categories are created is through sentences that define an **S subject** term (who or what) having a certain **P property** or **predicate** (what it has). Usually, the predicate term comes after the word *are* or *not*.

The three most basic categorical statements found in deductive reasoning are ALL, ONLY and NO statements.

ALL statements come in the form *All subjects in a certain category **S** have a special property **P***. Here are two examples.

All bachelors (S) are unmarried (P).

All students (S) in this class have brown eyes (P).

Guess which one of these statements would be more appropriate for use in deductive reasoning. The first claim is a true analytic statement because it is based upon a definition (a bachelor is defined as an unmarried male, presumably adult and otherwise potentially marriageable). The second may be synthetic because I either had to go around and look at each student's eye color or else set up some kind of selection procedure so that only students with brown eyes would make it into the classroom. In either situation, the statement has synthetic properties and may therefore be more appropriately dealt with in the next chapter on inductive reasoning.

ONLY statements are structured like this: *Only things with property **P** are members of category **S***. This is equivalent to saying *All **S** is **P***. Look at the above two examples and we can rewrite them as ONLY statements and preserve the same meaning.

Only unmarried men (P) are bachelors (S).

Only students with brown eyes (P) are in this classroom.

NO statements deny that any member of the category of the subjects has the property of the predicate: *No **S** is **P***.

Interestingly enough, this is also equivalent to saying that *No **P** is **S***. Here are a couple of examples.

No cat (S) is a canine (P).

No canine (P) is a cat (S).

Notice that the above statements are analytic rather than synthetic: we do not have to inspect every cat to make sure that it is not a canine, nor do we have to inspect every canine in order to make sure that it is not a cat. According to their classification within the animal kingdom, the species of cats are not part of the genus of canines.

NO statements also have an interesting relationship with the $\sim P$ of ALL statements. If *All **S** is **P*** then *No **S** is $\sim P$* . Look at the following renditions of our initial examples of ALL statements.

No bachelors (S) are married ($\sim P$).

No students (S) in this class have blue eyes ($\sim P$).

We could reduce all NO statements to ALL statements involving $\sim P$.

No cat (S) is a canine (P).

All cats (S) are non-canines ($\sim P$).

There are parallels between deductive reasoning and conditional reasoning.

ALL: to say *All **S** is **P*** means
*if something is an **S**, it is also a **P***

Example: *All cats are felines.*

Conditional Equivalent: *If it is a cat, then it is a feline.*

ONLY: to say *Only **S** is **P*** means
*if something is a **P**, then it is also an **S***

Example: *Only citizens may vote.*

Conditional Equivalent: *If someone is voting, then he must be a citizen.*

NO: to say *No **S** is **P*** means
*if something is a **P**, then it is not an **S**.*

NO statements, unlike ONLY and ALL statements, are biconditional, because we can also say that
*if something is an **S**, then it is not a **P***, as well as,
*if something is a **P**, then it is not an **S**.*

Example: *No person is perfect.*

Conditional Equivalent: *If someone is a person, then he is not perfect.* The biconditional equivalent would be *if something is perfect, then it is not human.*

The structure of deductive arguments is called a **syllogism**. This was initially developed by the ancient Greek **Galen** (129-199 CE) who is better remembered for his work as a physician and investigator of the human nervous system. Since then syllogisms have been structured around three statements, known as the major premise, minor premise, and conclusion. The first two statements represent

something already known (or assumed) by the categories defined. The last line is the conclusion, and claims something that was not directly stated before, but which we can be sure of due to the validity of the structure of the argument.

The **major premise** asserts that all members of a large category **S** have a certain property **P**. Here is an example.

MAJOR PREMISE: *All cats (**S**) are mammals (**P**).*

The **minor premise** asserts that something is a member of that category (**S**).

MINOR PREMISE: *Felix is a cat (**S**).*

(Notice what has happened in the minor premise: the subject is Felix and the predicate is being a cat, but in the major premise being a cat was the subject. This is called distributing a term: the subject term of the major premise becomes the predicate term of the minor premise, and is then absent from the conclusion.)

Alternatively, the minor premise may assert that something lacks property (**P**).

MINOR PREMISE: *Hector is not a mammal (\sim **P**).*

When we pair the major premise with the first minor premise, we get a valid conclusion.

MAJOR PREMISE: *All cats (**S**) are mammals (**P**).*

MINOR PREMISE: *Felix is a cat (**S**).*

CONCLUSION: *Felix is a mammal (**P**).*

Notice the similarity to Modus Ponens:

*If **S**, then **P**; **S**; therefore **P**.*

If something is a cat, then it is a mammal.

Felix is a cat, therefore, he is a mammal.

When we pair the major premise with the second minor premise, we get another valid conclusion.

MAJOR PREMISE: *All cats (**S**) are mammals (**P**).*

MINOR PREMISE: *Hector is not a mammal (\sim **P**).*

CONCLUSION: *Hector is not a cat (\sim **S**). (He is a parrot.)*

Notice the similarity to Modus Tollens:

*If **S**, then **P**; \sim **P**; therefore \sim **S**.*

If something is a cat, then it is a mammal.

Hector is not a mammal, therefore, he is not a cat.

The two fallacious ways of doing this syllogism also have parallels to fallacies with conditional statements.

MAJOR PREMISE: *All cats (**S**) are mammals (**P**).*

MINOR PREMISE: *Principal Skinner is a mammal (**P**).*

CONCLUSION: *Principal Skinner is a cat (**P**) ?!?*

(Notice that in the above fallacy, the S term from the major premise was not distributed to serve as the predicate of the minor premise. Both premises used the same predicate, so the conclusion is not valid.)

Notice the similarity of the above deductive fallacy to the fallacy of affirming the consequent.

*If something is a cat, then it is a mammal.
Principal Skinner is a mammal, therefore, he is a cat.*

Here is the other fallacy we sometimes see with ALL statement deductive syllogisms.

MAJOR PREMISE: *All cats (**S**) are mammals (**P**).*

MINOR PREMISE: *Dolphins are not cats (\sim **S**).*

CONCLUSION: *Dolphins are not mammals (\sim **P**) ?!?*

Notice the similarity to the fallacy of denying the antecedent.

*If something is a cat, then it is a mammal.
A dolphin is not a cat, therefore, it is not a mammal.*

The problem with the last two minor premises, is that they could only have led to valid conclusions if the major premise had been written *Only cats are mammals*. Then, we could have said if something is a mammal (even Principal Skinner) it would have been a cat, and if something was not a cat (that essential criterion for being a mammal) it would not have qualified as one.

NO statements can be used in syllogisms as either the major or the minor premise (both not in both). One negative premise requires a negative conclusion. A negative conclusion requires a negative premise. Two negative premises together yield no valid conclusion. Consider this example.

MAJOR PREMISE: *No dogs have wings.*

MINOR PREMISE: *No cats are dogs.*

CONCLUSION: ???

If you are tempted to conclude something like *No cats have wings* then you have come up with a factual conclusion, but you know that for a fact because of your prior knowledge about cats, not because the structural validity of the syllogism.

A **valid** syllogism is one that guarantees that true premises produce a true conclusion. Structural validity does not guarantee the conclusion's truth when the premises are false. A syllogism lacking validity may still yield a true conclusion, but the truth of the conclusion is not guaranteed by the structure of the syllogism.

Another way deduction can work is with mathematics instead of language, and the terms can be equals, greater than or less than. Here are some examples of syllogisms built upon math. All of these are valid.

MAJOR TERM: $A = B$
 MINOR TERM: $B = C$
 CONCLUSION: $A = C$

MAJOR TERM: $A < B$
 MINOR TERM: $B = C$
 CONCLUSION: $A < C$

MAJOR TERM: $A > B$
 MINOR TERM: $B > C$
 CONCLUSION: $A > C$

MAJOR TERM: $A = B$
 MINOR TERM: $B > C$
 CONCLUSION: $A > C$

MAJOR TERM: $A < B$
 MINOR TERM: $B < C$
 CONCLUSION: $A < C$

MAJOR TERM: $A = B$
 MINOR TERM: $B < C$
 CONCLUSION: $A < C$

MAJOR TERM: $A > B$
 MINOR TERM: $B = C$
 CONCLUSION: $A > C$

Remember how we said that when we have two affirmative premises, then we must distribute the subject of the major premise to the subject of the minor premise. All of the above examples include one of the terms in the first premise in the second premise.

Remember how we said that a valid syllogism could not be constructed out of two negative (denying) premises. That works the same in math.

MAJOR TERM: *A is not equal to B.*
MINOR TERM: *B is not equal to C.*
CONCLUSION: *A is ??? to C.*

However we can pair one affirming premise and one denying premise and get a denying conclusion.

MAJOR TERM: *A is not equal to B.*
MINOR TERM: *B = C.*
CONCLUSION: *A is not equal to C.*

A **valid** deductive syllogism is properly structured so that if both premises were true, the conclusion would have to be true. However, you may also get a true conclusion from deductive arguments with false premises or faulty reasoning. Deductive arguments prove their conclusions, not their premises. Mathematician Kurt **Goedel** (1906-1978) pointed out that in any formal system there is a formula such that neither it nor its negation is derivable from the axioms of the system. So, the deductive approach cannot prove its own major premise. That is its starting point, its foundation supporting everything else in the argument, and cannot itself be supported by the argument.

So, the term *valid* merely means that the argument is appropriately structured. If it happens that both premises are true, and the argument is properly structured (*valid*), then the deductive argument is said to be **sound**. You cannot get a false conclusion from a sound deductive syllogism.

sound argument = valid + true premises

	Premises TRUE	Premises FALSE
Valid	Sound	Not sound
Not valid	Not sound	Not sound

Here is a truth table for deductive arguments.

premises	conclusion	valid argument?
T	T	?
T	F	NO
F	T	?
F	F	?

This table is only conclusive about one thing: if the premises are true and if the argument is properly structured, it is impossible to get a false conclusion.

Here is an example of two true premises, but a poorly structured (not valid) syllogism yielding a questionable conclusion.

MAJOR PREMISE: *President Obama supports gun control.*

MINOR PREMISE: *All totalitarian regimes support gun control.*

CONCLUSION: *Obama's regime is totalitarian.*

Both premises are probably true (and some conservatives fear that the conclusion may be true), but we do not have a

valid syllogism above, so the conclusion is not supported by the premises. It would be valid if we changed the middle term to

Only totalitarian regimes support gun control.

However, that statement is false, since many European, Asian, and Latin American governments not usually considered to be totalitarian also support gun control.

It is even possible to get a true conclusion from false premises, from a faultily structured argument, or even when faulty premises are paired with a faulty conclusion.

MAJOR PREMISE: *Only dogs can lay eggs.*

MINOR PREMISE: *My chicken is a dog.*

CONCLUSION: *My chicken can lay eggs.*

The conclusion is correct, but both premises are wrong, and the structure of the argument is not valid (but it would have been if the first premise had said

All dogs can lay eggs

but that still would have been a false premise.).

There is another important thing to mention about deductive reasoning: we are dealing more with categories than real things, and so it is possible to have **empty extensions** of categories. This means that the category exists, but no real beings exist in the category (but if some did exist, they

would have the characteristics of the category). Here is an example.

MAJOR PREMISE: *All unicorns are fast.*

MINOR PREMISE: *All hobbits ride unicorns.*

CONCLUSION: *All hobbits can ride fast.*

The structure of the syllogism is valid. The premises seem to fit what we know about unicorns and hobbits. The only problem is, neither these premises nor the conclusion prove that unicorns or hobbits exist. Remember, these are analytic statements (definitions rather than observations) and are akin to conditional claims.

If something is a unicorn, then it is fast.

If something is a hobbit, then it rides unicorns.

THINK ABOUT IT

Recall the ontological argument for the existence of God.

God is a perfect being.

One of the qualities of existence is perfection.

Therefore, God exists.

Think about how that argument would fit into a classic deductive syllogism.

MAJOR PREMISE: *All perfect beings have existence.*

MINOR PREMISE: *God is a perfect being.*

CONCLUSION: *God has existence.*

How does the concept of empty extensions affect this argument?

Venn Diagrams

There are several ways of visually depicting deductive arguments. One technique is with overlapping circles known as **Venn Diagrams**. One circle represents the subject of the major premise and the other circle represents the predicate of the major premise. This diagram divides all the space into four distinct areas.

S + P is represented by the overlap of the circle.

S without P is represented by the part of the S circle outside of the overlap with P.

P without S is represented by the part of the P circle outside of the overlap with S.

Neither S nor P is represented by the space outside of the "Master Card" diagram.

Shading is used to represent an area that is impossible according to the premise. So, with a NO statement, the overlap between the two circles is shaded in. With ALL statements we shade in the part of the subject circle that is not within the overlap with the predicate circle.

Let's take our familiar example.

MAJOR PREMISE: All men are mortal.

MINOR PREMISE: Socrates is a man.

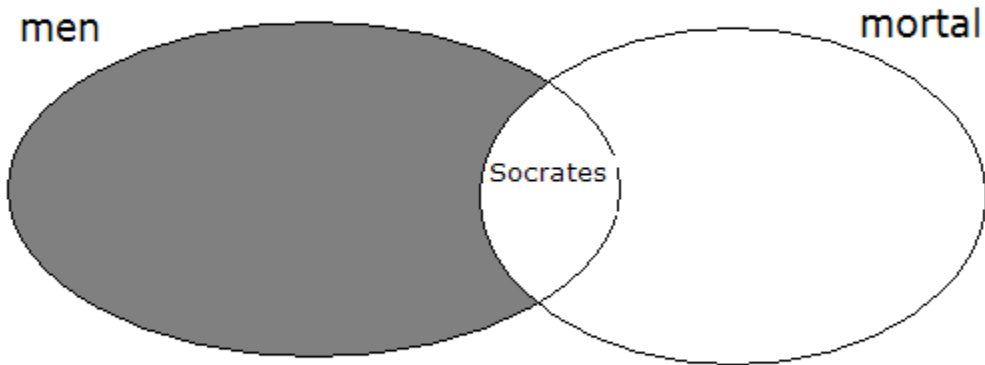
CONCLUSION: Socrates is mortal.

The major premise defines the two circles. We would have one big circle for men and another big circle for mortal things. To say that all men are mortal means that there are no men outside of the overlap with mortal things, so we need to shade in the left crescent of the men circle.

When we come to the minor premise and say that Socrates is a man, there is only one place that we can put him: inside of the overlap with mortal things. So, the conclusion is that Socrates, like all other men, must be mortal.

Two Circle Venn Diagram for an ALL statement

MAJOR PREMISE: All men are mortal.



Minor Premise: Socrates is a man.

Conclusion: Socrates is mortal.

Now let's consider another valid syllogism with the same major premise, akin to the modus tollens.

MAJOR PREMISE: All men are mortal.

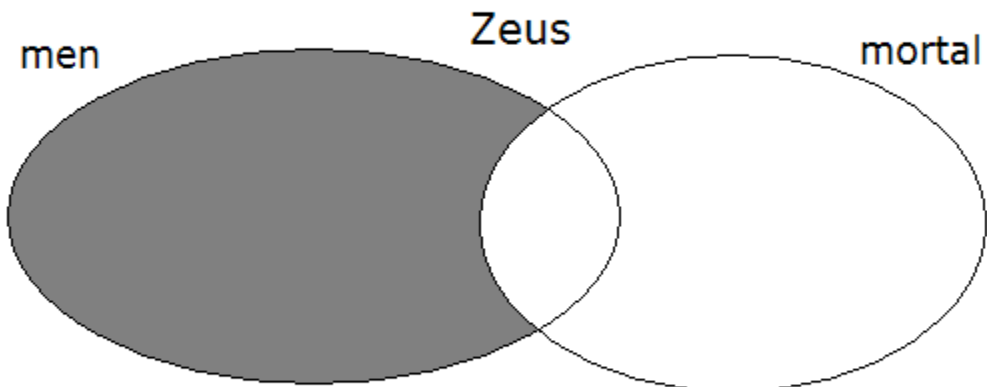
MINOR PREMISE: Zeus is not mortal.

CONCLUSION: Zeus is not a man.

Once we say that Zeus is not in the mortal circle, then he must be outside of the "Master Card" area, and therefore not a man, either.

Two Circle Venn Diagram for an ALL statement

MAJOR PREMISE: All men are mortal.



Minor Premise: Zeus is not mortal.

Conclusion: Zeus is not a man.

Now let's consider some fallacies with the same major premise.

MAJOR PREMISE: All men are mortal.

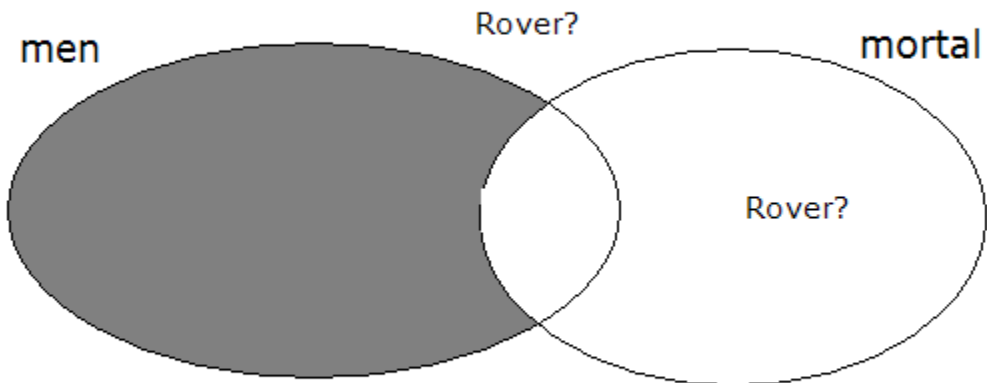
MINOR PREMISE: Rover is not a man.

CONCLUSION: Rover is not mortal?

When we say that Rover is not a man, all we know is that he is not in that overlap between men and mortal. He might be some other mortal being (e.g., a dog) as well as something immortal.

Two Circle Venn Diagram for an ALL statement

MAJOR PREMISE: All men are mortal.



Minor Premise: Rover is not a man.

Conclusion: Rover is mortal?

Here is another fallacy with the same major premise.

MAJOR PREMISE: All men are mortal.

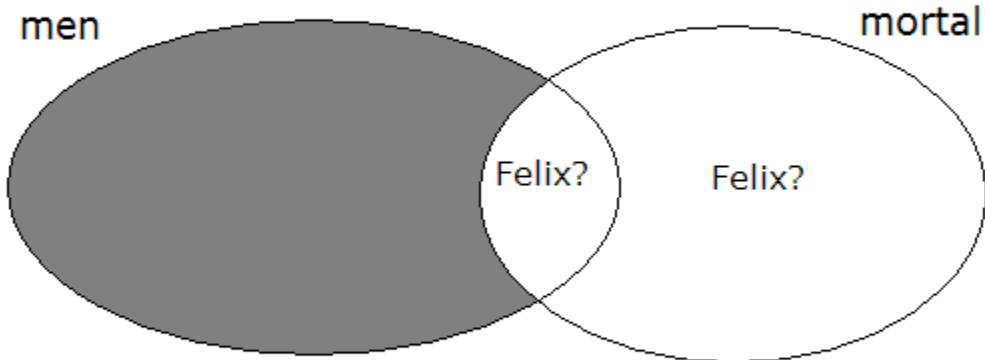
MINOR PREMISE: Felix is mortal.

CONCLUSION: Felix is a man?

When we say that Felix is mortal, all we know is that he is in that big circle of mortal things, not that he is in the tiny overlap with is men. Felix might be some other mortal being (e.g., a cat) as well as a human.

Two Circle Venn Diagram for an ALL statement

MAJOR PREMISE: All men are mortal.



Minor Premise: Felix is mortal.

Conclusion: Felix is a man?

Now let's see how the Venn diagrams work with NO statements.

MAJOR PREMISE: No cats have wings.

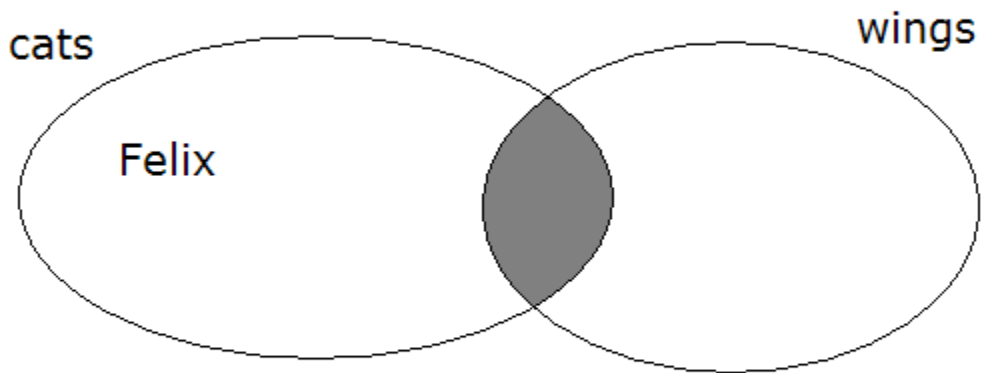
MINOR PREMISE: Felix is a cat.

CONCLUSION: Felix does not have wings.

The major premise means that we have to shade out the overlap. That leaves us with two separate crescents: cats and wings. When we put Felix in the cats crescent, he cannot be in the wings crescent, so Felix has no wings.

Two Circle Venn Diagram for a NO statement

Major Premise: No cats have wings.



Minor Premise: Felix is a cat.

Conclusion: Felix has no wings.

This also works with another affirmative minor premise.

MAJOR PREMISE: No cats have wings.

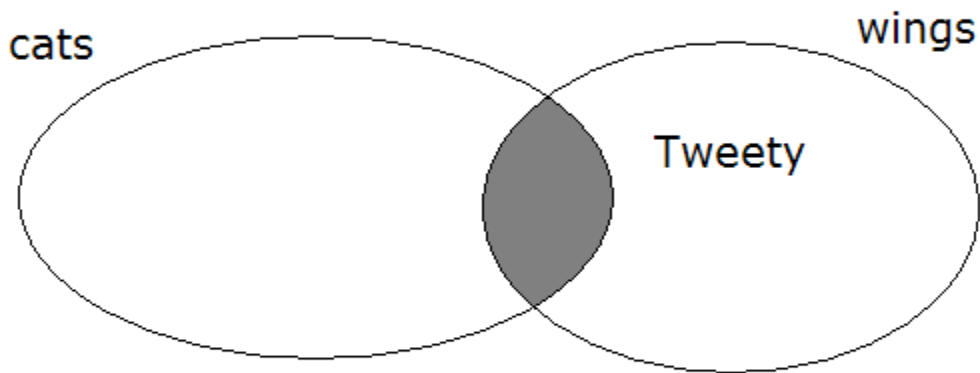
MINOR PREMISE: Tweety has wings.

CONCLUSION: Tweety is not a cat.

Once we put Tweety in the wings crescent, we know that Tweety cannot be in the cats crescent: so he cannot be a cat.

Two Circle Venn Diagram for a NO statement

Major Premise: No cats have wings.



Minor Premise: Tweety has wings.

Conclusion: Tweety is not a cat.

Now let's see how the Venn diagrams look for fallacies involving two NO premises.

MAJOR PREMISE: No cats have wings.

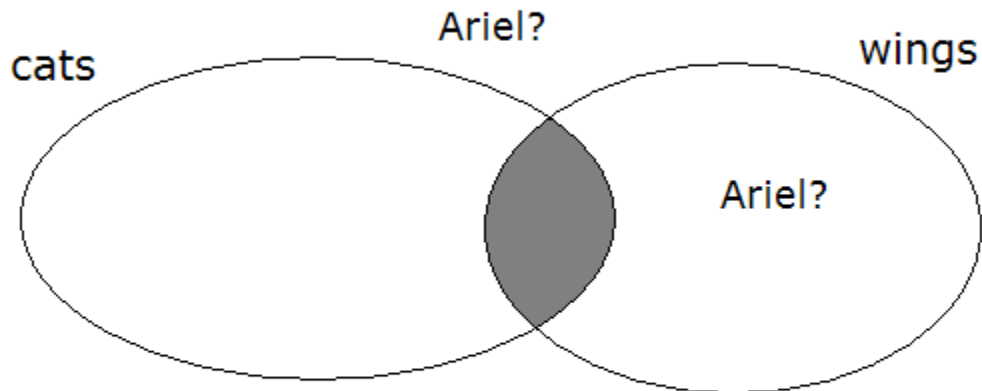
MINOR PREMISE: Ariel is not a cat.

CONCLUSION: Ariel has wings?

All we know from the minor premise is that Ariel is not in the cat crescent, but remember that there are four possible regions with Venn diagrams. We do not know if Ariel is an angel (with wings) or a mermaid (without wings) for among non-cats, there are both the winged and the wingless.

Two Circle Venn Diagram for a NO statement

Major Premise: No cats have wings.



Minor Premise: Ariel is not a cat.

Conclusion: Ariel has wings?

Here is another fallacy involving two NO premises.

MAJOR PREMISE: No cats have wings.

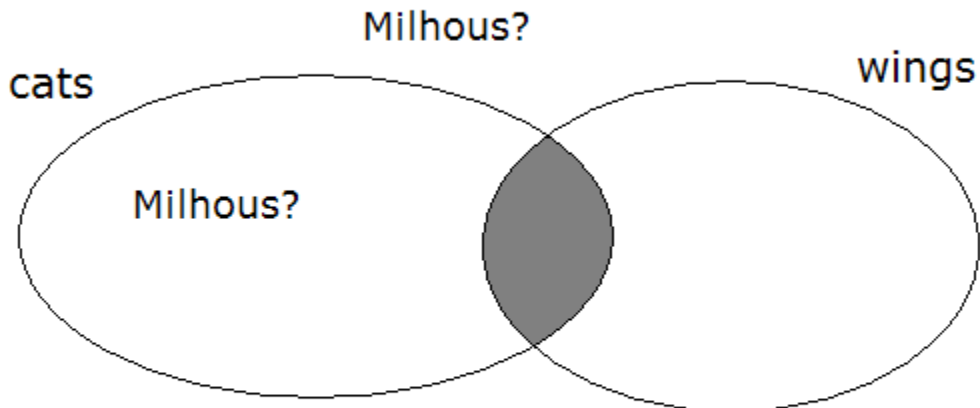
MINOR PREMISE: Milhous has no wings.

CONCLUSION: Milhous is a cat?

All we know from the minor premise is that Milhous is not in the winged crescent, but remember that there are four possible regions with Venn diagrams. We do not know if Milhous is a cat or something else without wings (like a boy who is a friend of Bart or a late President).

Two Circle Venn Diagram for a NO statement

Major Premise: No cats have wings.



Minor Premise: Milhous has no wings.

Conclusion: Milhous is a cat?

Another way to use Venn diagrams is to have three circles, with the third representing the subject of the minor premise. Now, for our first example of a syllogism, Socrates would get his own circle. So, circle A would be men, circle B would be mortal things, and Socrates would be circle C. With the major premise we shade out all of A that is not B, and with the minor premise we shade out all of C that is not B. We are left with just a tiny area where Socrates S could be: the intersection of Socrates and men and mortal, so Socrates is mortal.

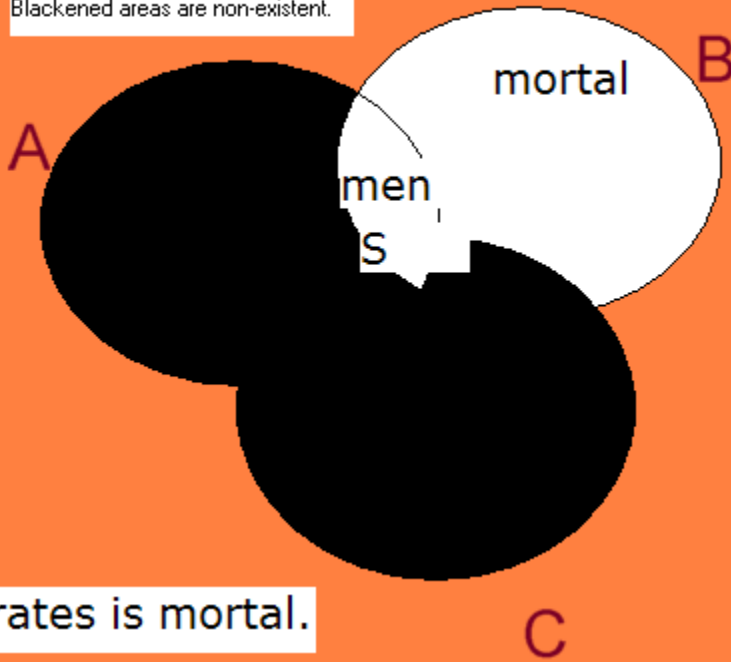
Following are the other three circle diagrams for the other syllogisms already presented.

Three Circle Venn Diagram for an ALL statement

All men are mortal.

Socrates is a man.

Blackened areas are non-existent.



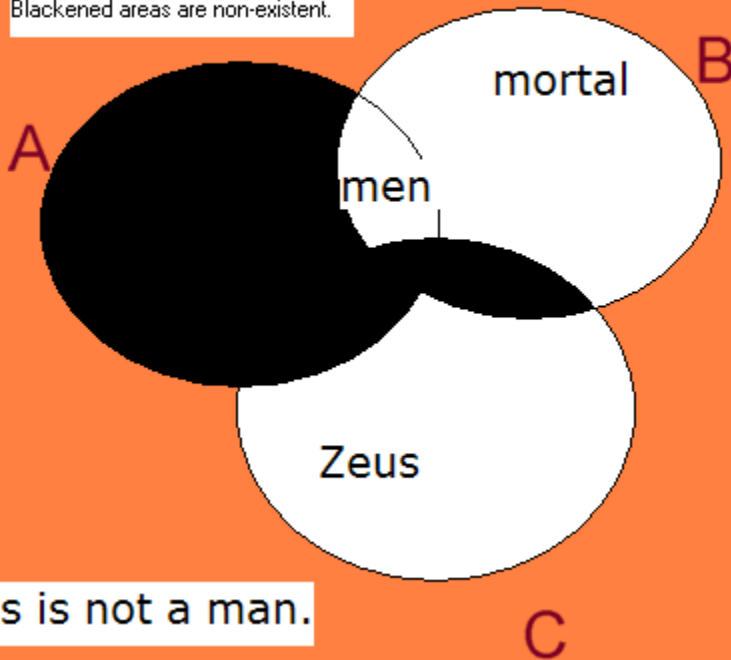
Socrates is mortal.

Three Circle Venn Diagram for an ALL statement

All men are mortal.

Zeus is not mortal.

Blackened areas are non-existent.



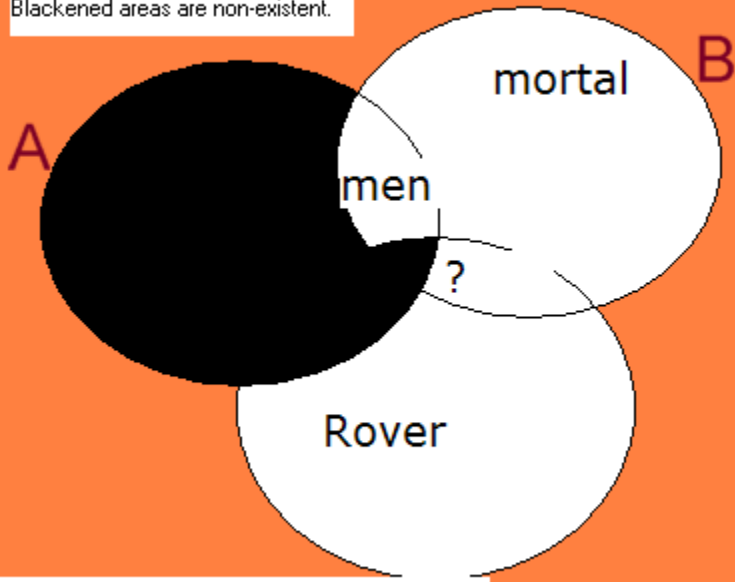
Zeus is not a man.

Three Circle Venn Diagram for an ALL statement

All men are mortal.

Rover is not a man.

Blackened areas are non-existent.



Is Rover mortal?

C

Three Circle Venn Diagram for an ALL statement

All men are mortal.

Felix is mortal.

Blackened areas are non-existent.



Is Felix a man or a cat?

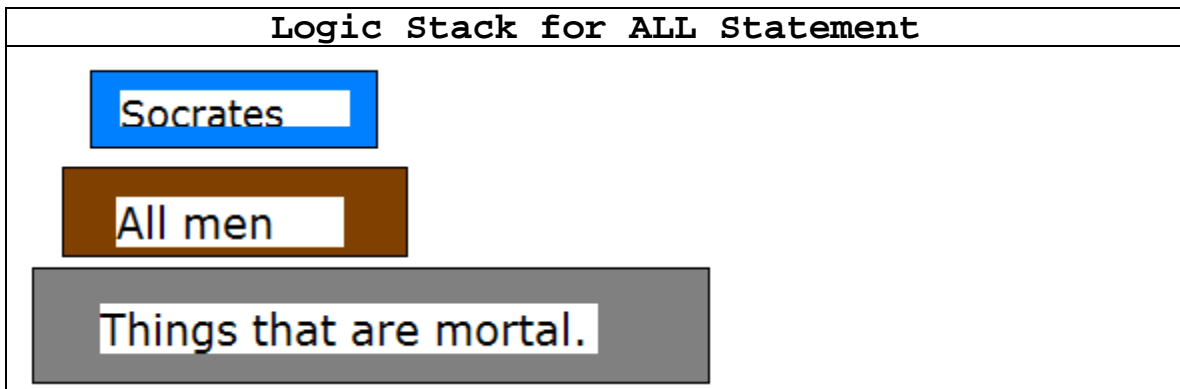
C

I am not a big fan of Venn diagrams, especially in the three circle mode. I have found that they confuse as many students as they help. If you do not find that Venn Diagrams illustrate deduction, so that you more readily comprehend valid syllogisms versus fallacies, then don't use them. There are other visual diagrams which many students find more clear for illustrating these points.

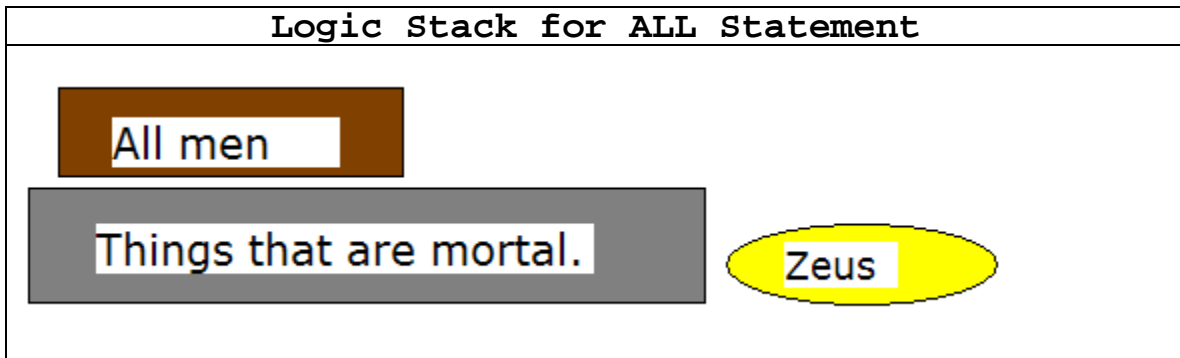
Logic Stacks

One visual and tactile method which may be more helpful than Venn diagrams is what I call logic stacks. Imagine that we have three blocks. The biggest block is the predicate of the major premise. Then we have a medium sized block for the subject of the major premise, and then a small block for the subject of the minor premise.

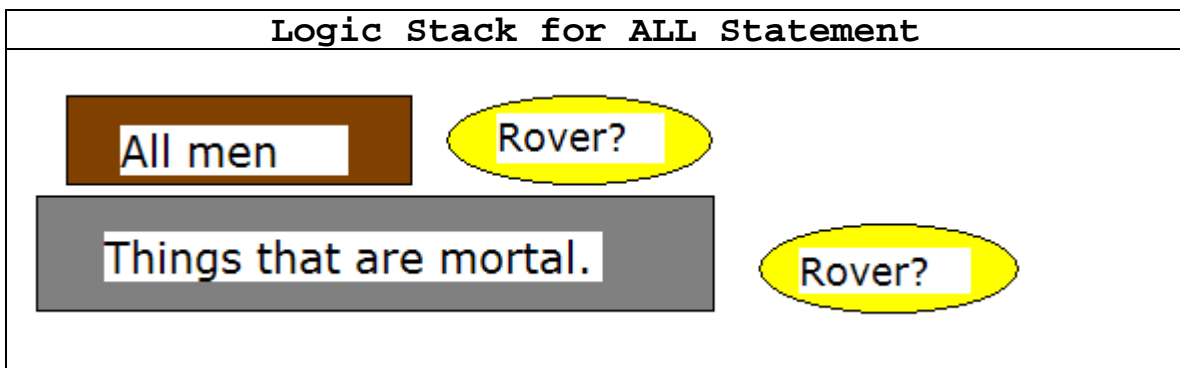
When the major premise is an ALL statement, we put the subject block on top of the predicate block in order to indicate if you are in the subject stack, you are also in the predicate stack. So, all men are also in the stack of mortal things. The minor premise about Socrates being a man means that we put him on top of the men stack, which means that he is also on the mortal stack.



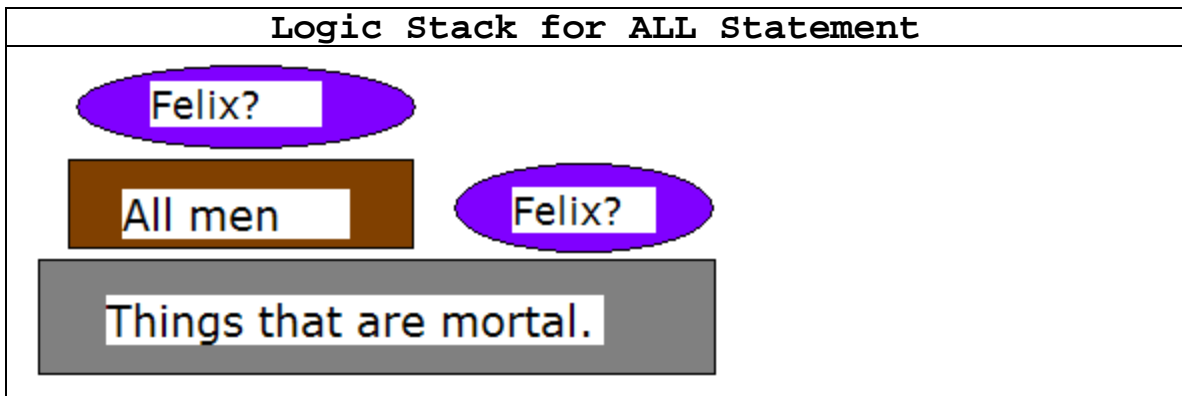
This also works for the other valid form of the syllogism. When we say that Zeus is not mortal, we know that he is not on the mortal stack, so he cannot be on the man stack either.



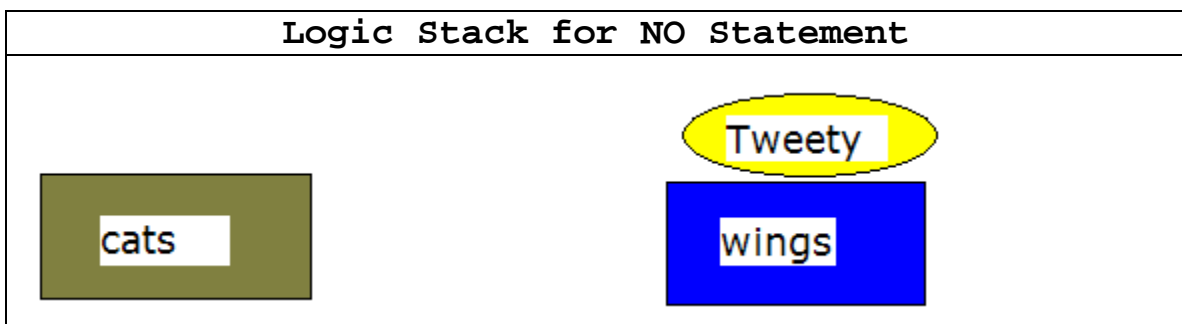
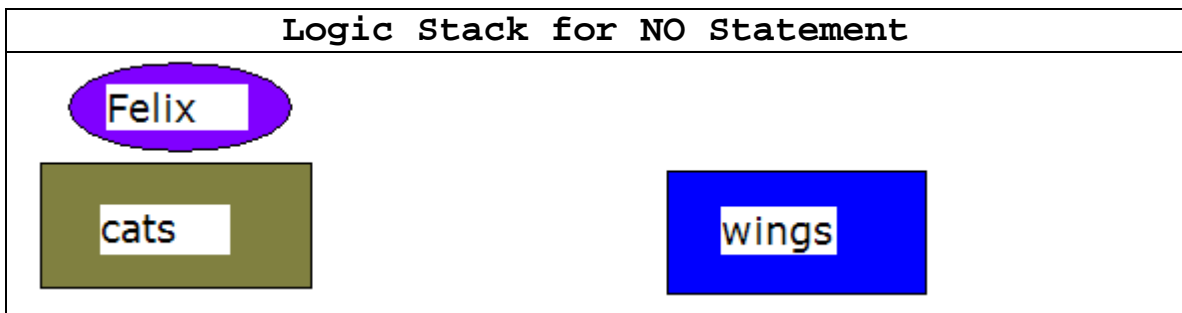
We can also visualize fallacies as not knowing which stack on which to place someone. If we know that Rover is not on the man stack, we do not know if he is on the mortal stack or not.



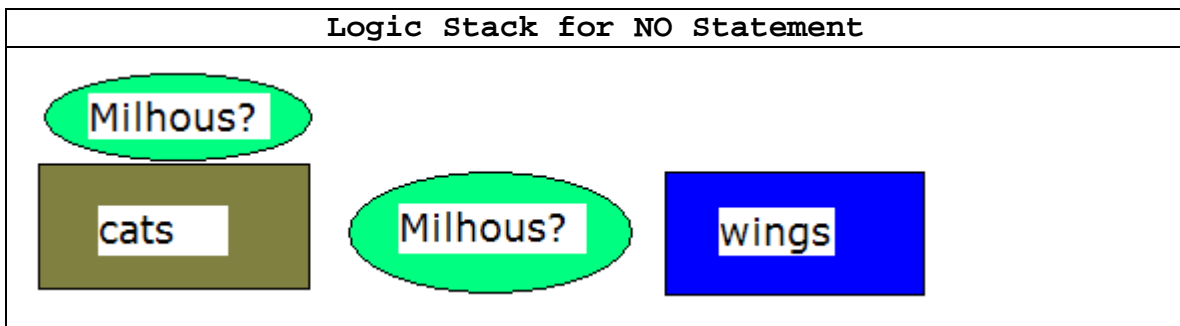
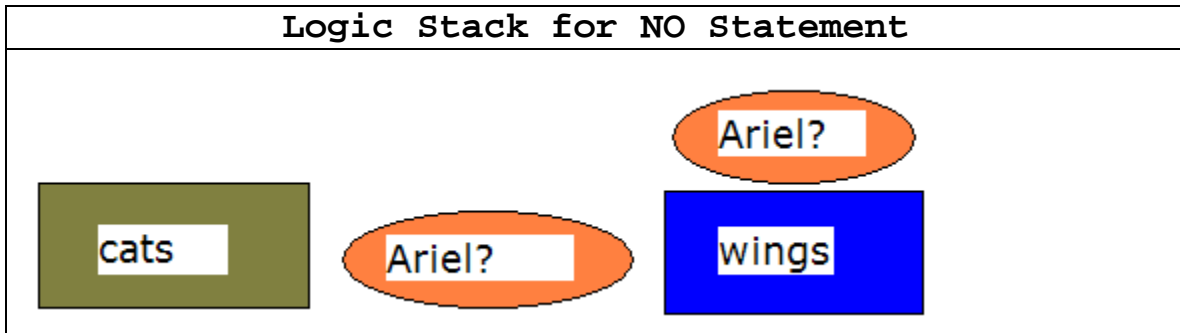
If we know that Felix is mortal, we do not know if he is also on the man stack or whether he is some other kind of mortal being (like a cat).



When the major premise is a NO statement, we do not stack the subject stack on top of the predicate stack. We will have a valid syllogism if the minor premise tells us which of these to stacks to put something else one. When we know Felix is a cat, he is on the cat stack, and therefore not on the wings stack. If we put Tweety on the wings stack, he cannot be on the cat stack.



When the minor premise is also a NO statement, we know that we have a fallacy because we don't know if the subject of the minor premise goes on the other stack or not.



Contingency Tables

The rows and columns design of the two-by-two contingency table is used for cross tabulation for the a posteriori data of empirical investigation, but let's see how we can use this type of diagram to demonstrate the relationship between the a priori categories of deductive reasoning.

We look at the major premise and use the subject to determine the rows and the predicate to determine the columns. The four resulting cells (A, B, C & D) represent four possible interactions between subject and predicate.

A = things in the subject category that have the predicate

B = things in the subject category that lack the predicate

C = things not in the subject category, but that have the predicate

D = things not in the subject category that lack the predicate

		PREDICATE	
		YES	NO
S U B J E C T	YES	A	B
	NO	C	D

The advantage of using these tables is that it becomes easy to see where the minor premise takes us (which row or which column).

Let's take the familiar example of an ALL syllogism.

MAJOR PREMISE: All men are mortal.

MINOR PREMISE: Socrates is a man.

CONCLUSION: Socrates is mortal.

After the major premise we declare the B cell empty.

		PREDICATE	
		mortal	not mortal
S U B J E C T	all men	A	B EMPTY
	other things	C	D

The minor premise tells us that Socrates must be located on the row of men (in cells A or B), but since cell B is empty, we can only put Socrates in cell A, and that means that he is in the column of mortal things.

		PREDICATE	
		mortal	not mortal
S U B J E C T	all men	Socrates A	B EMPTY
	other things	C	D

Here is another valid variation of the above syllogism.

MAJOR PREMISE: All men are mortal.

MINOR PREMISE: Zeus is not mortal.

CONCLUSION: Zeus is not a man.

We have the same major premise, so we know that the B quadrant is empty. When we get the minor premise, we

know that Zeus must be in the not mortal column (e.g., cell B or D), but since B is empty, we must put Zeus in cell D, and that means that Zeus is in the bottom row of other things (not a man).

		PREDICATE	
		mortal	not mortal
S	all men	Socrates	EMPTY
U		A	B
B	other things	C	Zeus
J			D
E			
C			
T			

This approach also visually depicts the limitations of non valid reasoning using the ALL major premise.

MAJOR PREMISE: All men are mortal.

MINOR PREMISE: Rover is not a man.

CONCLUSION: Rover is mortal?!?

We have the same major premise, so we know that cell B is empty. When we get the minor premise, we know that Rover is not in the man row, but since both cells C and D are open, we don't have enough information to know whether Rover is mortal or not.

		PREDICATE	
		mortal	not mortal
S	all men	Socrates	EMPTY
U		A	B
B	other things	Rover?	Zeus Rover?
J		C	D
E			
C			
T			

Likewise, when we say that Felix is mortal, we only know that he is in the mortal column, but not which row he is in (cell A or cell C) because he could be a man or a cat.

		PREDICATE	
		mortal	not mortal
S	all men	Felix? Socrates	EMPTY
U		A	B
B	other things	Rover?	Zeus Rover?
J		C	D
E			
C			
T			

Now, let's try this two-by-two contingency table with NO statements.

MAJOR PREMISE: No cats have wings.

MINOR PREMISE: Felix is a cat.

CONCLUSION: Felix does not have wings.

After the major premise, we can declare cell A empty.

		PREDICATE	
		has wings	lacks wings
S	cats	EMPTY	
U		A	B
B	other things	C	D
J			
E			
C			
T			

After the minor premise, we know that Felix must be on the top row (cell A or B) but since cell A is empty, Felix must be in cell B, which is in the column that lacks wings.

		PREDICATE	
		has wings	lacks wings
S	cats	EMPTY	Felix
U		A	B
B	other things	C	D
J			
E			
C			
T			

Now, look at the next valid syllogism for this major premise.

MAJOR PREMISE: No cats have wings.

MINOR PREMISE: Tweety has wings.

CONCLUSION: Tweety is not a cat.

We have the same major premise, so we know that cell A is empty. When we get the minor premise, we know that Tweety must be in the left column (e.g., cell A or C), but since A is empty, we must put Tweety in cell C, and that means that Tweety is in the bottom row of other things (not a cat).

		PREDICATE	
		has wings	lacks wings
S	cats	EMPTY	Felix
U		A	B
B	other things	Tweety	
J		C	D
E			
C			
T			

With NO premises it is pretty easy to spot non valid syllogisms because they use a NO in the minor premise as well, but the use of the contingency table makes it easy to visualize the situation.

MAJOR PREMISE: No cats have wings.

MINOR PREMISE: Porky does not have wings.

CONCLUSION: Porky is a cat?!?

We have the same major premise, so we know that cell A is empty. When we get the minor premise, we know that Porky must be in the right column (e.g., cell B or D), but since both cells are both open, we do not know whether to put Porky in B the cat row (i.e., if he's a very fat cat) or in D the bottom row (if he is a pig).

		PREDICATE	
		has wings	lacks wings
S			
U	cats	EMPTY	A
B		C	D
J		Tweety	Porky?
E			
C	other		
T	things		

Here's another non valid syllogism with this major premise.

MAJOR PREMISE: No cats have wings.

MINOR PREMISE: Fido is not a cat.

CONCLUSION: Fido has wings?!?

We have the same major premise, so we know that cell A is empty. When we get the minor premise, we know that Fido must be in the bottom row (e.g., cell C or D), but since both cells are both open, we do not know whether to put Fido C the wing column (i.e., if he's a bird) or in D the right column (if he is a dog).

ONLY syllogisms just switch around the subject and predicate. Instead of saying *All men are mortal* we would say *Only mortal things are men*. While these two statements look the same on a Venn Diagram or logic stacks, there is a difference when we get to the contingency tables (if we preserve the custom of keeping the subjects for the rows and the predicates for the columns).

MAJOR PREMISE: Only members may play golf here.

MINOR PREMISE: John plays golf here.

CONCLUSION: John is a member.

After the major premise we can declare that cell C is empty, because non-members cannot play golf here.

		PREDICATE	
		may play golf	may not
S U B J E C T	members	A	B
	non members	EMPTY	D

When we come to the minor premise, we know that John must be categorized in the left column (cell A or C) because he can play golf at the club, and since C is empty, he must be in A, the member row.

		PREDICATE	
		may play golf	may not
S U B J E C T	members	John	
	non members	EMPTY	

If we modify the major premise to read *All members and only members may play golf here* then we can also declare cell B empty.

		PREDICATE	
		may play golf	may not
S U B J E C T	members	John Jim A	B EMPTY
	non members	EMPTY C	D Jill Julia

Now, we have three more valid syllogisms from that major premise.

MAJOR PREMISE: All members, and only members, may play golf here.

MINOR PREMISE: Jim is a member.

CONCLUSION: Jim may play golf.

MAJOR PREMISE: All members, and only members, may play golf here.

MINOR PREMISE: Jill is a not member.

CONCLUSION: Jill may not play golf.

MAJOR PREMISE: All members, and only members, may play golf here.

MINOR PREMISE: Julia does not have permission to play golf.

CONCLUSION: Julia is not a member.

Disjunctions can also be represented by these tables. Imagine that you can play golf if you are a member of the club, or are the guest of a member. Now the diagram gets a little tricky because we have two types of subjects (members and guests) and we shall have to depict the predicate inside of the cells. Only cell D (when someone is not a member AND not a guest) would be ineligible to play golf.

		SUBJECT #2	
		GUEST	NOT A GUEST
SUBJECT #1	MEMBER	MAY GOLF A	MAY GOLF B
	NOT A MEMBER	MAY GOLF C	MAY NOT D

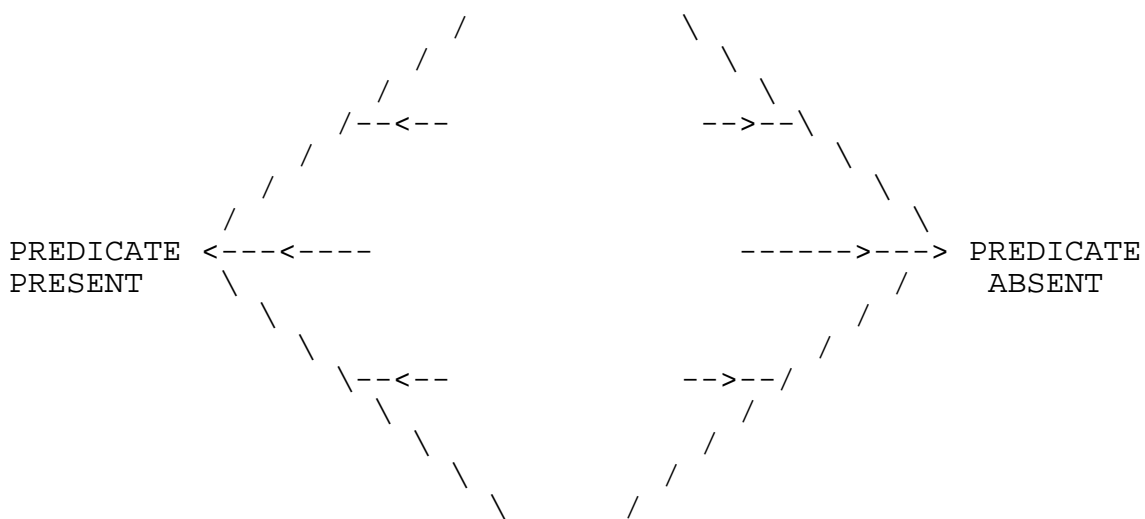
Conjunctions just eliminate two more cells, leaving only A. Suppose that in order to play golf at the club on a certain day you must be a member and have a reservation for that day.

		SUBJECT #2	
		RESERVATION	NO RESERVATION
SUBJECT #1	MEMBER	MAY GOLF TODAY A	MAY NOT B
	NOT A MEMBER	MAY NOT C	MAY NOT D

Logic Paths

Another useful diagram for deductive reasoning is what I call the arrow diagram or logic path.

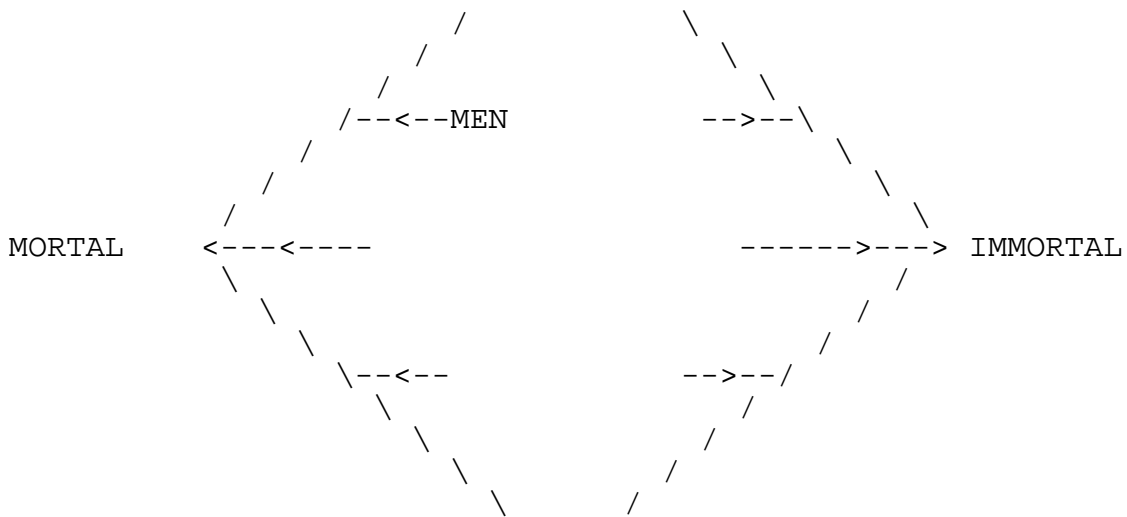
The analogy would be the flow of rivers and their tributaries. The subjects are like raindrops flowing into rivers and out to the sea. Imagine that the center of the diagram is like the continental divide along the Rocky Mountains and every raindrop falling to the left goes to the Pacific (the predicate, **P**) while every raindrop falling to the right flows into one of the tributaries of the Mississippi and therefore not to the Pacific, $\sim \mathbf{P}$.



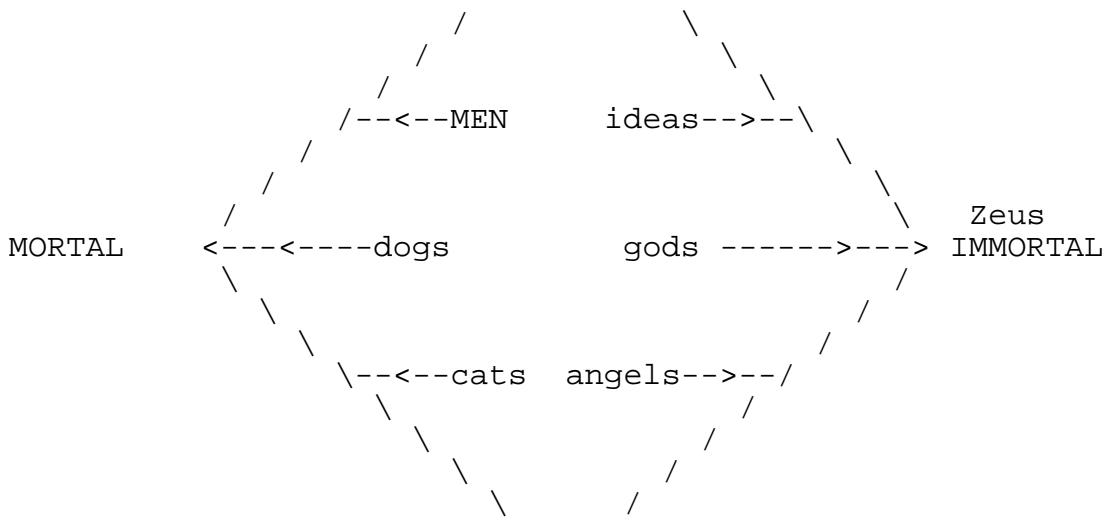
Now lets go back and review the major premises for our syllogisms.

MAJOR PREMISE: All men are mortal.

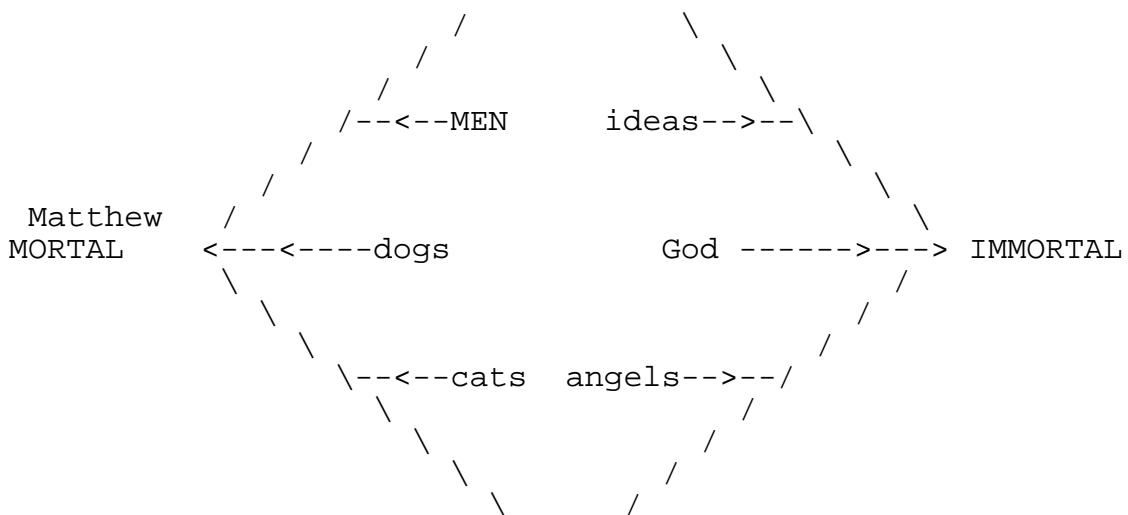
Now, we know that men are flowing toward the left side of mortality (they will all end up dead some day). If the minor premise is that Socrates is a man, then we know that he, too, will flow down that same path.



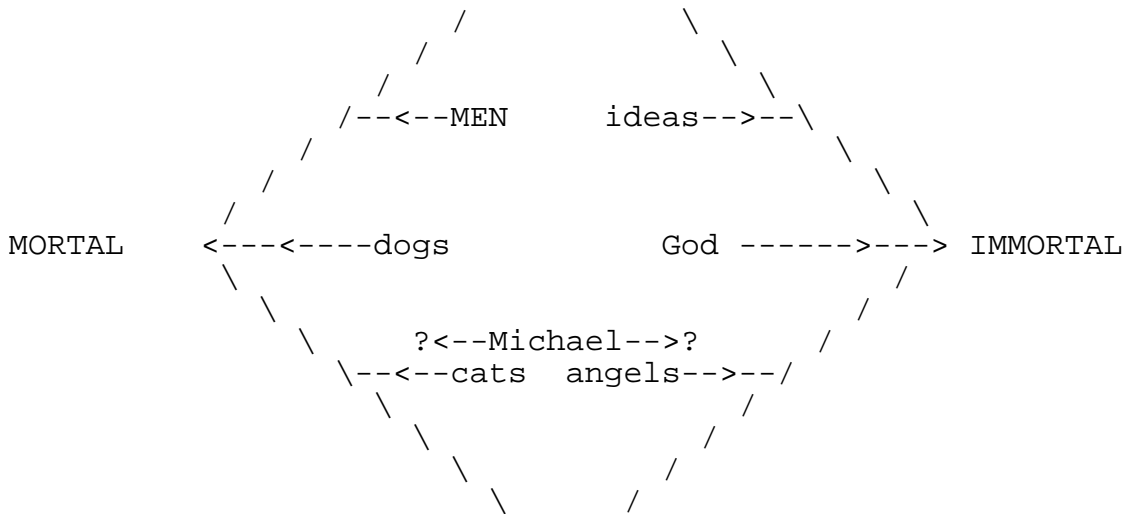
If we say that Zeus is immortal, we know that Zeus ends up on the right side, and since men are on the left side, Zeus must not be a man. Maybe Zeus is a Greek deity, maybe just an idea, we cannot say without more information. We only know that Zeus is immortal, and can therefore not be a mortal being like a man.



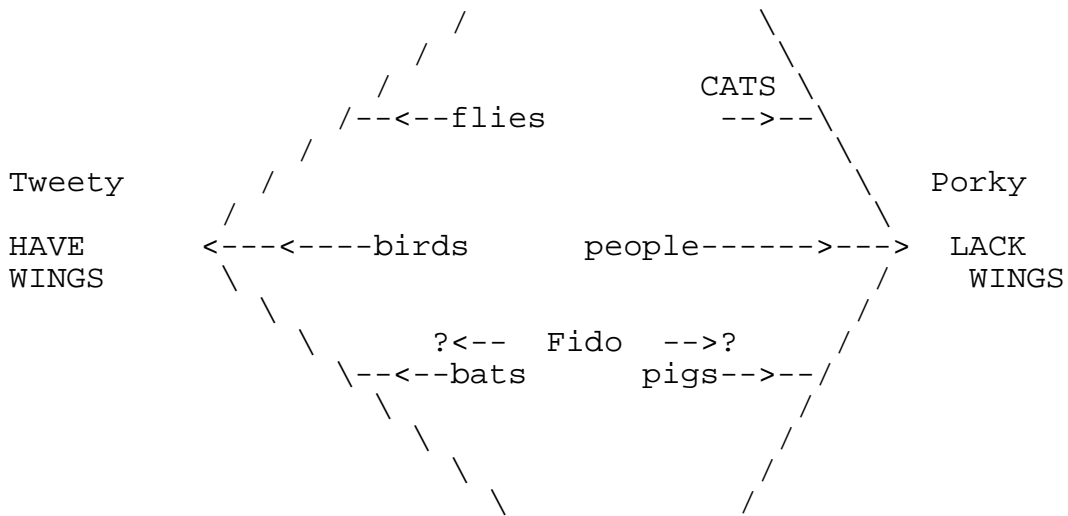
We can also use this diagram to see how fallacies don't allow us to see the course of the subject's journey. If we say that Matthew is mortal, we know that Matthew ends up on the left side, but we cannot conclude that he is a man because he could have arrived at his mortality through the route of being a dog, cat, fish, etc.



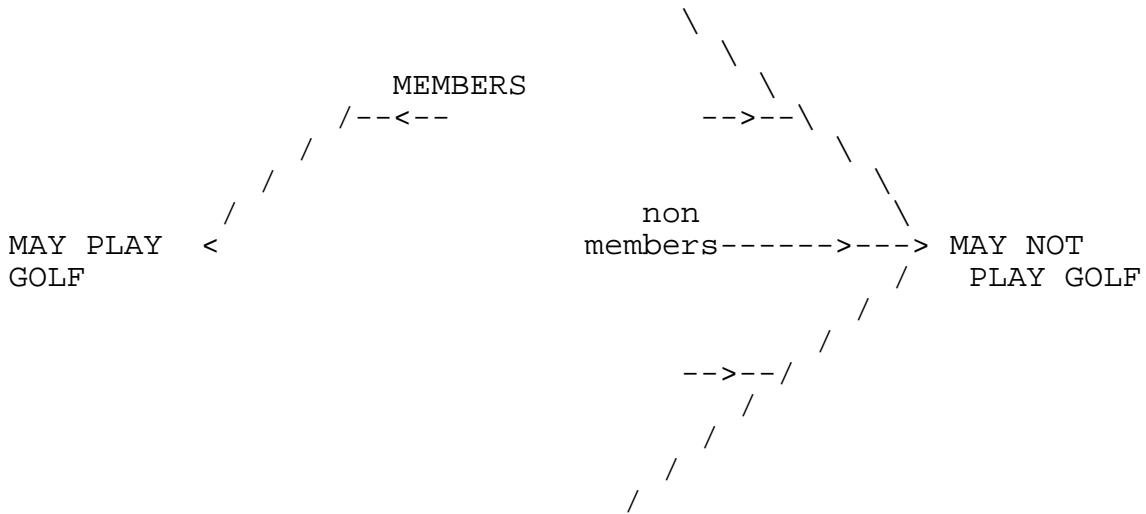
If we say that Michael is not a man, we know that Michael will not take that one path over to the left side of mortality, but we don't know which of the other many paths Michael might be on. If he is a cat, dog, fish, or cockroach, he ends up on the left side anyway, just like all men, but if he is an angel he would take a different path to the right side of immortality.



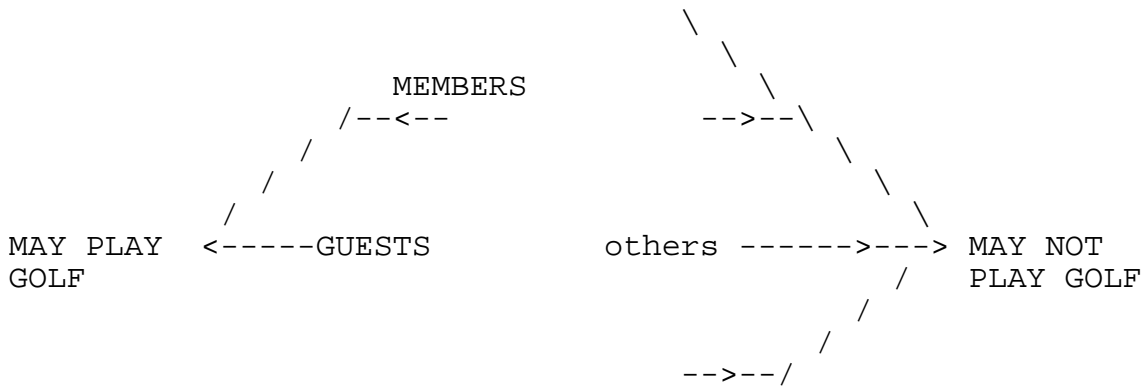
NO statements just put us on the other side of the continental divide. Take the one about no cats having wings. Fluffy and all other cats are on the cat path that flows to the right, no wings. We know that Tweety ended up on the left side (wings) so we can safely infer that he did not flow down the cat path. We know that Porky ended up at the no wings destination, but we don't know if he got there on the cat path or the pig path. We know that Fido will not be traveling down on the cat path, but we still don't know if his path will take him to the left (wings) or right (no wings).



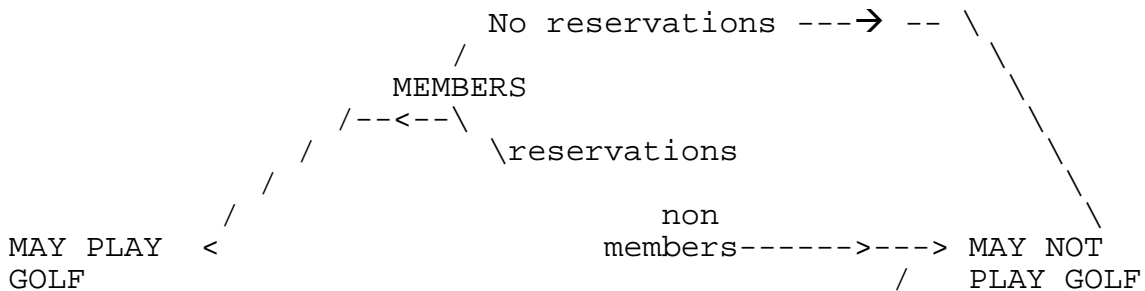
ONLY statements eliminate pathways, leaving only one.
 So, when we say that John can play golf, we know how he arrived at that status, he must have gotten on the course on the member path. If we know that Julia is not a member, we know that she is on the path that prevents her from playing golf.



Disjunctions just add another path, an independent one, which is an alternate way to get to the destination. If you can play golf at the club as a member or as a guest, you now have two independent pathways to the golf course.



Conjunctions just add another dependent turn on the one long path. If you need to be a member AND have reservations, the path looks like this.



THINK ABOUT IT

There are four cards: a blue diamond, blue circle, white diamond, white circle, and this rule: I will accept one color and one shape (any figure having either), and reject that which lacks the proper shape and color. So, only one card will be rejected and three will be accepted.

I accept the blue diamond.

Do you know anything else about my decisions related to the other three forms? Do you know which other card(s) I would accept and which one I shall reject? Try to construct one of the diagrams listed in this chapter to help you determine if we can know whether another card will be accepted or rejected.

The problem is that we know that a blue diamond is accepted, but we don't know why it was accepted: because it is blue in color or because it is a diamond in shape.

If we knew that blue and diamond had been the choices, then we would know that white circle was the odd man out.

If we knew that the card had been accepted because of its color, so it was accepted despite its shape as a diamond, then we would know that the white diamond was out.

If we knew that the card had been accepted because of its shape, so, it was accepted despite its color blue, then we would know that the blue circle was out.

CHAPTER EIGHT:

INDUCTION, SCIENCE & PSEUDOSCIENCE

Induction vs. Deduction

Deduction was the form of reasoning which applied general rules to specific cases. **Induction** is defined as the form of reasoning that is based upon a foundation of previous observations of external (material) reality. So, while deduction was analytic, starting with definitions, induction is synthetic, starting with observations. From these specific observations of individual cases, induction builds generalizations (which may then lead to additional inferences about other (yet unobserved) cases. So, while deduction was a priori, induction is **a posteriori**. The kind of claims used in deduction are categorical, and use terms such as *all*, *only* and *no* but do not necessarily imply that there exists anything in those categories (e.g., "All unicorns have horns."). Inductive claims, on the other hand, are **SOME** statements and do assert that there does exist at least one case in existence with those characteristics.

The chief use of deduction was in theology while the main application of induction is in empirical science. Deduction is frequently used in legal reasoning, especially in the fields of law (e.g., Constitutional, administrative, statute) in which a general rule must be applied to specific cases. On the other hand, induction is going to be more relevant to case law, where previous decisions must be analyzed in order to see if they amount to a general rule.

A well structured deductive argument was termed valid. That term has a different meaning when applied to induction. While it refers to the proper structure of a deductive argument, **validity** refers to the proper empirical measurement underlying induction. The term for a well structured inductive argument is **strong**. A deductive

argument that was valid in its structure and that had true premises was sound. An inductive argument that has strong premises and has true premises is called **cogent**.

	<i>premises true</i>	<i>premises false</i>
<i>properly structured</i> (strong)	cogent	not cogent
<i>not properly structured</i> (weak)	not cogent	not cogent

With deductive arguments, the conclusion is necessary, but with inductive arguments, the conclusion is at best probable. When there are deductive fallacies, this is always due to the structure of the argument (e.g., not distributing the middle term or having two negative premises), but inductive fallacies are due to problems with sampling, research design or the interpretation of statistics. Suppose we observe zero instances after having looked at several cases. Induction does not allow us to infer a *no* statement in the sense that *none exist* but only that none have been observed yet (hence, the old saying "You cannot prove a negative.").

Induction supports scientific endeavor. Science is a necessary component of our modern technological progress, but science is not sufficient for all knowledge or a good life. Induction is, therefore, essential but not adequate.

The need for induction grows out of the limitations of deduction. Many years ago, when I first learned formally about deduction, I had an uneasy suspicion that it was artificial, and lacked application to the "real" world that I knew as a farm boy. Much of deduction seemed little better than a tautology. Before we can

know that our premises are true, we must either assume them or verify them in some other way (perhaps induction?). For example, if we say that *all men are mortal* how do we know? Inductively, we would have to examine every man to make sure he is mortal. If that is the situation, then it makes no sense to call the statement *Socrates is mortal* a conclusion proved deductively, for we have already observed the truth of that statement as part of building our major premise: we had to look at all men, including Socrates, to verify that they were all mortal.

Logic	Deduction	Induction
Statements	Analytic	Synthetic
Using qualifiers	All, Only, No	Some
Proof	a priori	a posteriori
Application	Theology	Science
Field of law	Constitutional	Case
	Administrative	
	Statute	
Validity refers to	Argument structure	Variable measurement
Structure	Valid	Strong
With true premises	Sound	Cogent
Conclusion is	Necessary	Probable
Fallacies due to	Structure	Sampling
		Research design
		Misinterpretation
Model	Syllogism	Contingency table

If we rely upon definition when we say that all cats are wingless, then what we have merely decided that a *feline domesticus* with wings will be disqualified from the label of cat. Therefore, when we say *Felix is a cat* it is a minor premise contingent upon Felix being wingless, and thus the conclusion yields no new information.

What induction does is to declare that facts are more important than definitions: instead of discarding facts that do not match the definitions, perhaps we should discard definitions that do not match the facts. When given a choice about understanding reality in terms of observable facts or abstract ideas, induction and science go with the former. Tying this back to some of the ancient Greeks we have studied, while Zeno and Heraclitus debate about whether or not a flowing river exists, inductive reasoning commits to a science that yields the technologies of the boat and the bridge.

Whom can we cite as the father of science? By the time that the 19th century philosopher **John Stuart Mill** had written his treatise on induction, science had pretty much separated into specialized disciplines: physics, chemistry, biology, etc. By the 18th century, **David Hume** was clearly articulating the empiricist approach in philosophy, but his thought is largely built upon the 17th century writings of **Bacon**. But before there was a philosopher with a systematic understanding of induction, there were scientists (e.g., **Galileo** in physics) using it. If we were to try to identify which ancient Greek was most committed to this approach, it would have to be **Aristotle**. In some fields (e.g., biology) he exhibited a great capacity for observation and induction, while in other branches of knowledge (e.g., physics) he relied principally upon deduction. Some anthropologists and evolutionary psychologists say that the human capacity for induction predates the onset of the kind of conceptual thought used in logic, and can be traced back to the trial and error methods of primate tool making.

Some logicians have pointed out that induction lacks a formal justification within the field of logic. Induction cannot justify itself, especially since it is not right all of the time, as seen here.

Premise: one is a prime number

Premise: three is a prime number

Premise: five is a prime number

Premise: seven is a prime number

Conclusion: Therefore, all odd numbers are primes.

But when two prime numbers are multiplied, their product will be odd, but not a prime. Induction does not even work in generating an easy pattern to predict the next prime number.

Here is an even less sanguine example of the limitations of induction.

Premise: Last year, I did not die.

Premise: Last month, I did not die.

Premise: Last week, I did not die.

Premise: Yesterday, I did not die.

Premise: So far today, I have not died.

Conclusion: I will never die.

Trying to construct an inductive truth table appears to be an exercise in speculation, as much of a guessing game as sports betting (which is itself a great example of inductive reasoning: predicting future events on the basis of past observations).

<i>premises</i>	<i>conclusion</i>	<i>strength</i>
T	PROBABLY T	?
T	PROBABLY F	weak
F	PROBABLY T	?
F	PROBABLY F	?

How then are we to justify our use of induction? The real "proof" of induction is in the technology that it supports (the bridges and the boats we use to get across the river). Induction is vindicated as a worthy means to a desired end. Induction cannot justify the value of an end, but it can justify the effectiveness of the means (and therefore its instrumental value).

Science

What makes an inductive conclusion probable is the regularity of nature. Therefore, induction presumes scientific theories that claim the orderliness of nature, and therefore, induction cannot be cited as the proof for these scientific theories. So, let's take a step back and see how science really works.

Science is knowledge based upon the **empirical** method of observation. We often comprehend science as a body of knowledge, but it may be more appropriate to conceive of science as the method or approach behind the bodies of knowledge that we see in fields such as physics, chemistry, biology, psychology, etc.

Science studies variables. A **variable** is something that can change, and can be measured. (A **constant** is something that can be measured, but does not change.) Any report of scientific research should describe how the variables were measured. This constitutes the **operational definition** of those variables. A good operational definition is one that can be measured precisely and be quantifiable. The precision of measurement will be described in the next section on scaling. Operational definitions should also be reliable and valid.

WRITE IT RIGHT

Do not use the term *accurate* in this course. Don't call deductive reasoning accurate, but *valid* or *sound* (if the reasoning meets those criteria). Don't call inductive reasoning *accurate*, but *strong* or *cogent* (if the reasoning meets those criteria). Above all, don't refer to the measure of a variable as accurate, but as *precise*, *reliable* or *valid*. Remember that these are three different concepts, and it is not a matter of treating these three words as if they were synonyms. The measure of a variable is precise or not precise, reliable or not reliable, and valid or not valid. There are specific criteria for each of these terms.

"Knowing what to measure, and how to measure it, makes a complicated world less so."

- Steven D. Levitt

Reliability refers to consistency of measurement. There are different ways of examining the consistency of a measurement. One would be to consider the source of our measurement. If we want to know how tall a person is, we could use a yardstick, ruler, and tape measure. The question of reliability is whether all three

would agree and give the same number of inches for the person's height. Another form of reliability concerns the stability of measurements over time. If we measured a person's height a week from now, we would expect to get a similar outcome, but if our yardstick were made out of elastic, we would not get consistent measurements, because we might stretch it a little more (or less) next time. While most variables are pretty stable (e.g., height, personality, intelligence), some variables are known to go up and down even within a few weeks (e.g., weight, depression), so the importance of this kind of reliability depends upon the variable. Therefore, the reliability of any test should not be assumed, but should be based upon prior empirical research.

RELIABILITY OF DIAGNOSIS
(this means consistency of measurement)

second examiner

		YES			NO
#####					
		##	#		##
		##	CELL A	#	CELL B
	YES	##		#	##
	patient	##		#	##
	HAS	##	AGREEMENT	#	DISAGREEMENT
f	disorder	##		#	##
i		##		#	##
r		##		#	##
s		##		#	##
t		##		#	##
#####					
	patient	##		#	##
	does	##	CELL C	#	CELL D
x	NOT	##		#	##
a	have	##		#	##
m	disorder	##	DISAGREEMENT	#	AGREEMENT
i		##		#	##
n	NO	##		#	##
e		##		#	##
r		##		#	##
#####					

Reliability can be depicted graphically a number of ways but the most useful is the two-by-two contingency table for cross tabulation. The rows represent how the first measure classifies the variable (one row for YES and the other row for NO). The columns represent how the second measure classifies the variable (one column for YES and the other column for NO). The four interacting cells represent different patterns of agreement (cells A and D) or disagreement (cells B and C) between the two measures.

Let us suppose that this is a question of whether two different diagnosticians (perhaps a psychiatrist and a clinical psychologist) agree or disagree in terms of how they diagnose a hundred patients. Each of the two examiners sees each of the hundred patients. Cell A represents those patients where both examiners agree that the patient has the disorder. Cell D represents those patients where both examiners agree that the patient does NOT have the disorder. Cells B and C represent disagreement: where one examiner diagnoses the existence of the disorder and the other examiner does not.

When we are talking about empirical measurements, the term **validity** means that we are measuring the variable that we purport to measure (and not some other variable that happened to be easier to measure). Using a ruler, even a nice, reliable, wooden one to measure a person's weight would not be valid. Rulers may be valid for measuring length or width or height, but not weight. This may seem obvious that we should be measuring what we are supposed to measure, but using inappropriate measures is one of the greatest fallacies in all of science. Out of laziness, ignorance, or comfort, some scientists prefer to use the convenient and familiar methods of measurement when such measures do not really calibrate the variables that are supposed to be the topic of the investigation. I have seen psychologists use IQ tests (developed to predict performance in grade school) to assess senile dementia. I have seen the Rorschach test (developed to assess unconscious conflicts) used to predict executive performance.

The validity of any test should not be assumed, but should be based upon prior empirical research. This research would have to compare how a given measure really stacks up against the accepted standard for measuring that variable, or some desired outcome measure.

VALIDITATING A PREDICTOR TEST

outcome variable: five years later

	worker with firm	worker no longer with firm
	#####	#####
	##	##
	## CELL A	## CELL B
	##	##
interviewer	##	##
likes	## TRUE	## FALSE
p	##	##
r	## POSITIVE	## POSITIVE
e	##	##
d	##	##
i	#####	#####
c interviewer	##	##
t does	## CELL C	## CELL D
o NOT	##	##
r like	##	##
	## FALSE	## TRUE
	##	##
	## NEGATIVE	## NEGATIVE
	##	##
	##	##
	#####	#####

Let's suppose we are doing research to see if interviews are really valid predictors of how workers perform on the job after they are hired. For example, we may want to predict if a given worker will be with the firm five years down the road. Suppose that a personnel director hypothesizes that she can predict long term tenure with the company by asking a few questions in the

interview. Again, we can use the two-by-two contingency table to help us visualize the process of validating this predictor variable. The rows will represent the verdict of the interviewer, whether she likes or does not like the candidate who interviewed for the job. The columns will represent the job related outcome (e.g., whether the worker is still with the company after five years). Cells A and D represent those cases where the interviewer guessed right. Cells B and C represent where the interviewer guessed wrong.

If the vast majority of cases stack up in Cells A and D, the measure is valid. What matters almost as much is the particular pattern of errors (B or C). Some measures of variables tend to error on the side of *false positives* (e.g., the interviewer declaring that the interviewee will last five years when the interviewee does not) and some measures error on the side of *false negatives* (e.g., the interviewer saying that a given interviewee will not last, but the worker remains on the job).

WRITE IT RIGHT

Within scientific terminology, there are many terms which do not form plural nouns by adding s. Learn the proper pluralization of these nouns.

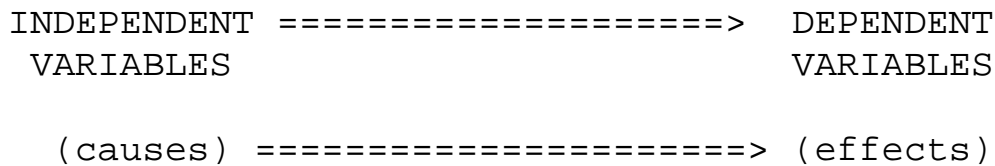
<i>Singular</i>	<i>Plural</i>
Bias	Biases
Criterion	Criteria
Datum	Data
Diagnosis	Diagnoses
Hypothesis	Hypotheses
Phenomenon	Phenomena
Stimulus	Stimuli

One datum is a single fact or bit of information, whereas data would be several bits of information.

Also remember to use a plural verb with plural nouns. For example, in the social, physical and medical sciences, the term *data* is treated as a plural noun, so we would say *these data were*. In the field of information technology, *data* is usually understood as a large, indivisible whole to be processed, so the noun is considered singular, and people in that field usually say *this data was*.

The goal of science is to study the orderliness of nature, or more specifically, to understand, predict, and control those phenomena. The way that science accomplishes these goals is through the use of causal models. Science tries to explain things in terms of cause and effect; and by observing causes, predict effects; and by manipulating causes, create certain effects.

There are two types of variables: **dependent** (observed effects) and **independent** (usually understood to be the possible causes of those effects).



Science uses inductive reasoning because it starts its quest for knowledge with the observation of specific cases. (In psychology we refer to these specific cases as *subjects* or *participants* in order to refer to the people or animals about whom we gather data.) In chemistry or biology the cases may be individual test tubes.

The **population** is the general class of cases we are studying. Examples of populations used in psychology might be all rats of a certain species, all female consumers, all U.S. voters, all workers in a certain industry, all depressed patients. Never refer to the *general population* because populations are always specific. In

other sciences, the cases might be inanimate objects, ranging in size from asteroids to atoms. Any one particular member of such a population would be one specific case.

Usually, we cannot directly observe all the members of a given population. We only get data from a few cases. A **sample** is what we call the cases actually observed. Examples of samples would be: the rats ($n = 24$) which we observed running this particular maze, the voters ($n = 980$) whom we polled, the customers ($n = 1,234$) who sent in product registration cards for the clothing purchased at the local WalMart in March, the workers ($n = 14$) on the dayshift in the shipping and receiving department, and patients ($n = 34$) receiving psychotherapy for depression at the clinic.

There are two essential features of good sampling. The first is an adequate sample size. As we shall see, according to the **law of large numbers**, the larger the sample, the more statistically significant the data. The second feature is that the sample be **representative** of the population. This is even more important than absolute size. If our sample of voters ($n = 980$) all came from a gun show, we should not expect them to represent the population of voters on a topic such as gun control. If our sample of clothing customers ($n = 78$) were all large sizes, that is not representative of all the clothing customers who may have different clothes buying experiences and preferences.

One kind of sample that is rarely representative is when the subjects are self-selected. A sample tends to be more representative of the larger population if they are similar on the most relevant background variables: gender, age, geography, etc. The problem with self-selected samples is that they result in samples from a specific demographic or psychographic that are more motivated to participate.

If we run an ad in the local newspaper inviting people to vote in a telephone poll about social security benefits, those who call in will not be a representative sample of U.S. voters. People who are

more likely to read the newspaper, have a phone, and have time to call in, will be over-represented. A more important factor in self-selected samples is motivation. People who are more fervent in their positions are more likely to participate. In this example of social security benefits, few young people might be motivated enough to make the effort to call in, while many older persons who are living on social security would definitely want their views made known. (Some might even call in several times, just to be sure.)

Another example of self-selected polls would be those conducted on the internet. Perhaps a profile of participants in such polls would be a 24 year old male, student, "geeky." In one Yahoo poll of the 2012 presidential preference among Republican candidates, libertarian Ron Paul came in first with nearly half of the votes, while the more traditional national polls found his support in the single digits.

Now consider this example. If we observe that half of the students in a political science class are Republicans, should we conclude that half of the students in the college are Republicans? If all students are required to take political science, and there is no other confounding variable (e.g., a conservative professor who attracts conservative students) then this one class may come close to being a representative sample of the population at the college. Otherwise, if students only take this course as an elective, and if students know that some professors are very liberal and others very conservative, the students who signed up for one particular class with one particular instructor may be considered a self-selected sample, and therefore not representative of the student population at that college.

The term **random** bears further explanation. It should not be used to imply haphazard, but an approach to sampling in which each member of the population has an equal chance to be selected into the final sample. Standing outside of the college library and handing out questionnaires to whomever comes out is a sample of convenience, not a random sample.

information that we have observed. A **theory** is an abstract concept we create or apply to help us understand, predict or control. Both theory and data are essential components for scientific knowledge. Data give us content. Theories give us context, by which we may frame the data. Theory without data is idle speculation, but data without theory are meaningless trivia.

DATA + THEORY = SCIENTIFIC KNOWLEDGE

"Science is built up with facts, as a house is with stones. But a collection of facts is no more a science than a heap of stones is a house."

- Jules Henri Poincare

What links theory and data is the dynamic and interactive process of hypothesis testing. Natural phenomena are not chaotic: they only appear to be chaotic because they do not greatly fit the rationally ordered models of our powers of scientific explanation. Scientific knowledge is the product of the scientific method, but the method itself is a process. The best policy for increasing the quantity of scientific data and the quality of scientific knowledge is not to reify the existing pool of data or the old theories used to interpret those data. The best policy for improving future scientific knowledge is to nurture the scientific method, especially those forms which seek to push beyond the limitations of current data and past theory.

Formal scientific research begins with a specific question or prediction based upon some theoretical or assumed relationship between variables. A **hypothesis** (plural hypotheses) is what we call a specific prediction guiding research. The purpose of the research is to gather data that can test the hypothesis. When the data come in, they are said to confirm (or fail to confirm) the initial hypothesis. We then have an opportunity to revise the theory,

generate a new hypothesis, and engage in a new round of research. The body of knowledge generated by science grows and improves through each of these rounds, whether or not we confirm our hypotheses. Each new set of data should modify the theory or at least suggest a new hypothesis.

Let's look at one example, that the earth is spherical rather than flat.

*"In days of old,
when knights were bold,
and science not invented,
the earth was flat,
and that was that,
with no man discontented."*

The theory of the flat earth is a most useful theory if we only have technology for ground transportation. Over five hundred years ago, with the advent of ships with trans-oceanic capabilities, navigators such as Columbus, Magellan and Drake began to doubt the theory of the flat earth. New data of how a ship disappeared over the horizon did not fit the theory of the flat earth, but would be more consistent with the theory of a spherical planet. So, these navigators came up with a new hypothesis: sail west to arrive in the east, and perhaps circumnavigate the globe. Later, when air travel became a possibility, a new hypothesis was advanced: that it would be shorter to fly from Los Angeles to Moscow over the North Pole than to fly due east. Again, the hypothesis was confirmed by flight data.

Later, when space travel became a possibility, it was hypothesized that a small satellite or capsule containing human travelers could orbit the planet. Again, confirmatory data were generated by this research. Prior to photography from space, it might be said that a spherical earth had never been observed, that it was just a theory that had successfully generated a series of confirmed hypotheses.

Karl **Popper** was a 20th century philosopher who defined the scientific process as the attempt to disconfirm hypotheses. Indeed, Popper contended that if a theoretical system could not conceivably be challenged by empirical data, such a theoretical system had no right to the title of science. Religious doctrine, therefore, could not be called *scientific*.

An **ad hoc** hypothesis is one that is so broad and flexible, that it can explain anything. An ad hoc theory claims to be able to explain everything, including why

- previous predictions were not fulfilled
- things that were not predicted happened
- similar cases have opposite results
- opposite cases have similar results

Popper would say that such ad hoc hypotheses have no place in science. One of his favorite targets was Sigmund **Freud**'s system known as **psychoanalysis**. Regardless of what his patients told him, Freud was able to explain it according to his psychoanalytic principles. One of the main tenets of psychoanalysis is the Oedipus Complex, that little boys develop a sexual attraction to their mothers, and then see their fathers as rivals who must be killed. So, if a patient admits to lusting for his mother and hating his father, Freud would cite that as direct proof of his theories. If, on the other hand, the patient vigorously denies such emotions, Freud would say that the patient is using powerful defense mechanisms, and that more psychoanalysis is required in order to bring out the Oedipus Complex. So, either way, psychoanalysis can explain the situation. So, according to Popper, this is not science.

Most research in social sciences like psychology comes in the form of a survey in which several variables are measured in a large sample, and then an attempt is made to find a relationship between the variables. There are several ways that survey data can be gathered: in laboratories, field counts, questionnaires and archives. As long as we are merely measuring variables, do not call such research an experiment.

An **experiment** is research in which the independent variable is intentionally manipulated by the investigator. As in a survey, the sample should be large and representative of the population, and the dependent variables should be measured precisely, reliably, and validly. The major difference between a survey and an experiment is that a survey just measures the variables, while an experiment takes an independent variable and then manipulates it. The end result is that the experiment is the best way to infer a cause and effect relationship between the variables.

Suppose you have the theory that vitamin C helps prevent the common cold. So, you generate the hypothesis that people who regularly take vitamin C will report fewer colds. If you just asked a hundred people two questions

Do you consume vitamin C regularly?

Have you had a cold in the past year?

You would probably find data appearing to be confirmatory: the people who take Vitamin C will report fewer colds. However, is that the best causal explanation for the observed data? Perhaps the people who took the vitamin C are more health conscious and exercise regularly, eat better, wash their hands more often, and avoid contact with people who are already infected with the cold virus. As we shall see in the next section, trying to infer causation in a survey is not easy.

"In many sciences (physiology, pathology, physics, chemistry) experimentation is more important than observation itself. It is impossible to discover anything in physics or physiology without envisioning an original experiment, without subjecting the phenomenon of interest to more or less new conditions. And the study of morphology itself (histology, anatomy, embryology), where observation seems enough, is acquiring a more experimental character every day."

- Santiago Ramon y Cajal

A better approach is experimentation. Take a sample of people and randomly assign them to two groups. (Here, **random** means that each subject has an equal chance, compared with every other subject, of winding up in a particular group.) When subjects can select their own groups, that is not random. In the example of vitamin C, we would not allow our subjects to choose whether or not they took vitamin C everyday, because that would make the "experiment" no different from the survey: whether or not the subjects were taking vitamin C would no longer be independent of their choice or preference. In a true experiment, one of these two randomly selected groups, the experimental, would receive the vitamin C supplements, and the other group, known as the **control** (not the controlled, but the control) would not receive the supplements. To equalize the impact of expectations, each group would receive the same kind of daily capsules, but the experimental group's capsules would contain vitamin C and the control group's capsules would contain an inert substance, known as a **placebo**. Now, if we notice a difference between the two groups in terms of the incidence of colds, we may infer that the vitamin C was the cause.

"To call in the statistician after the experiment is done may be no more than asking him to perform a postmortem examination: he may be able to say what the experiment died of."

-R.A. Fisher

More guidelines about the proper design of experiments and use of questionnaires can be found in my other books.

At this point, let us say that science is a fascinating endeavor. Scientific knowledge is not the sole product of individual effort, but of a community's coming together on a certain point, of each individual building on what has been done in the past. In this sense, induction is more "democratic" compared to deduction. Deduction may work with a Pope, Sanhedrin, or Supreme Court that can set the authoritative definitions, but induction is more of a bottom-up approach, growing out of data, not authorities. The question is not *Who is right?* but *What is right?*

I consider myself a professional scientist and an amateur philosopher, and perhaps that is why I am so critical of deduction and enthusiastic about induction. However, never forget the inherent limitations of induction. The process of induction cannot verify that induction itself is cogent.

Neither can science verify that the scientific method is the only path to truth. **Scientism** is the name for the position that science is the only source of truth. Note: the doctrine of scientism cannot itself be established empirically, therefore scientism is a self-contradicting paradox.

Statistics & Precise Scaling

The use of statistics involves techniques for describing and analyzing numerical data taken from samples. Data are said to be **qualitative** if they are non-numerical, i.e., if they describe variables or constants by using narrative (words instead of numbers). Such data come from in-depth case studies, open-ended interviews, focus groups, ethnographies, field observations, or analyses of text and images. No statistics can be performed on purely narrative level data. Data are said to be **quantitative** if

they are based upon numerical results of counting. Numerical data can be expressed in different scales that differ according to their levels of precision.

Nominal scales involve classification of each case into a distinct category.

VARIABLE: Did the worker have an accident on the job?

NOMINAL MEASUREMENT: yes/no

VARIABLE: Was the customer a man or a woman?

NOMINAL MEASUREMENT: male/female

VARIABLE: Did the customer view the experimental ad?

NOMINAL MEASUREMENT: experimental/control

VARIABLE: Did the newly hired worker pass job training?

NOMINAL MEASUREMENT: passed/failed

VARIABLE: Which brand did the customer purchase?

NOMINAL MEASUREMENT: brand X / brand Y / brand Z

Nominal scaling is easy, but it lacks precision: the exam taker who just barely passed and the one who got a perfect score would both be lumped into the *passing* category; the exam taker who missed one extra item would be lumped into the *failing* category, along with the guy who missed every item.

One step up on the quest for greater precision is the use of **ordinal** scaling having some form of ordering, seriation, ranking, or other comparison or gradation of magnitude or degree. In other words, ordinal scales mean that two cases can be compared in such a way so that one case can be said to have more of the variable, or be higher on that variable, compared to the other case.

VARIABLE: Do workers agree with the new policy?

ORDINAL MEASUREMENT: agree / neutral / disagree

VARIABLE: Worker performance rating

ORDINAL MEASUREMENT: outstanding / good / fair / poor

VARIABLE: Years with company

ORDINAL MEASUREMENT: under 2 / 3-5 / 5-10 / over 10

VARIABLE: How often does customer have to wait in line?

ORDINAL MEASUREMENT: sometimes / usually / always

A greater level of precision can be attained with **interval** scaling, where each case gets a number to represent its score on a variable. Here is an example an intervally scaled variable.

VARIABLE: Temperature on a thermometer

INTERVAL MEASUREMENT: 75 degrees Fahrenheit

For an interval scale, this score must be constructed so that the ten point difference between 30 and 40 has the same quantity of the variable as the difference between 80 and 90. The following example may not qualify, and may only be an ordinal scale using numbers subjectively and artificially.

VARIABLE: Worker performance evaluation

INTERVAL MEASUREMENT: rating a 7 on a 1-10 scale

An even more precise scale would be **ratio**. This requires that the number actually be proportionate to the quantity of the variable possessed (and that there be a true zero point). So, neither Fahrenheit nor Celsius temperatures would qualify, but the Kelvin scale would, where zero degrees means no heat at all. **Discrete ratio** scales deal with indivisible units, such as

VARIABLE: Worker production

INTERVAL MEASUREMENT: 321 appliances produced

Continuous ratio scales involve variables in which the units can be divided into fractions or decimals for even greater precision, such as

VARIABLE: Time

INTERVAL MEASUREMENT: the operation took 13.6 seconds

VARIABLE: Distance

INTERVAL MEASUREMENT: traveled 136.5 miles

This digression into mathematical scaling is important in order to illustrate a serious chasm between classical logic and modern science. Nearly forty years ago when I began the study of formal logic, I could not get past the law of bivalence. Oh sure, I understood it, but I could not accept it. *A given subject either has a predicate or it does not have the predicate.* Sorry, Aristotle, that is just too rigid a view of the world: all black or white with no shades of gray. Shall we say that the temperature in my office is hot? The law of bivalence says that we must answer yes or no: hot or not. Perhaps an ordinal scale would be more appropriate: hot, warm, temperate, cool, chilly, cold. Of course, a more precise scale would be interval: 82 degrees Fahrenheit. The principles of the excluded middle and bivalence do not apply to many synthetic statements when we measure with ordinal or interval scaling. We do not ask if a person is tall or short, but how tall a person is in feet or centimeters.

But since categorical reasoning is assumed by deduction, we are limited to the least precise measures provided by nominal scaling. Scaling other than nominal fudges on the law of the excluded middle: it is not whether a thing has a property, but how much of the property it has. Induction can deal with averages, percents, and correlations, and therefore, all the shadings and complexities of the empirical world.

Correlation

A **correlation** is the relationship between two variables (or two different measures of the same variable). To say that two variables (or measures) are correlated merely means that they vary together, and does not necessarily imply that one is the cause of the other (although, this might be the case). Here are some words that suggest a correlation

associated with

linked to

related to

Whenever we observe a correlation, we need to know two things about it: the direction (i.e., direct or inverse) and the magnitude (i.e., strong or weak).

To say that a correlation is **direct** means that the two variables go in the same direction, such that if one variable is high, so is the other, and if one variable is low, so is the other. Direct correlations are termed **positive** because the mathematical formulas used to calculate their strength yield a positive number when the association is direct. Do not infer that there is anything *good* or favorable about a positive correlation. For example, there is a direct relationship between cigarette smoking and lung cancer: people who smoke more cigarettes are more likely to develop lung cancer. So, the correlation is positive even though cigarettes and cancer may be bad things.

To say that a correlation is **inverse** means that the two variables go in the opposite direction, such that if one variable is high, the other must be low, and vice versa. Inverse correlations are termed **negative** because the mathematical formulas used to calculate their strength yield a negative number when the association is inverse. Do not infer that there is anything bad or unfavorable about a negative correlation. For example, there is an inverse relationship between the amount of physical exercise that a person gets and that person's chance of having a clinical depression. So, the correlation is "negative" even though exercise is good and the absence of depression is good.

WRITE IT RIGHT

Be extremely cautious about using the words "positive" and "negative" in this class. You may use them for describing a technical statistical term, such as false positive, false negative, positive correlation, or negative correlation. You may also use "negative" to describe the side in a debate that opposes the resolution, or the approach of the modus tollens: denying the consequent. However, do not use "positive" or "negative" to mean good or bad, favorable or unfavorable.

Remember, when it comes to correlations, do not call them *good* or *bad* (or *excellent* or *fair* or *poor*).

If we take any two variables at random, the odds are that there will be no relationship between them: neither direct nor inverse. To describe this lack of relationship, we use the term **zero** correlation.

The second dimension in describing correlations is their strength. By this we mean how strong is the trend? Is there a precise and proportionate relationship of one variable to the other which holds in every case, or are there some exceptions to the trend? If there are no exceptions, the correlation is perfect (represented by +1.00 or -1.00). If there are but a few exceptions, the correlation is strong. If there are many exceptions, the correlation is weak. If there are so many exceptions that there is no trend, we have a zero correlation. (On the other hand, if most of the cases were exceptions, then there would be a trend in the other direction.)

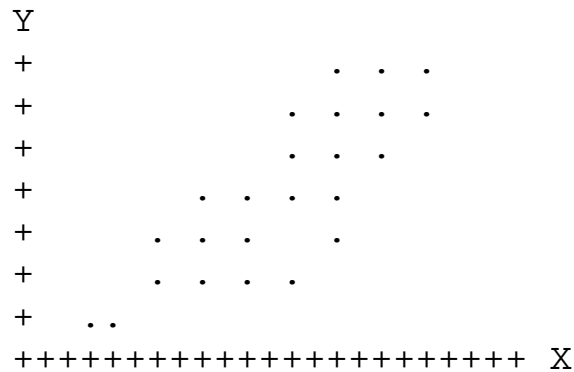
The next table shows how we use decimal numbers to describe the strength of the correlation. A **correlation coefficient** is a number with a theoretical range between -1.00 and +1.00 (but remember: the negative or positive sign just tells us the direction of the relationship). The closer to zero, the weaker the relationship, the closer to 1.00 (positive or negative 1.00) the stronger the relationship between the variables.

+1.00	perfect positive	no exceptions to trend
high	strong positive	few exceptions to trend
+ .60	moderate positive	some exceptions to trend
+ .20	low weak positive	many exceptions to trend
0.00	low weak negative	many exceptions to trend
-.20	moderate negative	some exceptions to trend
-.60	high strong negative	few exceptions to trend
-.100	perfect negative	no exceptions to trend

These cut offs are not hard and fast: studies with human subjects (e.g., marketing, management) rarely get correlations above .60, but studies of inanimate objects frequently get high correlations.

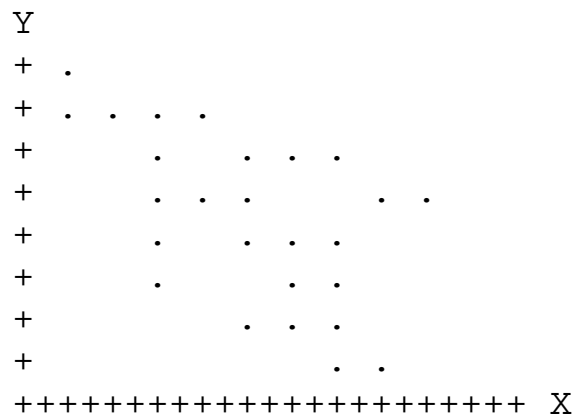
When both variables are scaled intervally, a graphic display of correlation would be the **scatter plot**. This may look like a frequency distribution, but these data are **bivariate**. Each data point represents an individual case. The **X** (horizontal) coordinate represents one variable, while the **Y** (vertical) coordinate represents the other variable. The strength of the correlation is indicated by how closely the individual points of data approximate a straight line: a perfect correlation would have all data points on the line, a zero correlation would have the points so scattered that no line could approximate them. If, as we move from left to right, the slope of the line rises, the correlation is positive.

SCATTERPLOT FOR STRONG, POSITIVE CORRELATION



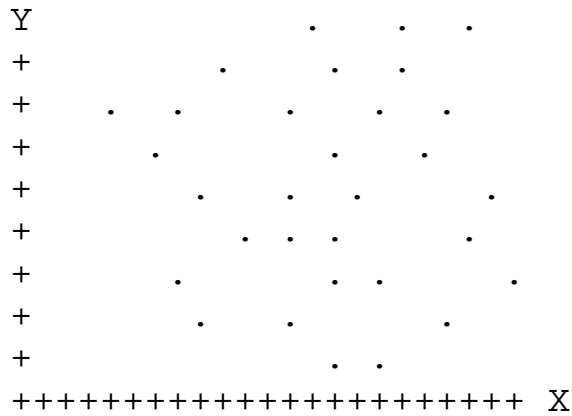
If, as we move from left to right, the slope of the line falls, the correlation is negative.

SCATTERPLOT FOR MODERATE, NEGATIVE CORRELATION



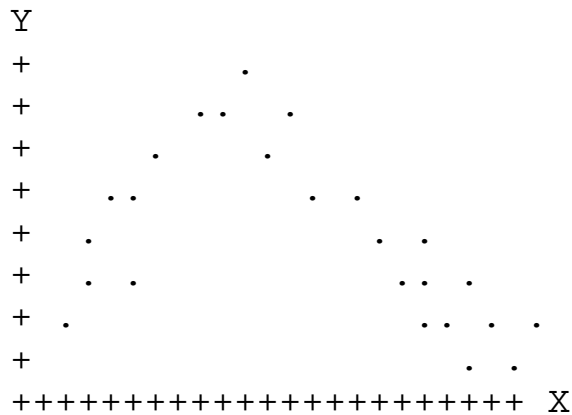
If the line is vertical or horizontal, the correlation is really zero because one of the variables turns out to be a constant. Even if either variable is a constant, many correlations approximate zero if there is no obvious linear trend to the bivariate distribution of data points, such as seen in the following example.

SCATTERPLOT FOR ZERO CORRELATION DUE TO LACK OF TREND



Another way to calculate a zero correlation is when the relationship between the two variables is curvilinear. Perhaps there is a direct relationship between the variables over the lower range of X, but then an inverse relationship over the higher range of X.

SCATTERPLOT FOR ZERO CORRELATION DUE TO CURVILINEARITY



The two-by-two **contingency table** is another diagram for showing correlation, especially in nominally scaled variables (e.g., male-female, yes/no, pass/fail, experimental/control). Let's

consider this example: *is there any correlation between whether or not a worker has had safety training and whether that worker passed the safety test?* Here we would use rows to represent the variable of training: the top row for workers who were trained, and the bottom row for workers who were not trained. We would use the columns to represent our outcome variable: the left column for those who passed the safety test, and the right column for those who failed the safety test. Suppose out of a sample of 50 workers (N) twenty went through training and thirty did not. Out of the trained group, 15 passed the test, and five did not. Out of the untrained group, only ten passed the test, and 20 did not. The table shows where each of these numbers goes.

		VARIABLE TWO: PASSED SAFETY TEST?		
		YES	NO	totals
#####				
TRAIN	##		#	##
	##		#	##
V	##		#	##
A	##		#	##
R	##	15	#	##
I	##		#	##
A	##		#	##
B	##		#	##
L	##	CELL A	#	##
E	##	CELL C	#	##
#####				
O	##		#	##
N	##		#	##
E	##		#	##
	##	10	#	##
	##		#	##
	##		#	##
NO	##		#	##
TRAIN	##		#	##
#####				
totals		A+C	B+D	N = A+B+C+D
		25	25	50

Notice how for these data, most cases stack up in cells A and D: the workers with the training passed the test, and the workers with out the training did not pass the test. So, that is a direct relationship, a "positive" correlation. (Remember, it is *positive* because it is direct, not because training is good or passing the test is good.)

Regarding the strength of this relationship, notice that there are a number of exceptions to the trend: the five workers who failed the test even though they had the training and the ten workers who managed to pass the test even without the training. These exceptions mean that we do not have a perfect correlation, or even a strong one. The actual correlation computes to about $+0.4$ (in this class, you do not have to worry about the formula we used to get that coefficient), but just know that $+0.4$ is a moderate, direct relationship.

If the relationship had been inverse, we would have expected most of the cases to pile up in cells B and C. If the relationship had been close to a zero correlation, the product of A x D would have been close to the product of B x C. Or, to put it in terms of our example, the proportion of the trained group passing the test would have been close to the proportion of the untrained group passing.

The concept of correlation enables us to come to a better understanding of reliability and validity. Remember how we could depict reliability as a simple two by two contingency table showing agreement / disagreement. That means that we could calculate a correlation coefficient showing the consistency. If a measure of a variable is reliable, we should have a strong correlation between the measures. When it comes to validity, we are correlating a given measure (to be validated) with an established measure of that variable. If a measure of a variable is valid, we should have a strong correlation with the established measure.

With our new perspective on correlation, we can revisit a key topic of this entire book: **stereotypes** (simplistic generalizations about groups of people). Any topic can be analyzed on three levels of critical thinking: the talk show level, the high school level, and the university level. When we listen to radio talk shows, we are bombarded by stereotypes presented as if they were reality, including racist, homophobic, sexist, ageist and xenophobic stereotypes. In high school we get an equally simplistic formula: "there are no stereotypes, everyone is an individual." Now that we understand a little more about the conceptual tools of induction and correlation, we can approach a university level answer to the question of stereotypes.

Let's take the stereotype that certain ethnic groups are smarter. In order to study that empirically, we need to operationalize what we mean by being "smarter": perhaps getting into a good university. Maybe we have to reflect on the validity of that measure, because there may be some other confounding variables (e.g., parental pressure, ability to afford to go to college). That being said: is there a correlation between certain ethnic backgrounds and attendance at college? Or to put it differently, are certain ethnic groups disproportionately over-represented in college attendance?

When I was a student at the University of Chicago, there was a joke which contained three stereotypes. "We have the best of all worlds: Baptist money, Catholic theology, and Jewish students." The university was founded by a large donation from the devout John D. Rockefeller to what was then a small Baptist seminary. By the 1930s, the divinity school had hired many leading Roman Catholic theologians. Even when I was there in the 1970s, I noticed many Jewish students and professors. Not every Jewish person in Chicago was affiliated with the university (only a small percentage were) and not every student and professor were Jewish (indeed, only a minority were). However, less than three percent of the U.S.

population is Jewish, and the proportion of students (and professors) at the University of Chicago was much higher than that. So, there was a positive correlation (be it a weak one) between being Jewish and being at the University of Chicago.

When I taught at University of California Riverside, the stereotype was that most students were Asians. In a large class, I would have over a dozen Nguyens, and almost as many Kims and Lees. Most Asians in California are not attending the University of California system, and most of the students in that system are not Asian, but there was a correlation: Asians were over a third of the student body at most UC campuses, yet they were only about a tenth of the population of California. So there was a positive correlation (at best a moderate one) between being Asian and being in the University of California system.

Or turn to the area of sports and ethnicity. Go to most golf courses: predominantly white, African-Americans will be under-represented. Go to most tennis courts: predominantly white, African-Americans will be underrepresented. Go to a professional basketball game, and African-Americans will be overly represented. So, yes, there is a correlation between ethnicity and sports.

Or look at occupations. Not every person of Hispanic descent is a gardener, and not every gardener is Hispanic, but non Hispanic gardeners would be exceptions to the trend, for Hispanics are over-represented in that occupation, at least in California. Go to the airport and look at the pilots and the sky caps to see another correlation: African-Americans are under-represented in the former, and over-represented in the latter.

To acknowledge a correlation is to acknowledge a fact, and there is nothing evil in that. What is wrong is to make a decision about individuals based upon stereotypes (profiling) when we have better data about that particular individual. If we stick to stereotypes, we would have told

Jeremy Lin to be an anesthesiologist, instead of a basketball player

Tiger Woods to be a basketball player instead of a golfer

The Williams sisters to be social workers instead of tennis players

Eminem to be a Country singer instead of a rapper

When we see a tall African-American male, if we rely on stereotypes, we advise him to try for a career in the NBA, but if we look at his individual SAT scores, we may realize that he could be a financial analyst, and if we look at his chemistry grades we realize that he could be an anesthesiologist.

One of the most profound assumptions of hate talk is that people can be labeled through deductive reasoning rather than inductive: the assumption that ethnic and religious labels are analytic rather than synthetic. This holds only for a limited range of variables. The only thing we can say, analytically, about all Christians is that they accept Jesus as their savior (for otherwise, they would not be Christians). The only thing we can say, analytically, about all atheists is that they reject God (for otherwise, they would not be atheists). When we start making inferences about their behaviors, then we are in the realm of correlations, and that is inductive reasoning. Once we have had the chance to directly observe the individual behavior of a specific Christian or atheist, then we have better information to make inferences about that person's morals.

What the research of most psychologists and sociologists shows is that most of the stereotypes widely accepted have, at best, moderate levels of correlation. This means that, in practice, if we attempt to use stereotypes as a guide for predicting behavior, we end up with large numbers of both *false positives* and *false negatives*. If we were recruiting for the NBA based solely on ethnicity, we would take Gary Coleman (a false positive) over Yao

Ming (a false negative) because African-Americans are on average better basketball players than Chinese are. What industrial psychology has demonstrated is that there are better predictors of future behavior, and these predictors need to be applied at the individual level. Height may be a better predictor than ethnicity when it comes to playing basketball, but there are probably better predictors than height, such as skills based tests for each NBA candidate.

Another pitfall in correlational reasoning is the fallacy known in Latin as *post hoc ergo propter hoc*. This translates as "B happened after A, therefore, B happened because of A." What this means is that many times we leap to a causal inference after observing a correlation. The robin arrives at the beginning of spring. Did the arrival of the robin cause the change of seasons? There is a correlation between how well baseball players perform and how much they are paid: the best paid players have the best records. Can we improve an average player's performance by doubling his salary? To answer yes to either of these questions would be obvious examples of the **post hoc** fallacy, of mistaking a sign of something for its cause.

When we have two correlated variables (X and Y), multiple hypotheses can explain why they go together. Perhaps X is the cause of Y as the post hoc explanation assumes. Perhaps Y caused X. In the above examples, the coming of spring caused the robin to return, and the baseball players' superior performance earned them superior financial compensation. Yet another explanation is that both observed variables (X and Y) might be merely collateral effects, both produced by the same underlying cause (perhaps another variable, Z). We speak of such a relationship as a **spurious** correlation. Such a correlation can be direct or inverse, strong or weak, but it cannot be explained as one variable having caused the other.

An example of a spurious correlation would be the temperature as reported on the bank temperature sign in downtown Redlands, and

the temperature reported on the thermometer in my backyard, about a mile away. On a hot July afternoon, the bank temperature sign might read 99 degrees, and my backyard thermometer might be 97 degrees. On a cool January morning, the bank temperature sign might read 41 degrees while my backyard thermometer might say 43 degrees. When one measure is high, so is the other. When one measure is low, so is the other. The correlation is direct and quite strong, for there are very few variations from a linear pattern. But, neither variable causes the other. My backyard thermometer is not hooked up to the bank temperature sign. When the people at the bank arrive in the morning, they don't call me up and ask me to run out in back and let them know the temperature so that they can set their sign. Neither of the two measures has an influence on the other. They are both mere effects of the same underlying cause: the ambient temperature in Redlands. Even though the correlation is spurious, we can still use knowledge of one measure to predict the other.

Here is another example of a spurious correlation: student performance on the first quiz and the performance on the second quiz. The correlation is positive: students who do well on the first quiz tend to be the same people who do well on the second quiz, and those who do poorly on the first quiz tend to be the same who do poorly on the second quiz. However, in this example the correlation is only of moderate strength, for there are more exceptions to the trend: some students slacked off after getting a high grade on the first quiz, and others used their low grade on the first quiz as a wake up call. Therefore, this correlation offers less ability to predict from one score to another (compared to our example of the temperature). The important thing about this example is that the correlation is spurious: neither quiz grade caused the other quiz grade. Both quiz grades were merely the effects of the students' abilities and efforts.

Probability

Probability is the likelihood of an occurrence. Deductive reasoning assumes that outcomes have a probability of either 1.00 (certainty) or 0.00 (impossibility), but inductive reasoning attempts to estimate a decimal number in between. The fact that both correlation coefficients (symbolized by the letter ***r***) and probabilities (symbolized by the letter ***p***) use decimal numbers leads to a great deal of confusion.

Classical probability assumes that the alternative events (X,Y,Z) are mutually exclusive (only one can be the observed outcome), are collectively exhaustive (one of these outcomes must occur), and have equal likelihood (in the case of this example, that probability would be 33.33% for each). Classical probabilities simply take the number of possible outcomes (like different categories of a variable on a nominal scale) and assume that the probability of each event is $1 / M$ (where M is the number of possible outcomes).

The **empirical probability** formula is that relative frequencies of past observations should be used to calculate probability:

P = number of past observations for an outcome / total observations

For example, if a soccer team has already played a total of 10 games this season, and won four of them, the empirical probability of winning the next game would be .40.

Empirical probabilities are sometimes called **a posteriori** because they calculate the likelihood of an event after observations have been made, while classical probability is sometimes called a priori because its assumptions are made before (prior to) observations are made (or despite observations which have been made).

However, the empirical approach is also making an assumption that cannot be proved: that past observations are the best predictor of the trend of future observations.

Subjective probability is merely a person's estimate of what will occur in the future. (This is sometimes called **epistemic probability**.) Subjective probabilities may be no better than guesses overly determined by emotional factors, but they could also represent human wisdom influenced by expertise and knowledge.

Regardless of which type of probability we are dealing with (classical, empirical or subjective), the **complement** rule applies. The probability of an event **P** and **~P** must equal 1. So, the probability of **~P = 1 - P**.

		EVENT Y		
		OCCURS	DOES NOT	totals
#####				
OCCURS	##	#		##
	## JOINT	#	ONLY X	##
	##	#		##
	## event X occurs	#	event X occurs	## P(X)
	##	#		##
E	## event Y occurs	#	event Y does not	##
V	##	#		## A+B
E	##	#		##
N	## CELL A	#	CELL B	##
T	#####			
	## CELL C	#	CELL D	##
X	##	#		## C+D
	## ONLY Y	#	NEITHER	##
	##	#		##
	## event X does not	#	event X does not	##
	##	#		##
DOES	## event Y occurs	#	event Y does not	## 1-P(X)
NOT	##	#		##
	##	#		##
#####				
totals	P(Y)		1 - P(Y)	1.00 = A+B+C+D

One diagram to understand probability is the contingency table, and this time we will use probabilities rather than observed cases. When two events are being measured, we can examine the relationship of their respective outcomes.

The probabilities of the individual events occurring (or not occurring) are written in the margins (for totals) so we call them **marginal** probabilities.

When *both* of two outcomes (one from one variable and from the other) occur simultaneously, this is referred to as **joint** (or conjoint) probability. This is like the concept of a conjunction that we covered in a previous chapter. If the probability of event X is $PX = (A+B) / N$ and the probability of event Y is $PY = (A+C) / N$, then there are three different ways we could use to find this joint probability, and they all work, and give the same answer.

We could simply multiply each marginal probably

$$\text{JOINT } P(X,Y) = P(X) \text{ times } P(Y)$$

We could take the number of cases in cell A and divide by the total number of cases N.

$$\text{JOINT } P(X,Y) = A / N$$

Using the complement rule, we could subtract the **PROBABILITIES** of cells B,C, and D from 1.

$$\text{JOINT } P(X,Y) = 1 - P(B,C,D)$$

The probability of *neither* event occurring can be found in any of three ways also.

We could simply multiply the probabilities of each event not occurring.

$$P(\text{not } X, \text{ not } Y) = P(\text{not } X) \text{ times } P(\text{not } Y)$$

We could take the number of cases in cell D and divide by the total number of cases N.

$$P(\text{not } X, \text{ not } Y) = D / N$$

Using the complement rule, we could subtract the PROBABILITIES of cells A,B,C from 1.

$$P(\text{not } X, \text{ not } Y) = 1 - P(A,B,C)$$

The probability of *either* event occurring (i.e., at least one of the two events) is like the concept of disjunction covered in a previous chapter. This probability can be found in any of three ways.

We could use the addition rule of probabilities

$$P(X \text{ or } Y) = P(X) \text{ plus } P(Y) \text{ minus } P(X \text{ and } Y)$$

We could take the number of cases in cells A,B,C and divide by the total number of cases N.

$$P(X \text{ or } Y) = (A+B+C) / N$$

Using the complement rule, we could subtract the probability of cell D from 1.

$$P(X \text{ or } Y) = 1 - D$$

Another diagram that can be used is a Venn Diagram showing overlapping circles (* represents the overlap of *both* X and Y). The parts that are X are X and not Y. The parts that are Y are Y and not X. The blank background represents *neither* X nor Y.

Venn Diagram

```

      XXX          YYY
    XXXXXXXX     YYYYYYYY
  XXXXXXXXXXXXX  YYYYYYYYYYYY
XXXXXXXXXXXXXXXX**YYYYYYYYYYYYYY
XXXXXXXXXXXXXXXX***YYYYYYYYYYYYYY
XXXXXXXXXXXXXXXX**YYYYYYYYYYYYYY
  XXXXXXXXXXXXX  YYYYYYYYYYYY
    XXXXXXXX     YYYYYYYY
      XXX          YYY

```

The aforementioned diagrams and formulas for probabilities are based upon the assumption that the probabilities of X and Y have statistical independence, i.e., that whether or not X has occurred should not have an impact on whether or not Y occurs. This may be a faulty assumption in the real world, because the occurrence of X may make Y more (or less) likely in practice. In other words, X may be an independent variable impacting Y as a dependent variable. This condition is known as statistical dependence.

The **conditional probability** of an event is the probability of it occurring, given that another event has already occurred. For example, if the event defined by X has already occurred, then we know we are operating on row 1, and the probability of event Y is $A / (A+B)$. If we do not know if the event defined by X has already occurred, then the probability of the second event is $(A+C) / N$

"An event that has already taken place has a 100% probability."

- N.N. Taleb

It is only by looking at such concepts as joint probabilities that we can begin to apply logic to *some* statements.

With deduction, syllogisms use ALL, ONLY or NO statements.

MAJOR PREMISE: All dogs are canines.
MINOR PREMISE: All Chihuahuas are dogs.
CONCLUSION: All Chihuahuas are canines.

Syllogisms don't work for induction because they cannot handle SOME statements.

MAJOR PREMISE: Some dogs are large.
MINOR PREMISE: Some dogs are Chihuahuas.
CONCLUSION: Some Chihuahuas are large !?!

Here's the lesson: with two particular premises (SOME statements) no deductive conclusion can be reached. So, instead of deduction, we must use induction; instead of viewing these statements analytically, we must view them synthetically; instead of the syllogism, we must use the two-by-two contingency table; instead of classical, a priori, probability, we must use empirical, a posteriori probability.

Classical probability says that we construct the contingency table by setting the marginals first and then multiplying through to find the probabilities in each cell. This presumes statistical independence, so that if half of all dogs are large, and a tenth of all dogs are Chihuahuas, then we would expect to find 5% of all dogs being large Chihuahuas. When you look at this as a conditional

probability, and we start off knowing that we are dealing with a Chihuahua, such a prior assumptions would lead us to assume that half of all Chihuahuas are large.

		CHIHUAHUA		
		YES	NO	totals
#####				
LARGE	##		#	##
	##		#	##
	##		#	##
S	##		#	##
I	##		#	##
Z	##		#	##
E	##	.05	#	.45
	##		#	##
O	##	CELL A	#	CELL B
F	##	#####		##
	##	CELL C	#	CELL D
D	##		#	##
O	##		#	##
G	##		#	##
	##		#	.50
	##	.05	#	.45
	##		#	##
SMALL	##		#	##
	##		#	##
#####				
		.10		.90
totals		P(Y)	1 - P(Y)	1.00 = A+B+C+D

The empirical approach says that we start with observing individual dogs. The first dog is Goliath, a large Great Dane. We would put him in Cell B because he is large (row one) and not a Chihuahua (column two). The next dog is Paquito, a tiny Chihuahua, so he goes in Cell C. When we are done observing each member of our sample, we convert the numbers to proportionate probabilities, and we come up with something like that below, showing a 0.00 probability of seeing a large Chihuahua.

CHIHUAHUA

	YES	NO		totals
LARGE	#####	#####		
	##	#		##
	##	#	Goliath	##
	##	#		##
S	##	#		## P(X)
I	##	#		##
Z	##	#		##
E	## .00	# .50		## .50
	##	#		##
O	##	#	CELL A CELL B	##
F	#####	#####		
	##	#	CELL C CELL D	##
D	##	#		##
O	##	#		##
G	## Paquito	#		## .50
	##	#		##
	## .10	# .40		##
	##	#		## 1-P(X)
SMALL	##	#		##
	##	#		##
	#####	#####		
	.10	.90		
totals	P(Y)	1 - P(Y)		1.00 = A+B+C+D

Notice you have most of the dogs in Cells B and C: that means an inverse relationship between being a Chihuahua and being a large dog. The correlation is not strong because there are exceptions: there are some other breeds of dogs that are small.

Deductive reasoning is based upon categorical statements such as

- All S is P.
- Only S is P.
- No S is P.

When we observe that *some S is not P*, we have just established the contradictory of, and refuted that

- All S is P.

- Only P is S.

When we observe that *some P is not S*, we have just established the contradictory of, and refuted that

- All P is S.

- Only S is P.

When we observe that *some P is S*, we have just established the contradictory of, and refuted that

- No S is P.

- No P is S.

We should also revisit the previous chapter on conditional statements. I fear that most logic textbooks oversell modus ponens and modus tollens, as if their conclusions are always a certainty, while too easily dismissing the "fallacies" of affirming the consequent and denying the antecedent as if their conclusions were never right. Let's take this example:

If you earn a college degree, you will earn a high income.

Modus ponens tells us: Jack earned his degree last June, so he will earn a high income.

Modus tollens says: Jill is a forty year old impoverished woman, so she must not have completed college.

Let's view these claims with the aid of the two-by-two contingency table and empirical probabilities derived from a sample of the educational and income levels of a representative sample of a hundred adults between thirty and fifty years of age.

		INCOME LEVELS		
		HIGH	LOW	totals
YES		#####	#####	#####
	##		#	##
	##		#	##
C	##		#	##
O	##		#	##
M	##	20	5	## 25
P	##		#	##
L	##		#	##
E	##		#	##
T	##	CELL A	# CELL B	##
E		#####	#####	#####
D	##	CELL C	# CELL D	##
	##		#	##
B	##		#	##
A	##		#	##
	##	15	60	## 75
D	##		#	##
E	##		#	##
G NO	##		#	##
R	##		#	##
E		#####	#####	#####
E		#####	#####	#####
totals		35	65	100 = N

We will probably find a direct correlation of moderate strength similar to the one depicted in the table: most people who have

earned degrees earn a higher income, and most people without degrees do not. However, the reality is that there are exceptions. Some degree holders choose to work in lower paying careers (e.g., social work) or obtained their degrees from less prestigious universities (e.g., University of Phoenix) and had their resumes thrown in the trash. Some non-degree holders were able to earn a high income perhaps by starting their own businesses or capitalizing on some artistic talent.

So what does the above table say about *modus ponens*? The table gives us some probabilities instead of an absolute *yes or no*. If you earn a degree, the odds are 80% ($100 \times 20/25$) that you will have a higher income. Regarding *modus tollens*, the table suggests that if you do not have a high paying job, then there is over 90% ($100 \times 60/65$) probability that you do not have a degree.

When it comes to affirming the consequent and denying the antecedent, this empirical approach shows that they have some limited predictive capacity.

Affirming the consequent: Jim earns a high income, so he must have earned a college degree. The empirical probability of this, based upon the data in the table, would be almost 60% ($100 \times 20/35$).

Denying the antecedent: Betty has no college degree, so she will probably not earn a high income. The empirical probability of this is 80% ($100 \times 60/75$).

So, the "fallacies" would still be right the majority of the time, though not right as often as the *modus ponens* or *modus tollens* (according to the data in this table).

Perhaps the most important concept to remember in this example of education and incomes would be the *post hoc fallacy*. These are survey data, and not those coming from an experiment. We should be cautious about inferring that the educational attainment caused

the income differentials. Perhaps there is some background factor (e.g., parental income) making this a spurious relation: rich kids are more likely to go to college and earn degrees, and afterwards, they are more likely to maintain high incomes. The same family connections that got them admitted to Stanford will get them a job on Wall Street.

Null Hypothesis Testing

Perhaps the most important application of probability is in establishing statistical significance. This is known as null hypothesis testing. We begin scientific research by setting out a **hypothesis**, a prediction about the relationship between variables. Just as every statement P has its contradictory $\sim P$, so every hypothesis about a correlation between two variables has an alternative hypothesis, known as the **null** hypothesis. The null always states that there is no underlying relationship between the variables, and that any observed data which appear to support such a relationship can be dismissed as being due to random variation, pure chance, luck. So, we start our statistical analysis of data by estimating the probability of the null.

This process of null hypothesis testing is known as **inferential statistics** and involves calculating or estimating the probability of the null hypothesis being able to account for the observed data. The less probable the null hypothesis, the more confident we are in the data supporting our hypothesis that there is a difference. How **statistically significant** our data are depends upon the level of confidence we wish to employ.

We tend to get better levels of significance (i.e., lower p values) when the sample size is larger, when the difference between the means is greater, and when the standard deviation is smaller.

p value:	significance:	required in:
<.10	marginal	political polling
<.05	fair	most social sciences
<.01	good	quality assurance
<.001	excellent	pharmacology

DECISION MADE BY RESEARCHER

	ACCEPT NULL		REJECT NULL	
	#####		#####	
null	##	#		##
explains	##	#		##
	## correct	#	TYPE I ERROR	##
R	## decision	#	alpha error	##
E	##	#		##
A	##	#		##
L	##	#		##
	##	#		##
S	##	CELL A	# CELL B	##
I	#####		#####	##
T	##	CELL C	# CELL D	##
U	##	#		##
A	##	#		##
T	##	#		##
I	##	#		##
O	## TYPE II ERROR	#	correct	##
N	## beta error	#	decision	##
null	##	#		##
can't	##	#		##
explain	#####		#####	

Accepting the null hypothesis (which admits that we really proved nothing) or rejecting the null hypothesis (which opens up the possibility that another hypothesis was confirmed by our research)

is a decision that the researcher must make. The lower the p value we require for rejection, the less likely we are to error in the direction of a premature rejection of the null (**Type I error**), but the more likely we are to accept the null when a real causal explanation is present (**Type II error**). Certain statistical tests are better at avoiding Type I error while others are better at avoiding Type II error. Both types of error can be reduced by having a larger sample size. Most amateur researchers are too quick to claim that their research is significant: they commit Type I error. Experienced researchers tend to be more cautious, preferring to risk Type II errors.

More Inductive Fallacies

We have already covered most of the major logical fallacies that people commit with induction: ad hoc hypotheses, post hoc explanations, Type I errors. Here are some others.

If we do not sample thoroughly and randomly, we could get data giving stronger correlations than actually exist in the population. Most people form their attitudes, including stereotypes, by something that psychologists call **confirmation bias**: we tend to look for cases that fit the hypothesis, and ignore those cases that do not.

For example, suppose you have heard the stereotype that gay men like to be hair stylists. You come down to visit me in Acapulco and notice a beauty shop in my neighborhood. The proprietor appears to be a woman, no wait, it is a man, but a guy that seems to portray a lot of gay stereotypes (e.g., soft voice, hand movements, facial makeup, earrings, shaved legs) and he openly talks about his dates with boyfriends.

		HAIR STYLIST	
		YES	NO
#####			
YES	##	#	##
	##	#	##
	##	#	##
	##	#	##
	##	#	##
	##	#	##
	##	#	##
	##	#	##
G	##	CELL A	# CELL B
A	##	#	##
#####			
Y	##	CELL C	# CELL D
	##	#	##
	##	#	##
	##	#	##
	##	#	##
	##	#	##
	##	#	##
	##	#	##
NO	##	#	##
	##	#	##
#####			

So, that case clearly fits in Cell A, and confirms your stereotype. Then you go with me to Dallas to visit my brother in law, an ex-prize fighter who took the money he won in the ring and invested in a chain of beauty shops (because he thought it was the best way to meet a lot of women). My heterosexual brother-in-law should be placed in Cell C but you sort of forget about this instance. Similarly, when you learn that one of your other professors is gay, and should therefore be in Cell B, you forget about this case also. But if you see another example of an obviously gay hair stylist, you will remember to mentally note that and file it away in Cell A. Now, if I challenge your survey as unsystematic, that you are only trying to fill one cell, you might mentally look for examples in other cells, but you will most likely only think of those cases that fit Cell D:

heterosexual men who have occupations other than dressing hair. The result of this non-random process is that you have (perhaps unconsciously) selected the sample to confirm the hypothesis.

Another example of inadequate sampling comes from the **availability heuristic**. This is where we are overly impressed with the most vivid cases that most easily come to mind, and tend to ignore the more typical, but less vivid cases. What is the most dangerous mode of travel? We think of the news of airplane crashes, but you are more likely to die (per passenger mile) from automobile transportation. You have a greater risk of a fatal accident driving to the airport than flying across country on the plane. What is the most dangerous job in the energy industry? A nuclear power plant technician has a much safer job than a coal miner, oil rigger, or fuel truck driver, but visions of Three Mile Island, Chernobyl, or Fukushima come to mind. What is the most dangerous thing in a suburban home that you have to keep your child away from? You probably thought of a firearm, but statistically, the answer is a swimming pool. What is the best way to get rich? We think of the news stories about the lottery winners, but the chances of winning the lottery are so small that you would have to purchase dozens of tickets a week, for thousands of years, in order to be likely to win one of those multi-million dollar jackpots. Perhaps you came up with a different answer for how to get rich: inherit it. This conclusion might be due to the fact that wealthy brats are often in the news for their bad behavior. Actually, most of today's millionaires earned the bulk of their own fortunes.

Another problem relating to sampling is how we look for trends. We tend to be overly impressed by the most recent data. Stock market guru (and the world's richest man, according to some calculations) Warren Buffet calls this the "rear view mirror effect." If a basketball player makes the last three baskets, we tend to assume that there is some kind of hot streak that makes the next basket more likely. How should we predict the weather for three months from now? Instead of looking at the weather for the

previous three months, you would be better looking for long term patterns and see if there is a long term trend and/or some regular cycles.

The opposite tendency is to say that recent trends must necessarily be counterbalanced by new data. This is known as the **Gambler's Fallacy**. The assumption is that previous events can influence future events in the opposite direction. If a coin has come up heads three times in a row, this must somehow make tails more likely on the next toss. The "law" that it should come up heads half of the time is not like a law that the coin strives to obey for fear of being found guilty. The coin has no memory of how it landed last time and no intention of landing differently the next time. This fallacy is largely due to the variable ratio reinforcement that gamblers get. In the past, they have found that a losing streak changes eventually. Unfortunately, over the long haul, they will lose more than they win in games of pure chance (e.g., roulette, dice).

Another problem with trend analysis is excessive **extrapolation**, in which present trends are assumed to continue in a linear fashion. If a little X is associated with a little Y, and more X is associated with more Y, will a lot of X be associated with a lot of Y? Suppose you had a music company. When the population of the U.S. was 200 million, you sold 20 million cassettes. When the population went up to 250 million, you sold 25 million cassettes. Using extrapolation, you can see that when the population reaches 400 million, you should be selling 40 million. The only problem is that the growth of most products is not linear, but has a rapid rise, a leveling off, and then a slow decline. There are more people buying music nowadays, but they are buying it MP3 downloads.

Many novice statisticians make a scatterplot of two variables and then figure out where the regression line would go, and then ask the question, if the X variable were out to here, what would that give me as a Y value? That assumes that the relationship between the variables remains linear over time (or over a long range). For example, what is the correlation between household income and

the use of heating oil in the winter? Take a sample of a hundred New England families and you will see a moderate direct relationship. You observe that families making an average income tend to have an average use of home heating oil, and that families with half of an average income use about half as much heating oil. From this you might want to extrapolate that someone who has ten times the average income may use ten times the amount of heating oil. But the correlation no longer holds at very high (or low) levels. Perhaps the wealthy can afford to leave New England during the winter for cruises and summer homes in Florida. The same trend can be observed with the amount that a family spends on fast food. It rises with income, but only to a point, and then the family starts eating at better restaurants.

Correlations are not always proportional at extremely high levels. A little bit of wind fans a flame, but a hurricane would put out a candle. Even when correlations do not bend down from a direct to an inverse relationship, there is frequently a flattening of trend lines. Go back to the case of the correlation between family income and the amount spent on fast food. That does increase with income, but only to a point. Even if there were no other restaurants in town, the trend line would flatten at higher income levels because there is only so much you can eat.

A principle of economics that ties in here would be the law of **diminishing marginal value**. How important in your overall level of material satisfaction is the first hundred thousand dollars of income each year? It means that you can afford a nice car, eat well, have new clothes, take a vacation, and pay the rent. How important will the next hundred thousand dollars be? Well, it will mean that everything will be a little better: better food, better clothes, better apartment, better vacation; but maybe not twice as good. Suppose you are Carlos Slim with 60 billion dollars. How much better would your life be with another 100 thousand? It would be barely noticeable.

One more problem for novice statisticians is the use of inappropriate statistical tests. Many formulas (e.g., mean, standard deviation, Pearson correlation coefficient, Analysis of Variance) are **parametric**, requiring that the variable have a normal distribution (i.e., a bell curve). Before they get enough experience in the field, statisticians often try to use these parametric measures everywhere, but in the real world, many variables (from income to the incidence of mental disorders) are not normally distributed. This inappropriate use of parametric statistics leads to many inflated correlations as well as Type I errors.

One last error for novice statisticians: do not assume that the decimal number represented by the r value (correlation) or p value (probability of the null hypothesis) is the probability that something will be true. It is only the probability of the null hypothesis explaining the data.

		SKATEBOARDER?		
		YES	NO	totals
#####				
MALE	##	#	#	##
	##	#	#	##
	##	#	#	##
	##	#	#	##
	##	20	30	## 50
	##	#	#	##
	##	#	#	##
G	##	CELL A	CELL B	##
#####				
E	##	CELL C	CELL D	##
N	##	#	#	##
D	##	#	#	##
E	##	#	#	##
R	##	#	#	##
	##	5	45	## 50
	##	#	#	##
	##	#	#	##
FEMALE	##	#	#	##
	##	#	#	##
#####				
totals		25	75	100 = N

Let's look at the correlation between being a male and skateboarding. Let's survey a hundred high school students in a suburban area: 50 boys and 50 girls. The correlation between being male and skateboarding is about $+0.3$, but that does not mean there is a 30% probability for anything. The probability of being a skateboarder, if one is known to be a male, is 40%. The probability of being a male, if one is known to be a skateboarder, is 80%. The probability of being a non-skateboarder, if known to be a female, is 90%. The probability of being a female, if known to be a non-skateboarder, is 60%.

Pseudoscience

Pseudo means phony. **Pseudoscientific** claims are those which pretend to be scientific, but are not. Most forms of pseudoscience stem from these aforementioned inductive fallacies. Many forms of pseudoscience attempt to predict the future, but they do not do so with an inductive analysis of trends and causation. For example, **astrology** is the pseudoscience using the position of the stars and the planets to make predictions about the personality or future of individuals. However, astrology uses deduction based upon alleged affinities.

MAJOR PREMISE: All people born under the sign of Aries are bold.

MINOR PREMISE: John was born in April, under the sign of Aries.

CONCLUSION: John is bold.

The major premise does not come from observation of thousands of people born under that sign after taking valid and reliable tests of personality. The major premise comes from the description of a Babylonian deity of war, who was held to govern over that period

of time. Empirical studies have been done of personality traits and their correlation with astrological sign, and the null hypothesis must be accepted at the end of most of these studies.

So how can astrology persist? The principle of confirmation bias explains this and most occult methods of predicting personality or future events. Say you meet a person who is bold and you learn he is an Aries. That fits the profile, so you file it away in your mind as another confirming instance (while ignoring all the non-Aries who are bold and all the Aries who are not bold). The same holds for the ability of astrological horoscopes to foretell one's future. Every time something appears to happen in accordance with the horoscope, you note that as a confirmatory instance, and when something does not come to pass, you ignore it or explain it away with an ad hoc explanation.

Dream interpretation was a tool that I used widely in clinical practice. I monitored my own dreams and those of my patients, and noted that sometimes the events of the day after seemed to correspond closely with the dream of the night before. However, the vast majority of dreams bore no relationship to future events. But if someone were not a thorough investigator, and fell sway to the power of the confirmatory bias, such vivid dreams could be a powerful force in convincing someone about the ability to predict the future.

Other paranormal techniques of predicting the future come from interpretation of the vague quatrains of seers such as Nostradamus. When we see an event that might fit with a new interpretation of one of his writings, we file that away as a confirmatory instance. When we try to predict what does not happen, we either ignore this lack of confirmation, or come up with some ad hoc explanation for why it failed. For example, in 1559 Nostradamus predicted the death of the enemies of Christ's church. Yet that was followed by the death of the Catholic French King Henry II, while in England the Protestant Elizabeth I was crowned.

In many ancient societies (e.g., African, Chinese, Greek, Mesopotamian, Mesoamerican) **divination** of the future was a major feature of their religious traditions. Those who practiced divination were convincing, especially in coming up with ad hoc explanations about why some predictions failed.

In addition to such **precognition**, there are other forms of psychic phenomena involving forms of extra sensory perception such as **clairvoyance** (perceiving events despite barriers and distance) and **telepathy** (the ability to read someone's mind). Individuals claiming to be **psychics** exist even in our modern society, and may charge by the minute for a telephone call. Again, these claims usually fail the scrutiny of carefully designed scientific research controlling for extraneous factors.

Medical and psychiatric **quackery** also thrive on inductive fallacies. Claims of homeopathic cures about minute traces fly in the face of chemistry. More importantly, such claims lack the confirmation of experiments using placebo control groups.

Perhaps the greatest hoax since the mid 20th century has been the Scientology movement. This system of "mind clearing," also known as Dianetics, was developed by the insight of science fiction writer L. Ron **Hubbard**. He told his followers to avoid psychiatric treatment, and to trust only his remedies for mental disorders. He developed his own diagnostic instrument, the "Oxford" personality test, and has made many claims about the effectiveness of his methods in raising IQ scores. There's just one problem, there are no objective studies to verify any of these claims: the cure of depression, the validity of the diagnostic instrument, etc. In many countries, Scientology gets around claims of medical malpractice by disguising itself as a religious organization, though some countries (e.g., Germany) simply label it a fraud. In real science, the question is about what is right, but in Scientology, the question is about who is right, and their answer is L. Ron Hubbard.

How can such approaches to knowledge be so wrong so often and still attract adherents? I shall invoke a psychological explanation focusing on the affective rather than the cognitive. Look at all of these pseudosciences and **superstitions** (belief in psychic phenomena) as a form of the defense mechanisms of denial or fantasy. Specifically, they defend against depression. In my experience with depressive patients, the central dynamic is that the person feels helpless and hopeless. That is one reason why so many depressed patients mask their primary symptoms with hypochondriasis (delusions of physical illness) or paranoia (delusions of persecution). The hypochondriac would rather think, "It's not my fault, it's my physical illnesses." The paranoid would rather think, "It's not my fault, the world is against me." Astrology and Scientology are delusional systems that defend against depression by means of counteracting helplessness and hopelessness. They provide explanations, and although the explanations are wrong, they do assuage feelings. (No wonder the Scientologists discourage their members from taking Prozac.)

Science & Religion

When we subject the major arguments for the existence of God to the tests of induction, they do not fare very well. The teleological argument was the one that used the analogy of finding a watch on a deserted beach. The best explanation for the watch is that it was made by an intelligent creator, and so that must be the best explanation for this complicated universe.

The argument can actually be put in a classical deductive format.

MAJOR PREMISE: All well ordered things have a creator.

MINOR PREMISE: The solar system is a well ordered thing.

CONCLUSION: The solar system has a creator.

This is clearly valid, but is it sound? The major premise seems to be circular, assuming that it is trying to prove.

The closer we look at this argument inductively, the more it appears to be confirmatory bias. We can easily find examples of natural things that are complex, but what natural things that are not complex?

Induction cannot justify the existence of God, for we cannot observe other worlds that have been created, and then infer that our own is (most likely) the result of creation. The closest induction comes to this is by analogy: other complex objects have been created, therefore the entire world has been created. (That seems a little like the fallacy of composition.)

Perhaps a greater inductive fallacy permeating religious doctrine is ad hoc explanation. Popper's critique of psychoanalytic theories being able to fit any conceivable situation we encounter, would also apply to religious doctrine. Whatever happens must be God's will, and part of His providential plan for salvation. So everything that happens confirms the doctrine.

But maybe we are setting up an inappropriate test for religion by making it pass the muster of induction. After all, induction could not verify that induction itself was cogent. Science cannot verify that the scientific method is the only path to truth.

No scientific observation can conclusively verify, through induction, the existence of God (or the existence of free will). On the other hand, neither can induction and science verify the non-existence of God, (or determinism). The verdict remains at the level of decision: do we choose to act as if there were free will or not? Do we choose to worship God (or some other divine entity or force) or not?

The book of *Genesis* shows that God has expectations of our behavior, and that man is constantly tempted not to live up to

those standards. Adam's fall did not occur because he stopped "believing" in the existence of God, but because he chose to disobey God's will. He chose to seek his own agenda and ignore the commandment of God. He was tempted (influenced) by the snake and Eve, but Adam made the decision.

Perhaps induction cannot justify monotheism, but perhaps monotheism led to science. Monotheism is an antidote to the animistic thought that pervaded tribal society and provided the underpinnings of magic. When we assume that the natural world is governed by understandable laws and causal relations, we don't have to propitiate thousands of capricious spirits in order to effect the changes we desire.

The book of *Leviticus* is a great picture of a tribal people in spiritual transition. Notice that the rejection of idolatry is usually made in the same breath as a criticism of **divination** (predicting the future) and sorcery (manipulating the future with magic rather than science). The boundary between science (the physical) and religion (the spiritual) is blurred in tribal religions. The great accomplishment of Hebrew monotheism was the separation between the spiritual and the physical. This, therefore, paved the way not only for abstract theology, but also for the development of science. Since the physical realm was not to be regarded as holy or mysterious, it could be studied as mundane. Since it was the product of creation, God's intelligent design, man's intelligence could search for that design in nature. Perhaps it is not a coincidence that medicine made its greatest advances in monotheistic cultures (e.g., the medieval Jews and Muslims). Even the Greek Hippocrates was able to point to medical causes of mental disorders only when he rejected demonic possession as the cause.

"Long before modern physics, high religion detached itself from the illusions of materialism: so, too, its faith in a rational order pervading the universe gave man the confidence to search for nature's regularities and laws."

- Lewis Mumford

"Science grew out of religion."

- Arnold J. Toynbee

By definition, religious doctrine deals with questions that are spiritual rather than material (with deities, salvation, and afterlife). We cannot justify any religious doctrine purely by appeal to deductive or inductive reasoning. Perhaps we should reconsider the nature of religious **faith**. Maybe it is not primarily cognitive attribution: e.g., this event occurred (or did not occur) because of this situation (i.e., the will of God). Perhaps religious "faith" is not a cognitive flaw akin to superstition, but something primarily affective and interpersonal (a commitment to serve someone outside of oneself). Indeed, this view would be consistent with the Greek *pistis* and Latin *fides*, terms translated as *faith* in the King James Version of the Bible.

The theodicy argument against God also misses the point. When tragedy arises, whether we are hit by it or narrowly avoid it, our commitment to something outside of ourselves increases, because we realize both our mortality and our connectedness. I would hope that even confirmed atheists would have shared these sentiments, and the tragedy would have brought out their gratitude to their fellow men and women who helped, and their empathy (if not direct assistance) to their fellow men and women in need of help.

Science must be seen as a complement to religion, not as a rival seeking to supplant it. The same justification for induction justifies religion: it usually works. Both religion and science are keys to living better, but religion must transcend superstition and intolerance; science must transcend sterility.

Science and religion use language differently. Scientific language must be denotative, while religious language must be connotative: a day language for science and a night language for religion.

Is there just one kind of truth or are science and religion different kinds of truth? In other words, are the law of gravity and the law against murder essentially the same? I say that they are fundamentally different. As physical beings we are subject to the law of gravity, but we choose to obey (or disobey) the moral law against murder.

"Conflict can be avoided if science and religion are strangers occupying separate domains at a safe distance from each other. Science asks about causal relations between events ... while religion asks about the meaning and purpose of our lives. The two kinds of inquiry offer complimentary perspectives on the world, separate and independent from each other and not in conflict."

- Ian G Barbour

Science is built upon data. Religion is built upon decision. No scientific theory should be impervious to empirical data. No religious doctrine should be vulnerable to empirical data. *Genesis* is not a biology textbook, but myths that chronicle mankind's decisions about God. *The Origin of Species* is not scripture. Science gets the age of rocks and religion the rock of ages; science studies how the heavens go, and religion how to go to heaven. Steven J. Gould referred to these as two separate realms or non-overlapping magisteria. We need to know which realm we are in for which situation. When an automobile does not work, we do not attempt to cast out a demon, we call a mechanic.

The depth of our understanding of both religion and science increases over time. That is most obvious in science, but should also been seen in religion. Over the centuries, we have realized that slavery, polygamy, and genocide are wrong, but these were not recognized at the time of the composition of the Torah.

One thing we should have learned from the Reformation and the Enlightenment is that it is inappropriate to attempt to legislate either theology or science. Both of these grow and bloom only with exposure to the open competition of ideas. What is most inappropriate is to legislate science as theology or theology as science. The Supreme Court should not hand down a verdict on the Bible, and theologians should decree a *fatwa* on the Constitution.

Science & Ethics

David **Hume's** point that premises which are only *is* statements cannot yield *ought* conclusions implies that scientific investigation cannot by itself come up with ethical guidelines. Data give us factual content, not moral consent. Indeed, the very conduct of scientific research, not to mention the application of the resulting technology, requires moral guidelines that science cannot itself generate.

The ethical guidelines for science cannot come primarily from utilitarian considerations, since we cannot know or even begin to imagine how scientific discoveries (e.g., gunpowder) might eventually be deployed in a technology dedicated to evil ends. The deontological approach has come up with several guidelines, especially for the treatment of human participants in experiments. There are guidelines about confidentiality and informed consent, but these raise questions such how can someone who is retarded, demented, or otherwise mentally ill give informed consent? There are also questions regarding research necessarily involving deception as the key independent variable. An ongoing dialogue between physicians, ethicists, jurists and researchers seems the only viable course to answering these questions. Perhaps the most important guideline for the treatment of participants in research, human and animal, is the need to minimize harmful consequences: risks, dangers, and suffering. This, also, requires ongoing dialogue.

CHAPTER NINE:

CREATIVITY & DECISION MAKING

Convergent problem solving

When we dealt with the world of analytic claims, such as in deductive syllogisms, Aristotle's law of bivalence clearly applied: a given statement was either true or false, and there was no in between. A woman cannot be "a little bit pregnant," for she is either pregnant or she is not pregnant. In the last chapter we moved into the empirical world of descriptive statements and inductive reasoning and saw that more precise measurements of reality could be attained by suspending the "law" of bivalence and recognizing gradations between an unequivocal *yes or no*. We learned that inductive truths are not certain, but at best probable. Yet, there was still a single *right* (or most precise, or most probable) answer for which we strove. If our scientific powers of measurement are inadequate today, perhaps they will be better next year, or in a decade, or in a century, and then we shall close in on that *one right answer*.

This approach, known as **convergent** problem solving, is based upon the assumption that there is only one right answer. Math is a convergent operation. Each equation is set up so that we *solve* it by finding the correct answer (which is usually just one). So-called intelligence tests are convergent, being set up as multiple choice alternatives which assign IQ points only for one answer. The criminal justice system is set up in this way: the defendant is either guilty or not, and the system trusts the process of jury verdicts and appeals to arrive at that one right answer. Most organized religions hold a convergent view of doctrine. There is one Catholic catechism to which all Catholics are to

accept. Similar clarity of doctrine is found in other hierarchically structured denominations (e.g., Latter-day Saints, Jehovah's Witnesses). Even those traditions (e.g., Baptists) that have a more congregational level of authority have a narrow range of acceptable doctrinal positions, and someone who advocates a different view of God, heaven, or sin beyond that range may be pressured to seek fellowship elsewhere.

Each of these above examples of conjunctive problem solving employs a very specific **algorithm** guaranteed (or at least, trusted exclusively) to yield that one correct answer. In math, there are rules for how to solve equations. Computers were first developed as tools for performing these serial calculations in an invariant sequence. In criminal law, there are rules of judicial procedure to determine how a decision is to be made at each step of the process of jurisprudence. In the Catholic Church, a layman should first consult the Catechism, then seek clarification with a priest, who can then refer the matter to a bishop, then an archbishop, and finally to the Pope, who can either decide the matter infallibly or call a Council to study the matter.

Divergent problem solving

In this chapter, we are going to challenge the notion that there is but one right answer for which we strive. We are going to explore a different type of problem solving.

Divergent problem solving means that several solutions are possible. Most real world problems permit various solutions. Notice the right hand column of the diagram below could be conceptualized as **ends** (things that we want to do, have happen, or a condition that we would prefer to avoid). The name for such a condition is a **problem**. The left hand column could be thought of as a **means** (a solution for the problem, a way of attaining the end). The realm of ends

boils down to **affect**: emotions and mood states (or at least preferences and priorities). So, a discussion about ends (or problems) is necessarily prescriptive, and involves value-laden claims with terms like *should* and *best*. The realm of means necessarily involves causal dynamics and descriptive, empirical issues: will this given means be an effective way to produce the desired end?

<i>The quest for a solution</i>	<i>The underlying problem</i>
What route can I take to work this morning?	The bicycle race has made it more difficult for me to get to work on time.
Where should I go on my vacation?	The dollar has fallen, so I won't be able to go to Europe.
Where should I finish up my BA?	I need to get a degree to advance in my career.
Which job offer would be best for me to take?	Some jobs don't pay enough, while others have a long commute.
When is the best time for my husband and I to start our family?	For the next few years, we don't have enough money, but later the biological clock will start running out.
Which product should our company manufacture?	Our current product cannot compete with Chinese manufacturers.
What is the best form of advertising for our company to use to promote that product?	Some forms of advertising don't work well with key demographics.
Whom should we hire for that new position?	We need to find someone with both education and experience.
Whom should I vote for in the upcoming election?	We need to find someone with honesty, experience, and a new approach.
How do I tell my friend that I am sorry?	I have unintentionally offended her, and now our relationship is strained.
What treatment should be prescribed?	The patient has major depressive disorder.

Notice also that some of the things in the right hand column are phrased in such a way as to suggest that some problems will be difficult to solve because there might be several, competing ends, and the selection of a given solution might solve some problems while leaving (or worsening) others. Perhaps the best example of this would be the last item: prescribing a treatment for a patient. Many times, the best treatment for the presenting problem is very expensive, or has annoying side effects, or risks of serious complications.

Psychologist Kurt **Lewin** referred to such complicated choices as intra-psychic conflict. In deciding whether or not to employ a given solution, we often confront an **ambivalence**, a sense of mixed emotions about the approach. We are at the same time attracted to the good that it could do, yet we are also deterred by some unfavorable aspect (e.g., cost, risk, pain, inconvenience, other disadvantages). Suppose you got accepted to the University of Redlands. At first you are elated because of its attractive features: close to home, great reputation, small classes, interesting student life. Then you begin to focus on the unfavorable factor: your application for admission was approved, but your application for a full scholarship was denied, so if you choose to enroll there, you will end up with a large debt for your undergraduate education.

AMBIVALENCE

Decision to accept or reject an option with both good and bad aspects: ambivalence, a conjunctive choice in which both aspects must be accepted.



Sometimes, the choice involved is not a *yes or no* about whether to employ a given solution, but a forced choice involving which of two different solutions should be employed. Perhaps it is unavoidable that one must be employed (and yet both have some level of undesirability). This is what Lewin referred to as an *avoidance-avoidance* conflict. Suppose you have been diagnosed with cancer and your oncologist says that you can either have chemotherapy or radiation treatment. As you investigate what each of these would involve, you would prefer to avoid the side effects, but you must choose one.

AVOIDANCE - AVOIDANCE

Decision between two bad options: avoidance - avoidance, a disjunctive choice in which either one of two bad things must be accepted.



If you are stuck with a forced choice between two options, the best case scenario is where you have two possible solutions and each is quite favorable and completely attractive. For example, suppose you have won an all expense paid vacation for two weeks to any place in the world! You have been thinking about Europe, but there are the Olympics coming up. What a choice! Lewin says that you will still experience intra-psychic conflict leading to frustration: you will feel badly that you can only have one venue (and, in effect, relinquish the other possibility). You have always wanted to see the Olympics, but, you also wanted to see Europe, and it is expensive now and will only be more expensive in the future.

Maslow's model is a generalization of how most people act, not a rigid law of how every organism must act in every situation. We can all think of examples of the starving artist who ignores level one needs to pursue self-actualization, or the posthumous medal of honor recipient who sacrificed his own life (levels one and two) to protect the other soldiers in his platoon (level three sense of belonging). Indeed, there are some cases (e.g., terrorist suicide bombers) where what is only apparent is which needs they have renounced, not which needs are being met.

Nevertheless, Maslow's model is widely accepted. You will see his famous pyramid in most textbooks on management and marketing. The former will encourage a manager to first make sure that employees get a living wage to meet their physiological needs, then develop a clean, comfortable and safe workplace, then encourage teamwork and pleasant interpersonal relations, then give praise and credit to nurture self-esteem. All of this provides the foundation for workers to then become self-actualized: innovative and self-starting problem solvers. The marketing applications of Maslow have been even more comprehensive: segmenting consumers on psychographics. Each potential customer is classified according to current level of needs, and that will determine not only which products and services are seen as attractive to that customer, but also what kind of advertising will be effective.

Creativity is the human ability and process reflecting divergent problem solving. Creativity is the ability to generate multiple solutions for a problem. A creative solution has to be both feasible (it must solve the problem), and original.

Perhaps the vast majority of "solutions" entering our minds each day are trivial: neither imaginative, nor feasible, simply

reflective of fanciful ideas that have been tried and failed at previous points in human history. Most of the feasible ideas we do have are hardly original, being the practical solutions that other people in similar circumstances have come up with at many points throughout human history. Most of the truly original thoughts we generate are imaginative, fanciful rather than effective. It is the rare person, and the rare moment, that comes up with truly creative solutions, satisfying both the criteria of being innovative and feasible. Those who come up with multiple creative ideas, the Da Vincis and the Edisons, are the rarest of persons. Maslow would have attributed such performance to the ability to function at the level of self-actualization for extended periods of time. Perhaps that is essential for creativity, but it certainly is not adequate.

		SOLUTION IS ORIGINAL	
		Yes	No
F E A S I B L E	Yes	CREATIVE	PRACTICAL
	No	IMAGINATIVE	TRIVIAL

The innovative and feasible products of creativity are interesting to study, but more fascinating is the process of creativity itself. This is because creativity proceeds in stages, some of which are predictable, but the core ones are not. Different writers and researchers on creativity may use different words to describe these stages, and they may even disagree about how many stages there are, but there is

agreement that creativity proceeds in stages. One commonly used set of stages would be orientation, preparation, incubation, illumination, and verification.

Orientation is the initial approach to a problem: how we frame it, define it, understand it. This stage is where the originality of the individual is important. The perspective must be a fresh one in order to avoid the later generation of merely practical solutions. Creative people understand an old problem in a new way and end up with a new solution.

Preparation is the next stage, referring to getting the necessary information on the problem and potential solutions. If preparation is not adequate, a feasible solution is not likely. This preparation takes place in libraries, focus groups, surveys, and small pilot experiments. One of the most important decisions that creative thinkers must make is how much time to spend in this preparation stage. Inadequate preparation means that feasible solutions are unlikely to be discovered, but excessive preparation can also have the effect of delaying the final solution of a problem. Indeed, some committees and bureaucrats, reluctant to admit that they oppose change, often employ the tactic of calling for more research as a tactic of avoiding change. As a professional researcher, let me admit that not all the data that can be gathered are worth gathering. It is necessary to know when to say "enough" and move on to an action stage. You don't have to measure with a micrometer if you mark with a grease pencil or cut with an axe.

The incubation stage may be the longest of the stages. The individual must put the problem on the back burners of the mind and allow it to simmer, simmer, until ...

Illumination is when the little light bulb comes on and the inventor says "Eureka, I have it." This is the original insight that suggests the new solution.

Verification is the last stage, and involves testing out the new solution, making sure that it is actually feasible.

"Creativity is allowing yourself to make mistakes. Art is knowing which ones to keep."

- Scott Adams

Notice that these different stages require different skills and types of thinking.

<i>What is required in the different stages of the creative process.</i>	
1. orientation	Connotative thought, analogies, get "out of the box"
2. preparation	Look for empirical evidence, synthetic statements, reason inductively
3. incubation	Connotative thought, analogies, get "out of the box"
4. illumination	
5. verification	Look for empirical evidence, synthetic statements, reason inductively; also reflect on prescriptive & ethical issues.

Think of these stages of creativity, not as a rigid algorithm that guarantees success, but as more of a **heuristic**, a loosely structured, flexible approach of moving toward a solution, using trial and error when necessary. In the short run, heuristics employ rules of thumb to get quick estimates. However, they can also be used over the long haul to get a series of successively superior solutions. Many people regard heuristics as being inferior to algorithms, especially when it comes to convergent problem solving. This may be true, but only because previous heuristics have fashioned a now well worn path that has become an algorithm. The algorithm (like a well tested and well written instruction manual) guarantees a right answer if you follow it carefully. But the only way to get to the innovation required in creativity is to rise above the algorithm's linear paths and jump on to

something new. We don't have to repeat all of Edison's false steps to build another incandescent filament light bulb, for he left us with an algorithm, but if we want to make a quantum leap in light technology, we must employ heuristics.

The discovery of creative solutions for complex problems may require that we go through the cycle of stages many times. Here is the key to making that cycle productive: to be truly creative, the inventor must go back to step one, the orientation stage, otherwise he will merely come up with minor improvements on the last idea. For example, take the problem of global warming.

<i>Example of the creative process in search of a solution</i>	
1. orientation	The problem is that people are driving and burning too many hydrocarbons.
2. preparation	Get information on automobiles and internal combustion engines.
3. incubation	Think about and visualize the problem, consider different aspects
4. illumination	Aha!! Let's discourage people from driving by not making any new freeway construction.
5. verification	We try this, and find that people just spend more time on freeways, going slower and burning more hydrocarbons.
<i>So, it's back to the old drawing board</i>	

The first iteration did not generate an innovative or feasible solution. Most (non-creative) problem solvers would just go back to step two, getting more information about automobiles and perhaps come up with an alternative to the internal combustion engine, such as a car powered by electricity or the hydrogen fuel cell. We would then have to verify the efficacy and benefits of this solution.

<i>Example of the creative process in search of a solution</i>	
1. orientation	The problem is that people are burning too many hydrocarbons.
2. preparation	Get information on automobiles and internal combustion engines.
3. incubation	Think about and visualize the problem, consider different aspects
4. illumination	Aha!! Let's encourage people to drive electric and hydrogen cars.
5. verification	We try this, and find that we end up creating just as much green house emissions creating the electricity and hydrogen for the new cars.
<i>So, it's back to the old drawing board</i>	

Now, let's attempt a truly creative approach. This means that we go all the way back to step one, to orientation. We need to redefine the initial problem of global warming. Instead of framing the problem as trying to find less polluting ways for people to travel around, we could reframe the problem as people having to travel so much. Much of the travel people do is getting to work and school, so we need automobiles and diesel belching school busses. If we could remove the need for so many people to travel to work and school, hydrocarbon emission would be reduced as a byproduct.

<i>Example of the creative process in search of a solution</i>	
1. orientation	The problem is that people have to travel to work and school.
2. preparation	Get information on modern work and educational programs.
3. incubation	Think about and visualize the problem, consider different aspects
4. illumination	Aha!! Let's let workers telecommute and students take online courses.
5. verification	We try this, and find that many people get more accomplished in less time without traveling so much.
<i>Maybe this is a solution we should pursue.</i>	

Creativity can be hurt by the refusal to explore other perspectives on the original problem. This habitual (rigid)

mental set is probably the greatest stumbling block to creative problem solving. **Rigidity** is orienting oneself to the problem in the same way, over and over again.

Consider the case of America's tallest building, the Sears Tower in Chicago. It was designed to have the fastest possible elevators running the most efficient schedule, but as soon as the building was occupied, it was noted that there was an internal traffic jam at quitting time. Workers were complaining about waiting several minutes for an elevator to take them down to the ground floor where the parking structures and public transportation were located. The corporate executives called in some consultants and clarified one major priority: "We don't want to change the work schedule: everyone still gets off at five."

When most students hear this problem they come up with solutions that are imaginative or trivial (i.e., not feasible):

- Sacrifice office space for more elevator shafts.
- Give the workers parachutes.
- Make the subway trains go up to the top floors to pick up the workers.

These solutions fail the feasibility criterion on the verification stage. More importantly, they all show the habitual, rigid mental set of defining the problem as a people moving problem. One consulting engineering company came up with a creative solution by going back to the orientation stage and redefined the problem by focusing on the sentence "Workers were complaining about waiting several minutes." The solution was to place mirrors in the area where people waited for the elevators. The mirrors gave the workers something to look at while they waited for the elevator to come. The complaints were reduced.

Reframing

Reframing is the process of redefining any situation, getting a fresh perspective on it. Perhaps you have seen advertisements implying that their products are creative because "they have broken the rules." The important thing about creative solutions is not *breaking* the rules, but to re-examine which rules we really need to follow and which become irrelevant to a re-framed problem. Reframing helps us to see the big picture. It allows us to rise above the tree tops and see the entire forest. It is hard to see the big picture when you are rigidly stuck in the frame. Reframing is refusing to accept the verdict that *it can't be done*. Maybe we have to change our understanding of *it* or *done*, but it can be done.

For example you may remember in your geometry class how you used a compass and straight edge to bisect a line and bisect an angle. You may remember being told that it is impossible to trisect an angle. I am now going to encourage you to come up with a way of accomplishing this feat. Your first approach might be to use a protractor or other more modern digital tool to precisely measure the angle and draw its three equal trisects. Some purists will say *unfair* because we are employing the tools that the ancient Greeks did not have. Maybe we have to reframe the point of this endeavor. Do we really want to solve the problem of trisection or do we want to burden ourselves with primitive tools just for the challenge? It is OK to accept such a challenge, but that makes it more of a stunt (allowing us to brag about how we can achieve something with one hand tied behind our backs) rather than a sincere attempt to enjoy the benefits of having solved the problem. (It is like trying to hand craft a Viking ship with their original tools and materials rather than just using my modern inflatable boat to go around the Acapulco lagoon.) To me, the great advantage to induction, science,

and technology is that I can enjoy the advances of the last thousand years to live a longer, more fulfilling, and more convenient life than that which was available to my ancestors.

But for the example of angle trisection, let's accept the constraints: nothing but a straight edge and a compass. I say that an angle can still be trisected. Use the straight edge to draw a horizontal line segment. Label points A (on the left) and B (on the right) close to the ends of that segment. Set your compass radius to any size (just so long as it is more than half the distance between points A and B). Create two circles, one with its center at point A and the other with its center at point B. These circles will create two points of intersection, one above the line, one below the line. Label the intersection point above the line C and the one below the line D. Use the straight edge to connect points C and D, forming vertical line segment CD. Label the point of these segments intersecting as E.

Even if your original line segment AB was not perfectly horizontal (and your segment CD is not perfectly vertical) their intersection forms four right angles. So, angle AED is a right angle, 90 degrees. You could also reframe and view that angle as being 270 degrees, and notice that it is trisected into three, equal 90 degree angles: AEC, CEB, and BED. (That makes it QED: proved!)

Suppose you now say that was too easy: 270 degree angles are special and we should not be surprised if they can be trisected. You would like to see some acute angle (and not an easy one like 45 or 30 degrees) trisected. OK, that can be done and here is how.

1. create an unknown acute angle (make it a pretty small one, under 30 degrees or so) and call the vertex point B.
2. put compass point at B and draw a circle.
3. label the points of intersection of circle and rays E and C.
4. put the compass point at E and move the pencil point to C.
5. draw another circle.
6. label the intersection of the two circles point D.
7. draw ray BD.
8. put the compass point at D.
9. draw yet another circle, passing through point E.
10. then at the intersection of the first circle and the third circle, label point A.
11. draw ray BA, and angle ABC is trisected by ABD, DBE, EBC.

Again, this seems too easy. All I had to do was reframe the problem: instead of starting with one angle and then finding three trisections within it, I moved in the other direction. I took a tiny angle and tripled it, showing my work along the way as three component sections.

	<i>Starting point</i>	<i>Reframe</i>
Major premise ALL	All S is P	Only P is S.
<i>Example</i>	All men are mortal.	Only mortal creatures are men.
	All S is P	No S is not P.
<i>Example</i>	All men are mortal.	No man is immortal.
Major premise NO	No X is Y.	No Y is X.
<i>Example</i>	No cats have wings.	No creature with wings is a cat.
	No X is Y.	All X is not Y.
<i>Example</i>	No cats have wings.	All cats are wingless.

Reframing can also be used when working with deductive syllogisms. Remember that the major premise can be reframed from an ALL to an ONLY or a NO statement.

When dealing with a statement of causation, several reframes are possible. We can start by questioning whether correlation really supports causation as opposed to the null hypothesis or collateral effects.

	<i>Starting point</i>	<i>Reframe</i>
Essential cause	E is an essential cause of R.	The absence of E is an adequate cause of the absence of R
<i>Example</i>	Oxygen is essential for life.	Lack of oxygen is adequate to cause death.
Adequate cause	A is an adequate cause of R.	In order to eliminate R, it is essential to eliminate A.
<i>Example</i>	Rain is adequate to make the field wet.	In order to keep the field dry, it is essential to keep it covered from rain.
Causal determinism	C caused E.	Desire for result E led people to employ means C.
<i>Example</i>	The pogroms caused the Jews to leave Europe.	The Jews came to America for a better life.
Causal analysis	X caused Y.	Consider other explanations for the correlation.
<i>Example</i>	Pornography causes sexual deviance.	Sexual deviants are attracted to pornography.

“All power corrupts, and absolute power corrupts absolutely.”

- Lord Acton

Perhaps the problem is not that power corrupts, but that the corrupt are attracted to power, and have no qualms about using deception and force to get more power.

We can seek a deeper analysis of causation using the four Ps (predisposing, principal, precipitating, perpetuating), and look for heterostatic or homeostatic algorithms. We can reflect on the Aristotelian conceptions of final, formal, material, and efficient causes. We can shift from causation to teleology: changing the push of past causation, to the pull of future goals.

We often find ourselves in contexts that we have perceived rigidly for so long that we see no way out of our bad habits. Diet guru Jenny Craig noticed that many overweight people complain that the hardest part about eating right is when they are in a restaurant or over at someone else's home and there is all of this perceived social pressure to eat. She found that the solution started in reframing the context of these occasions: not eating centered, but social centered. Food happens to be present at these occasions, but that is not their purpose or the key factor: these events are social occasions at which food happens to be present.

One of the most useful approaches when looking at any present problem is to consider that it may be an imperfect attempt at a solution to a past problem. Two mental disorders which fascinated me early in my career were paranoia (delusions of persecution) and hypochondriasis (delusions of physical illness). These were some of the most difficult disorders to directly confront because the patient distrusted the diagnosis. Many physicians and psychologists would rigidly impose the strategy of arguing with an equally rigid patient (and achieved no compliance with the treatment regimen).

	<i>Starting point</i>	<i>Reframe</i>
Change problem to a solution.	Present problem needs to be solved.	Present solution is result of a past problem.
<i>Example</i>	There are too many cars on the freeway.	The cars are a solution to the past problems of horse transportation.
Shift one solution to a new problem.	S is a solution to problem X.	S might also be a solution to problem Y.
<i>Example</i>	A photocopy machine solved the problem of making copies of documents.	A fax machine is like a long distance photocopy machine and solves the problem of sending images over great distances.

I came to realize that both of these disorders were actually solutions that the patient rigidly clung to in a vain attempt to maintain self esteem. The paranoid is really saying: "I'm not incompetent; the world is out to get me." The hypochondriac is really saying "I'm not incompetent; my body has failed me." Effective long term management of these disorders often depended upon removing that old problem of low self esteem so that the patient no longer needed to rely so heavily on the delusion. Once that reframe is made, we can come up with creative interventions for paranoid and hypochondriacal patients.

Another useful heuristic for reframing is to figure out how to shift the decision making: from boss to worker, from government to individual, from physician to patient, from teacher to student, from parent to child, from business to customer.

Shift of decision	Authority A decides for recipient R.	Authority A delegates decision to R.
<i>Example</i>	Americans Funniest Home Videos decides which videos to show to audience.	YouTube allows audience to find the videos they want to see.
Confront failure	Resist	Redefine success
<i>Example</i>	“I am 65 and dying.”	“I have managed to stave off death for 65 years and in that time, I have lived a great life.”

Think education and travel! These are some of the greatest experiences we can have to overcome our rigidities. A broad, liberal arts education and foreign travel provide experiences that force us out of the well trodden paths of our comfort zones and force us to think and act in new ways. They are instant reframing.

Perhaps the greatest rigidity that we all face in our interpersonal relations is the tendency to employ stereotypes about other people. Our confirmation biases resist reframing and keep us rigid. A stereotype can be seen as a rigidity of thought, our refusal to see each individual in the fresh and unique perspective that individual truly deserves. We will not come up with creative or satisfying relationships with others when our relationship stops with categorization and profiling. This inevitably leads to conceiving of people as “others” who are enemies rather than potential allies in joint ventures.

Let us also be aware that not only do we have to continuously guard against stereotyping other people, but

others are they are continuously perceiving us in stereotypes. We must be cautious of our words and behaviors, lest they fit the confirmation biases of those who perceive us.

My neighborhood in Acapulco has everything from movie stars and government officials to taxi drivers and folk medicine practitioners, living in everything from mansions to tar paper and stick shacks, practicing everything from traditional Catholicism, to Mormonism, to Scientology, to syncretistic blends of African voodoo. I am the only Northamerican and (since the German engineer across the street left) I am the only foreigner. I must guard against stereotyping my neighbors by their careers and religious affiliations, and must act in such a way that they do not stereotype me as "the Gringo." The more haughty and superior I act, the more it attacks their self esteem and encourages them to rigidly cling to whatever unfavorable stereotypes they may have about *norteamericanos*.

Comparisons & Analogies

Making comparisons is a standard exercise in critical thinking. Between any two things, we can construct categories from which we can have similar and different classifications.

Take the two main contenders for the Democratic party's 2008 presidential nomination: Barack Obama and Hillary Clinton. They had similarities of geography, marital status, office, party, and religion. They have differences in age, gender, and ethnicity. We could also take any particular political issue and plot their respective positions as to similarities and differences.

	<i>Barack Obama</i>	<i>Hillary Clinton</i>	<i>Comparison</i>
Has lived in Illinois	Yes	Yes	Similarity
Has lived in New York	Yes	Yes	Similarity
Ivy League education	Yes	Yes	Similarity
Authored autobiography	Yes	Yes	Similarity
Marital status	Married	Married	Similarity
Party	Democrat	Democrat	Similarity
Office	U.S. Senator	U.S. Senator	Similarity
Religion	Christian	Christian	Similarity
Born after 1960?	Yes	No	Difference
Gender	Male	Female	Difference
Ethnicity	African	European	Difference

The process of comparisons is deductive insofar as it involves analytic categories. The process is also inductive insofar as we must obtain synthetic data about the subjects before we classify them into these categories.

What is important is the relevance of these classifications and their subsequent comparisons for similarities and differences. For example, I often asked psychology students to compare John Watson and B.F. Skinner, in hopes that I would see similarities such as behaviorists and determinists, and a difference in the type of conditioning they developed. Too often I received irrelevant similarities like "both dead now" or irrelevant differences such as the vowels in their names.

The key question is not how many similarities or differences there are in the comparison, but how relevant they are to the question at hand. When we are engaged in creative problem solving, the question is usually something like “if the solution worked here, would it work there”? The answer depends on those key factors that made for an effective solution: can they be duplicated?

Here we come to the use of analogies in argumentation. They are engaging affectively and easy to grasp cognitively. Here are some examples of analogies.

- If that candidate cheated on his wife, he will cheat the voters.
- Illegal immigrants are like unwanted guests in our homes. It is time to lock the front door.
- Our family has to live on a budget or go bankrupt, and the same is true of all this federal deficit spending.

We readily recognize what the speaker is doing: setting up a conditional argument: *Since this is similar, we conclude that.*

There is a deeper purpose to the use of analogies. It is not really about providing an *ersatz* example supporting a hasty generalization of an inductive conclusion. Indeed, analogies are not even cases from the population under consideration. **Analogies** are comparisons that look like an example, but actually provide a metaphor. Analogies are a very clever rhetorical device for understanding a problem. He who controls the dominant analogy has successfully framed the debate. Therefore, a major technique in reframing any issue is to come up with a different analogy. Analogies are major tools in fostering the creative process (or in stifling it).

Decision Making

The process of decision making is an extension of means-ends analysis. It can now be understood as the use of cognitive maps and framing to help us better understand both the salient criteria (ends) and the available alternatives (means).

"Nothing is more difficult, and therefore more precious, than to be able to decide."

- Napoleon

"Many complain about their memory, but few about their judgment."

- La Rochefoucauld

Criteria are the important factors in a decision, the priorities to be considered, the problems to be solved. (Notice that this word, like *data*, is plural. The singular term is *criterion*.) So, the criteria are at their core affective rather than purely cognitive. Statements about criteria, priorities, preferences, goals, or ends are prescriptive, value laden.

Alternatives are options, solutions, means, and plans that are available and from which we may choose. The alternatives deal with *what* we will do, while the criteria focus on the *why* we do it. While the criteria are like the premises, the alternative selected would be like a conclusion. We choose this (alternative) because of those (criteria).

After our criteria have clarified our problem, and creativity has come up with several viable alternatives, we must then choose which course of action to take. People, and even groups, do not always make the best decisions.

*"Strategy without tactics is the slowest route to victory.
Tactics without strategy is the noise before defeat."*

-Sun Tzu

Most opportunities for making a decision are not even recognized and seized. In the majority of occasions, we simply employ a previously selected solution for a similar problem. When you are driving to school, how many times do you ask yourself, "what is the best route for me to take today"? Unless news of some road closure is fresh in your mind, you will just follow your usual route. Each time you need tooth paste, do you write out all the advantages and disadvantages of each brand, or do you simply follow the **routine** of selecting the one brand that you have been using? This decision making strategy of not revisiting past decisions is actually justifiable in most circumstances. People stick with the same driving route, brand of toothpaste, or spouse, because that choice has served them well in the past. Rather than view routine behavior as a form of habitual and rigid mental set, it might be better to say that people are trying to use their decision making resources more efficiently. "If it ain't broke, don't fix it." Their dedication to a certain driving route or grocery store or brand of gasoline has been based upon past experiences and inductive reasoning. Unless something major changes in their own priorities, or in the ability of that brand to meet those priorities, the subjects will continue to meet their priorities by buying that brand.

ROUTINE BEHAVIOR Act as if the decision has already been made by past deliberations; follow an established habit.

Example: have bought Crest toothpaste for 20 years

Advantage: saves time of comparison shopping

Disadvantage: miss out on new alternatives that may be superior

External referral of decisions is another cautious approach. This also looks like an attempt to avoid a decision. The individual decision maker "passes the buck" or "follows the book." Again, this is not always a poor strategy. Indeed, this may be the wisest approach when it is important to get the approval of someone else.

EXTERNAL REFERRAL Refer the decision to an external authority: a boss, rule book, parent, religious leader, etc.

Example: asking boss if it is OK to grant a customer's request

Advantage: protects one from the wrath of powerful persons or social traditions

Disadvantage: slow (we may have to wait for the boss to get back to us).

Intentional **randomization** appears to be another way to avoid making a decision, but it may also have some merits. Drawing straws, flipping a coin, playing rock-paper-scissors, or using a lottery makes the outcome very unpredictable to possible opponents, and has the appearance of being fair if someone ends up being a loser.

INTENTIONAL RANDOMIZATION Refer the decision to a coin flip or lottery.

Example(s): drawing straws to determine who will get the last piece of candy; flipping a coin to choose an offensive plan during the last play of the football game

Advantage: protects one from the wrath of losers;
makes decisions unpredictable by opponents

Disadvantage: the prize may be given to the least
deserving; the course of action selected
may have the worst prospects

Affect means emotion, and some people make big decisions by impulse or emotion. The decision is made by the individual, but not by utilizing any of the types of reasoning we have discussed. We see this every day at the supermarket checkout stand. Impulse items are displayed there. Many people see the cover of a tabloid and figure they have a few minutes to wait, so start reading the cover article, get emotionally engaged, and end up purchasing the "news" paper without even looking at the price.

AFFECT Act on the emotional impulse of the moment.
REFERRAL

Example(s): marrying a handsome, charming man because
you are "in love"; giving money to a beggar
out of pity; ordering a fattening dessert

Advantage: instantaneously alleviates current emotional
pressures

Disadvantage: the course of action selected
may have the worst long term prospects

A more rational approach is the **lexicographic**, which starts out by defining one specific criterion against which all possible alternatives will be objectively evaluated.

LEXICOGRAPHIC Identify one key criterion. Select the best
alternative for meeting that criterion.

Example: buying gasoline at the station which has
the cheapest price

Advantage: identifies the most important need and
meets that need

Disadvantage: other important criteria are not considered

The major drawback with the lexicographic approach is that it assumes that we have only one key criterion to meet. Real life is messy and complicated, with multiple, sometimes competing, criteria. For example, some of the greatest decisions of military history were made by General Eisenhower concerning the Normandy invasions. One of these decisions was about how much naval and aerial bombardment should take place before the amphibious assault began. More bombardment would serve to soften up coastal defenses, but the longer that such bombardment continued, the lower the level of surprise. So, the tradeoff was whether to have more softening or more surprise.

The British mathematician **Bayes** developed a complicated approach for dealing with multiple criteria. Therefore, it is also known as the compensatory model, because effectiveness in meeting certain criteria can compensate for deficiencies on meeting other criteria.

The Bayesian approach can answer the age old question: *is it better to have 10% of a watermelon or 100% of a grape?* The answer is: *it depends upon your criteria.* Ten percent of a watermelon offers more liquid. The grape would be easier to transport. Perhaps the watermelon is seedless. Perhaps the grape can be used to make a rare wine.

Specific weightings are given for different criteria, and then we estimate how well each possible alternative meets each of these criteria. We then multiply these scores by the weights, and add up the products to get the total expected value for each alternative.

BAYESIAN

Identify multiple criteria. Weight each criterion. Assess ability of each alternative to meet each criterion. Multiply ABILITY X WEIGHT, total up the value of each alternative.

Example:

which investment gives the best combination of Monthly returns, long term growth & liquidity?

Advantage: identifies all relevant criteria and selects the alternative which best MAXIMIZES GAIN

Disadvantage: time consuming, difficult to quantify some weights and scores, some criteria may not have linear proportionality of benefits

The Bayesian approach is usually very quantitative in its weighting of each criterion and scoring of the ability of each alternative to advance each criterion. Let's suppose you need a car. You start out by listing your criteria: low purchase price, good gas mileage, mechanically reliable, big enough to carry your sporting equipment, and stylish. Since these criteria may compete against each other, we may have to make trade offs. We must therefore weight each criterion so that we can give preference to those most important. Let's use a scale of 0 (not important at all) to 10 (extremely important) to indicate the weight of each criterion. You are pretty poor right now, so your top priority must be a car that you can afford: give a weight of 10 to purchase price. Gas mileage would be a close consideration, so give that a weight of 9. Mechanical reliability would be the next most important. The more you think about it, you decide it is just as important as the gas mileage, so give that a weight of 9 as well. The next factor would be size: big enough to carry you and your sporting equipment up to the mountains or down to the beach, but the more you think about that, you think that is just something on a wish list, not a top priority (like the three we have weighted so far), so let's just give that a only weight of 2. For you, style is even less important than size, so give that criterion just a 1.

The alternatives would be the possible choices of cars. You see the new Hyundai Santa Fe and think that would be perfect: stylish, room enough for your stuff, decent gas mileage. Your father then says he will let you have his old

Ford truck for free. The acquisition price is right but it burns a lot of gas, and will not be as mechanically sound as the new Hyundai.

In order to decide which alternative to go with, score each alternative on each criterion. Again, let's use the scale of 0 (totally fails) to 10 (totally succeeds). So, we set up this contingency table with the rows being the alternatives and the columns being the criteria. In the cells we put the scores of each alternative on that criterion.

On the criterion of price, the Ford truck is free, so that is perfect, give it a 10. A car that would be prohibitively expensive (like a Porsche) would be a 0, something that could comfortably fit your budget would be a 5. The Hyundai is a new car, but reasonably priced, and you think you could make the payments, so give it a 5. On gas mileage, the Hyundai is a little better than average (but no hybrid), so give it a 7. The older Ford truck is an eight cylinder F-150 and really burns gas, so give it a 2 on that criterion. Hyundai has a great reputation for mechanically reliable cars, so give it a 9. You know your dad's truck is OK, but it is getting that age where something is bound to go wrong sometime, so give it a 4. The truck has an eight foot bed, and can easily carry all your things, so give it a 10. The Santa Fe has an SUV body, so it will carry most of your things, give it an 8. You like the Hyundai's style, give it a 9. The old truck has a few dents and could use some paint, so on style it only scores a 2.

<i>Criterion</i>	Price	Gas mileage	Mechanical	Size	Stylish
<i>Weight</i>	10	9	9	2	1
<i>Scores</i>					
Hyundai	6	7	9	8	9
Santa Fe					
Ford F-150	10	2	4	10	2

Now let's multiply the score in each cell by the weight for each criterion. Then we will add these products across and get the total value (maximum expected gain).

<i>Criterion</i>	Price	Gas mileage	Mechanical	Size	Stylish	Total Value
<i>Weight</i>	10	9	9	2	1	
<i>Scores</i>						
Hyundai	6	7	9	8	9	
Santa Fe	60	63	81	16	9	229
Ford F-150	10	2	4	10	2	
	100	18	36	20	2	176

The Hyundai is the winner: it maximizes our total expected gain. Notice how the outcome would have been different if the scores had been different. If the falling dollar leads to a great price increase for the Hyundai, its score on price will go down dramatically. If we had weighted the criteria differently, the outcome could have been different as well. If mechanical soundness and gas mileage were lower priorities, the Ford truck might have won.

The Bayesian approach provides one answer to the question: why are the big investors seeking out risky projects? The answer is high risk investments are often the best way to maximize expected gain. The rule of thumb among Broadway angels is that flops always outnumber hits. Why then do these investors continue to back new musicals? The answer is that the losses on the flops are generally limited to what the investor has put in, but the potential for profits on the hits is unlimited. One hit that repays ten fold covers the losses on ten flops. The same logic is used by venture capitalists on Sand Hill Road in Silicon Valley, and the junk

bond kings on Wall Street. The key is to have a portfolio of different high risk investments. Even if it is probable that most of these investments will fail, if you get enough of them, it is unlikely that they will all fail, and the overall expected gain can be quite high.

The Bayesian approach can also be used to reframe **Pascal's** wager. The original presentation of the argument for God's existence was a dichotomous proposition: either accept the Christian God or be an atheist.

	<i>God really exists</i>	<i>God does not exist</i>
Be a Christian	Right decision	Miss out on fun
Be an atheist	Go to hell	Right decision

At first it looks like Pascal's approach is supported. Certainly the opportunity cost of missing out on some earthly fun seems a small price to pay for assuring eternal salvation, even though that value of seems hard to quantify.

However, when we look deeper, we see another flaw in the argument. Pascal only assumed two alternatives: traditional Christian and atheist. He did not consider an Islamic, Hindu, or Buddhist alternative, let alone the variations on Christianity that have occurred since the 17th century, such as life in resurrected form in Christ's millennial kingdom (Jehovah's Witness) or eternal life in one's own celestial kingdom (Latter Day Saints).

In this way, every *yes or no* decision can be reframed as a multiple options choice. The *yes* choice (e.g., worship the Christian God) yields a clear alternative, but what is less obvious or clear is what the *no* choice leads to. In Pascal's wager, he assumed a false dichotomy, and that the only

alternative to Christianity was atheism. He ignored Buddhist, Hindu, Daoist, and Muslim alternatives. To use the Bayesian approach, we would have to calculate the value of each of those alternatives (e.g., being reincarnated in a higher caste) and its probability of leading to that value.

On the other hand, we could reframe each multiple options decision as a series of *yes or no* decisions. A good example of this would be whom to marry. Except on certain television reality shows like *The Bachelor*, all of the potential candidates for spouse do not present themselves at the same time for a decision to be made. You might receive a proposal at age 19 from John, and the choice at that point in time is *yes or no*. If you say *no*, a couple of years later, you might meet Jim, who then pops the question, and you have a *yes or no* choice with him.

THINK ABOUT IT

Monty Hall's television game show "Let's make a Deal" usually offered the contestant three doors, behind one of which was a highly desirable prize (e.g., a new luxury car, an all expense paid trip to paradise) while behind the other two doors were booby prizes (symbolized by a goat). The contestant chose one of the three doors, and then before the door was opened to reveal the prize, the master of ceremonies increased the dramatic appeal of the program in the following way. He opened one of the doors not chosen to reveal a booby prize. With the two remaining doors still closed, Monty Hall offered another strange deal. The contestant was told that she could change her mind, and switch to the other remaining door, or could choose to stick with her initial choice. The majority of contestants preferred to remain with the door represented by their initial choice. They had figured, at that point, there were two doors and each was equally likely to have the real prize behind it.

Actually, the heuristic that the contestant should have employed would be to switch doors. When the contestant initially chose a door, there was a $1/3$

probability that she was right. The probability that one of the other two doors had the prize was $2/3$. That probability was not changed when Monty Hall opened a door that he knew to have a goat behind it: the odds remained $1/3$ that the door initially chosen had the valuable prize, and $2/3$ that the prize was behind another door. By showing which of the other doors did not have the prize, the odds were now $2/3$ that the prize was behind the other door (the one not chosen). Therefore, it would always be the contestant's best strategy to always switch in this situation.

Compared to the Bayesian approach of maximizing gain, a more cautious approach for dealing with multiple criteria would be the **conjunctive**. (This approach is sometimes called elimination-by-aspects or multiple hurdles.) Here we view each criterion as a different hurdle that each alternative must clear if it is to be selected. What we are left with is the alternative that at least minimally satisfies all criteria. We may not be selecting the alternative with the maximum potential for gain, but we will get the alternative with the minimum overall risk.

"Golf is not a game of great shots. It's a game of the most misses. The people who win make the smallest mistakes."

- Gene Littler

THINK ABOUT IT

The idea that you win by not making mistakes is not only a strategy in golf, but in warfare. The greatest military victories can usually be reframed as the greatest military defeats (for the other side). The results were determined less by the brilliance of the victors but by the incompetence or foolhardiness of the defeated. (Perhaps the most brilliant military strategy is to capitalize on the weakness of the enemy.) Consider America's rapid military victories

over the numerically superior forces of the Iraqi army in 2003. It was not that U.S. Defense Secretary Donald Rumsfeld was a genius, strategically, it was that Saddam Hussein was a fool.

Perhaps an even better example occurred in 1836 in the Texas war for independence. The military dictator of Mexico, Santa Anna, marched thousands of troops north to the rebellious territory and confronted a few hundred poorly armed volunteers. Santa Anna wasted time, material, and manpower taking the Alamo while Sam Houston regrouped his forces. When the Texans finally captured Santa Anna, Sam Houston figured out the best way to win the war: release Santa Anna so that he could go back to his troops and incompetently lead them to future defeats. That story may be an apocryphal Texas tale, but it does depict creative reframing!

"You only have to do a very few things right in your life so long as you don't do too many things wrong."

- Warren Buffet

CONJUNCTIVE Identify multiple criteria. Establish minimum score on each criterion. Eliminate those alternatives which fail to meet the minimum score.

Example: buying a house which will be large enough, close enough to work, and within your budget

Advantage: identifies all relevant criteria and selects the alternative which best MINIMIZES RISK

Disadvantage: time consuming, difficult to quantify some cutoffs and scores

Most of the big decisions in life involve this approach: where to live, which job to take, whom to marry. We can look at the automobile decision used above for the Bayesian example with a conjunctive approach as well.

<i>Criterion</i>	Price	Gas mileage	Mechanically sound	Size	Stylish	Final Judgment
<i>Weight</i>	10	9	9	2	1	
<i>Scores</i>						
Hyundai Santa Fe	6 <i>minor</i>	7 <i>minor</i>	9	8	9	Acceptable
Ford F-150	10	2 <i>major</i>	4 <i>major</i>	10	2	Too risky

Let's keep the same criteria and their weights and the same alternatives and their scores. What will change is how we use the criteria to judge the alternatives. Since the conjunctive approach is all about risk avoidance, we are looking for the severity of deficiencies. On price, the criterion required a 10 and the gift Ford truck has no deficiency, and the affordable Hyundai has only a minor deficiency. When it comes to gas mileage, we set the criterion so high that only an electric car or hybrid could meet it. Both of the alternative vehicles are deficient, but the deficiency is minor for the Hyundai and major for the big truck. On mechanical soundness, we required a nine, so the Hyundai has no problem, and again it is the old Ford that has a major deficiency. Both vehicles are minimally acceptable on size and style, because we set those weights so low.

Now notice that the Hyundai has only minor deficiencies, but the Ford truck has some major deficiencies. So again, the Hyundai is the best choice. Likewise, if we changed either the scoring or the weights, the outcome might be different. In this example, the Bayesian and the conjunctive gave similar results, but this is not always the case. The conjunctive only looks at whether or not an alternative met the minimum on each criteria, and does not give any extra

credit for exceeding those criteria: you cannot make up for a deficiency in one area by outstanding performance in another area (as you can with the Bayesian approach).

The conjunctive approach is similar to the **satisficing** approach developed by Nobel Prize winning economist Herbert **Simon**. When people are looking for a solution (especially when the solutions are presented sequentially over a long period of time rather than all at once) people tend to accept the first minimally satisfactory solution presented, and then view the problem as solved. This approach would say that holding out for a perfect solution is a bad policy, because it prevents the immediate adoption of a good (but imperfect) solution now available.

"The perfect is the enemy of the good."

- Dennis Prager

One problem for people who do not satisfice is that they tend to become dissatisfied with the choices that they have made (or even the alternatives that are presented) because they think that something better should exist (or worse yet, that they deserve something better). When they do choose an alternative, these non-satisficers are more likely to think that life has cheated them, that they have settled for less than they could have had.

Especially when alternatives are presented one at a time, the strategy of holding out for a better alternative does not work over the long term (because there is always the chance that a better one will be coming later). The same results are attained if one's initial criteria are set too high, and one is too picky a chooser.

The conjunctive approach is used (and should be used) for most of the big decisions in life: selecting a mate, a job, and a residence. But excessively high criteria lead to problems.

There is a name for people whose standards for a job are too high:
unemployed.

There is a name for people whose standards for a house are too high:
renters.

There is a name for people whose standards for a mate are too high:
single.

Of course, falling in love with the first house you see, or your first date, poses other risks, but usually these are not due to the conjunctive strategy, but to the use of an affective one.

In conclusion, neither induction nor deduction is capable of justifying itself (or the other form of reasoning). However, both induction and deduction can be justified by the decision making approaches we have discussed. Bayesian decision making shows that the use of reasoning will serve to maximize potential gain. Conjunctive decision making shows that reasoning will serve to minimize potential risk.

Both kinds of moral reasoning can be reframed as decision making looking for the most moral behavior as the best alternative. The **utilitarian** approach in ethics, which tries to secure the greatest good for the greatest number, is seeking to maximize expected gain, so it should work well with the Bayesian approach to decision making. The **deontological** approach in ethics, which attempts to avoid the risk of violating ethical norms, so it should do well with the conjunctive approach.

The one heuristic which might be overriding in our decision making at present is the best choice for today is not necessarily the one that gives you the best of today's outcomes, but the choice that gives the best range of outcomes for tomorrow's decisions. Decision making is an ongoing process, not a singular, one-time event. Therefore, a major consideration of every opportunity to make a decision is to preserve favorable alternatives for future decisions.

For example, you may not yet know what your ultimate career goals are, but if you get a BA from a fine private college or university, the value of that pedigree is that it opens up more future opportunities, even though some of which may have existed prior to going to college, or would have existed if one had chosen some other college. The value is that this alternative did not preclude these other options, and is therefore, it would be superior to those alternatives that merely provided these options.

The one alternative that would most preclude future options would be suicide. That is the most irreversible decision one can make in life. No other present decision can prevent so many future decisions.

Skepticism revisited

Skepticism is the decision to employ very high standards of proof. It is a choice to resist what is advocated by authority, tradition, or popular consensus. Skepticism emphasizes intellectual doubt, a hesitation in granting commitment, and a challenge to what others have advanced as "the truth." Applied to decision making, that means employing very high criteria before satisficing. Some level of skepticism is a good strategy, but in excess, skepticism leads to outcomes that are not necessarily optimal.

When it comes to the claims of the established religious traditions, the skeptic rightly asks "why are your doctrines and rituals still relevant"? However, some skeptics carry this to a rejection of the entire spiritual quest.

When it comes to accepting government, the skeptic rightly challenges authoritarian governments, asking "by what right do you claim power"? However, if the skeptic continues that same practice in a representative government tempered by the rule of law, the de facto alternative is anarchy.

When it comes to the claims of pseudoscience and medical quackery, the skeptic rightly demands "prove it" before swallowing the snake oil. However, if the skeptic continues to find fault with every epidemiological study about the etiology of diseases, we end up rejecting the sanitation measures that have eliminated cholera and the vector control strategies that reduced malaria. If the skeptic continues to deny the safety of vaccination, the default alternative yields a return to small pox and polio. If the skeptic denies the double blind placebo studies with statistically significant results showing the efficacy of anti-depressants, the default alternative selected is non-treatment, with an outcome of higher rates of suicide.

When it comes to the unexamined claims of ethics, the skeptic rightly questions the justification for any constraint on his own freedom. However, when the skeptic regards both utilitarian and deontological approaches as insufficient justification, the default is an ethical relativism, which cannot defend anyone's free speech or choice (including that of the skeptic).

Perhaps the greatest folly of the skeptic is to doubt his own free will. In effect, he is saying "I won't choose until you can prove that I can choose." Isn't that position a choice?

Skepticism, in appropriate amounts, is very liberating, but if skepticism denies free will, what is the point of liberation?

At such a point, the extreme skeptic is merely playing a mind game, employing one rule: *doubt everything*. This appears to be rational, if we reduce rationality to mere consistency, for if one always doubts, one is always consistent. So, in that sense, the skeptic has perfectly followed the rules of the game, but how can he win if no one can score?

Let's leave the rhetorical questions for an analogy to reframe what skepticism is. The extreme skeptic is like the child who puts his hands over his ears and then yells "I can't hear you" thinking that makes him right, for if he does not acknowledge anyone else's proof, he cannot lose.

But the skeptic is not as consistent as he imagines. He has not been skeptical of one thing: skepticism itself. He never asked the question: *why is skepticism the proper standard for proof?* If he were truly rational, and consistent, he would have to raise that question, then come up with an answer (and then reject it as insufficiently proved). He would have to be skeptical of skepticism.

Perhaps the best way to understand extreme skepticism is to view it as analogous to OCD: obsessive compulsive disorder. The psychodynamic of this condition is obsession about a phobia, then compulsive behaviors arise as a defense. For example, some OCD patients are obsessed with the dangers of dirt and germs, so they compulsively avoid touching things in public places and compulsively wash their hands and disinfect everything. (This might make OCD sufferers unemployable because they do not perform well in a job interview.)

The skeptic obsesses about gullibility. He greatly fears accepting some doctrine or belief that may be false, so he compulsively rejects everything (including scientifically verifiable statements and potentially relevant components of religion). Like the paranoid and the hypochondriac, the extreme skeptic lives in a world of consistent delusions in order to defend against a sense of helplessness and maintain a fragile self esteem. Like the person committing suicide, the extreme skeptic forecloses future options by denying their capacity to satisfice.

Aristotle advised us to use moderation. Skepticism, like so much else, is good in moderation rather than extremes. Reframing is the key to avoiding many dead ends in philosophy, and it is only by reframing the skeptic's objections that we can come up with viable solutions in so many areas of life. In general, where skepticism is, the appropriate response is a call for a collaborative response on open-ended questions.

When it comes to government, the skeptic knows how to resist unjustifiable authority, but we must counter with this reframed question: how do we create a responsible government?

When it comes to religion, the skeptic knows how to call into question the old traditions, but we must counter with a reframed challenge to develop rituals, ethics, and doctrines that facilitate our collective spiritual journey.

When it comes to science, the skeptic knows how to point out the flaws of pseudoscience, but we must counter with developing research methods that yield applications for better living.

CHAPTER TEN:

DEBATE VS. DISCUSSION

Policy Debates

Chapter six examined the different kinds of **resolutions** (propositions to be debated). Resolutions of **policy** were the most complex because they include most of what other resolutions include. In order to explore a proposition of policy, we must clearly define our terms (analytic claims), present empirical evidence (descriptive claims) and assume certain values (prescriptive claims). Because of the unavoidable values orientation of policy resolutions, they are usually phrased with the term *should*. They can be phrased as statements urging action or as a question. Here are some examples of policy topics. Notice that each of them calls for a specific action (a major change from current policy).

ABORTION: Should a constitutional amendment be passed overturning the Roe vs. Wade decision and allowing state governments to ban abortion?

ANIMAL RESEARCH: Should there be a ban on the use of live mammals in medical research?

CAPITAL PUNISHMENT: Should a constitutional amendment be passed abolishing the death penalty in all U.S. jurisdictions?

CONGRESSIONAL DISTRICTS: Should a constitutional amendment be passed abolishing local congressional districts, and apportioning representation by proportional vote of national parties?

DIVORCE: Should parents be prohibited from divorcing each other until their youngest child turns 18?

ELECTORAL COLLEGE: Should a constitutional amendment be passed replacing the electoral college with a direct popular vote in presidential elections?

EUTHANASIA: Should a constitutional amendment be passed to allow doctors to comply with the wishes of a dying patient in severe distress who asks to have his/her life ended?

GUN CONTROL: Should a constitutional amendment be passed to repeal the second amendment and ban the private ownership of firearms?

HEALTH CARE: Should a constitutional amendment be passed developing a national system of comprehensive health care?

JURY SYSTEM: Should a constitutional amendment be passed abolishing trial by jury and replacing it with a three judge panel?

MARIJUANA: Should the federal government legalize the possession, cultivation, transportation, sale and use of marijuana?

MERGERS: Should corporate mergers and acquisitions be banned?

PARLIAMENT: Should a constitutional amendment be passed abolishing the office of the president, replacing the executive branch with a prime minister selected by Congress?

POLYGAMY: Should a constitutional amendment be passed allowing people to take more than one spouse?

SELF-INCRIMINATION: Should a constitutional amendment be passed repealing the fifth amendment, and requiring defendants to testify?

TAXES: Should a constitutional amendment be passed repealing the sixteenth amendment (income tax) and replacing it with a comprehensive national sales tax?

TOBACCO: Should a constitutional amendment be passed outlawing the cultivation, manufacture, transportation, sale, or use of tobacco products?

Formal debate, especially those on resolutions of policy, assume something like the law of bivalence: either we should or we should not adopt the resolution. This makes sense for many of these resolutions because they call for an abrupt and inherent change from the **status quo** (the current way of doing things). Resolutions calling for incremental changes do not fit the debate model. Here are some examples that would not fit the mold for good policy debate topics.

ABORTION: Should access to abortion be made *more* difficult?

DIVORCE: Should obtaining a divorce be *more* difficult when there are children under age 18?

GUN CONTROL: Should there be *more* restrictions on the private ownership of handguns?

HEALTH CARE: Should the federal government have a *greater* role in making health care available?

MARIJUANA: Should the punishments for the possession, cultivation, transportation, sale and use of marijuana be *reduced*?

MERGERS: Should corporate mergers and acquisitions be *more* closely scrutinized by regulatory agencies?

SPACE: Should the federal government *reduce* funding for the manned space program?

TAXES: Should federal income tax rates be *reduced* and replaced with a national sales tax?

TOBACCO: Should the tax on tobacco products be *increased*?

Notice that these modified propositions no longer fit into the framework of a *yes or no* resolution. The question is now *how much or which?*

Traditionally, the policy resolution comes more as a statement than as a question, and the debate proceeds with one side (the **affirmative**) supporting the resolution and the other side (the **negative**) arguing against the resolution. The affirmative must advocate the resolution, and has the **burden of proof**. In order to meet that burden, the affirmative must establish a **prima facie case** dealing with three issues (which are arranged in a dependent array): to show a **need** for change, a workable **plan** by which the change can be accomplished, and that the adoption of the plan would, on balance, bring **benefits** (i.e., that the plan would solve the problems for which it was created without bringing about too many new problems in the process).

However, before the affirmative side begins to outline the particular arguments of its case, it must begin by offering a **definition of terms** (and it is traditional for the negative to begin its first stand on the floor by announcing an acceptance of those definitions). Because this definition usually goes unchallenged by the negative, the whole process may appear to be a mere formality. However, it is essential for the affirmative to render those definitions carefully (and necessary for the negative to listen carefully and reflect on the implications of those definitions before agreeing to accept them). Poorly defined terms may paint the affirmative into a corner from which it cannot escape. Cleverly defined terms may allow the affirmative to spring a trick case for which the negative is completely unprepared. Years ago there was a national high school debate topic that could be understood in very different ways.

Resolved: that the federal government should establish a program of national service for all citizens.

Most affirmative teams understood this topic as one focusing on military manpower, and defined *service* as involving a military draft (with possible civilian service alternatives) and defined the term *for all citizens* as indicating a universal service (with very few exemptions and limited deferments). Some affirmative teams advocated comprehensive health care. They did this by defining *service* as something that the government provided to the citizens (rather than received from the citizens) and *for all citizens* as a plan that would serve everyone (as opposed to having everyone serve).

Here is another example of such a debate topic from the 1960s.

Resolved: that nuclear weapons should be controlled by an international organization.

Most affirmative teams understood this to be a disarmament topic. They defined *controlled* as having direct power or command over the possession or use of and defined an *international organization* as something like the United Nations or a world government. Some affirmative teams used this topic to put forth a proposal for a non-proliferation treaty, by defining *controlled* as limiting the acquisition of. This precluded many negative plan objections about the difficulties of an international organization disarming the superpowers. A few affirmative teams advocated strengthening NATO or other alliances by defining an *international organization* as two or more nations working together. This approach was sometimes very effective,

because an unsuspecting negative team would spend its first stand on the floor talking about the dangers of communist expansion, and how communist governments could not be trusted to keep their agreements, and then the affirmative would announce its plan of strengthening anti-communist alliances such as NATO.

As soon as the affirmative team presents its definition, the negative should make sure that the debate is going to be headed in a direction it can cope with. As soon as the affirmative presents its plan, the negative should go back to those initial definitions and verify that the plan does indeed embody that definition (otherwise the negative can raise a great point that the affirmative has failed to fulfill its most basic obligation: to defend the resolution).

Some affirmative teams develop a comprehensive plan in which the fulfilling the resolution is only part of a much more comprehensive solution. This raises the complex issue of **extratopicality**. Here is an example of an old debate topic.

Resolved: that there should be compulsory arbitration of labor-management disputes in basic industries.

On this resolution most affirmative teams ran a case that criticized the status quo system of collective bargaining because of the problems caused by occasional labor disputes (strikes and lockouts). The plan then replaced collective bargaining with government imposed settlements. Some affirmative teams got the idea that a bigger economic problem was inflation, and came up with a plan for price controls. That solution is beyond the resolution, and therefore, extratopical. So, if the affirmative only advocated price controls, that would not have met the obligation to defend the resolution. However, the affirmative could meet its burden by arguing

- There is a need for price controls
- Price controls require wage controls
- Wage controls require government imposed settlements of labor disputes (i.e., compulsory arbitration)

This approach establishes an extratopical plan as an adequate solution, but makes the resolution an essential means to that solution.

Another topic previously discussed could serve as an example here.

Resolved: that nuclear weapons should be controlled by an international organization.

Suppose that the problem (need) is world poverty and the solution (plan) is a world government.

- There is a need for a world government
- A world government would have to be stronger than any nation
- A world government would have to control nuclear weapons

The negative could still win by demonstrating either that the extratopical portions of the plan are adequate to solve the problem without the resolution (i.e., that the resolution is not essential) or the negative could demonstrate the plan, even with the resolution, is not adequate to solve the problem.

Outline of issues for the traditional policy debate.

Is there a *need* for a major change of policy?

Is there a serious problem?

Is the situation widespread (or highly probable)?

Is the condition deleterious?

Are less extreme measures inadequate?

Would a counter-plan be inappropriate?

Is there a workable *plan* to implement the new policy?

Can it be financed?

Can it be administered?

Can it be enforced?

Would the new policy be *beneficial*?

Would it solve the problem for which it was created?

Do advantages outweigh disadvantages?

Are there other noteworthy advantages?

Are there overriding disadvantages?

How much will the plan cost?

How much freedom will be lost?

Will the plan compromise public safety or security?

There are three big issues in the traditional policy debate: need, plan and benefits. The affirmative has the burden of proof on each issue, and must show that there is a problem requiring the resolution, that the resolution can be embodied in a workable plan, and that such a plan would be on balance beneficial. These three big issues are linked in a **dependent** array: it is essential that the affirmative carry all three in order to win. It is adequate for the negative to successfully **refute** one issue in order to win.

Once the terms have been defined, the affirmative can begin with the first major issue of the debate: establishing a **need** for changing to the plan embodying the resolution. The need is actually a problem that exists today under the present system (**status quo**). In showing that a serious problem exists, this usually involves two sub issues (linked in a dependent array): the problem is both widespread and deleterious (seriously harmful as opposed to a minor inconvenience). The problem must usually meet both of these criteria because most policy resolutions are phrased in such a way as to require a massive change, and only a condition that is both widespread and severe could be a need for such a change. Some problems represent such a catastrophic outcome (e.g., nuclear war) that the problem does not have to be widespread, just probable.

Once the affirmative has shown that a problem exists, it has presented a prima facie case on the issue of need. Now, the ball is in the negative's court, and that side has the burden of refuting that need. Theoretically, the negative can refute any need argument in one of several ways. (Each of these approaches could be adequate to carry the need argument, and hence the entire debate.) The condition is not enough of a "problem" requiring the affirmative's plan if the situation (need) falls under any of these categories ...

- is non-existent, unlikely, or rare (i.e., not widespread)
- is not that bad (i.e., not deleterious)
- can be corrected by a minor repair or modification of the status quo (i.e., less extreme measures)
- really calls for a different kind of solution (i.e., a counter plan)

Let's take the following resolution.

Resolved: that the U.S. petroleum industry should be nationalized.

This is a policy that Mexico has had for seventy-five years (and most citizens of that republic are firmly committed to keeping it that way). But that point is a mere comparison, and hardly a need for the U.S. to change its policy. One specific need argument could sound something like this:

Need Argument #1: U.S. oil companies make excessive profits.

Now let's subject that argument to the above criteria. It appears to be widespread (at least for some recent years): those corporations involved in the extraction, transportation, and refining of petroleum have reported great profits. But what about the second criterion? Is it bad that a company makes profits? That means more money for investors as well as more money for exploration for new oil fields and building more refineries. In the past, oil companies have pointed to their unprofitable balance sheets as reasons why they could not pay higher wages (or comply with pollution control

laws). The higher profit removes those excuses. The whole argument about oil company profits is a phony need; it is merely a politician's use of the rhetorical device of the appeal to indignation: "I want to get you so mad at the oil companies that you will vote for me to punish them." It started with Huey Long back in the 1920s in Louisiana, but every time oil companies (or some other industry's firms) make record profits, some politician will hope to capitalize on the public's sense of envy, outrage or confusion.

What makes the argument so effective is that it is vaguely related to a very real problem (and just gives it an emotional supercharge). Consider this more direct approach.

Need Argument #2: U.S. oil and gasoline prices are too high.

This is a widespread condition, and has gone on for several years, forming a sustained trend. The pain of this situation is directly obvious to all of us who fill up the tanks of our vehicles. The problem extends to forcing up the price of all manufactured goods and agricultural produce that must be shipped on trucks or trains to the marketplace.

The **status quo modification** stance for the negative nicely fits certain topics and certain needs. For example, on the nuclear weapons topic, some affirmative teams argued that even the test detonations of nuclear weapons created dangerous radioactive pollution. A good stance for the negative was to recommend that this problem be dealt with short of an international organization actually taking over the nuclear weapons: a ban on test detonations would be sufficient. (Indeed, a series of international treaties, beginning in 1963, actually accomplished this goal.)

Regarding the resolution about nationalization of the petroleum industry, several modifications of the status quo could be supported by the negative. One would be to substantially increase the use of alternative fuels: ethanol, natural gas, hydrogen, electric vehicles, etc. Of course, as the negative advances such solutions, it has to present a prima facie case that they are workable solutions with some chance of solving the problem. As the solutions become more extreme and more of a departure from the status quo, the negative's burden of proof increases.

There is yet another option for the negative. It may develop a **counterplan** (which may be as extreme a change from the status quo as the one advocated by the affirmative, but a change in a different direction, one incompatible with the change called for by the resolution). This strategy is the least often employed by the negative side, because it has so many risks. One is that it seems to completely give up the presumption inherent in the defense of the status quo. It gives the affirmative something to attack (e.g., the workability and benefits of the counter plan). Another risk is that the affirmative team might simply appropriate the counter plan and say that it will work better along with their plan. Nevertheless, if the negative can come up with a plan that is antithetical to the resolution and does a better job of solving the problem, the element of surprise might be overwhelming.

For example, on the topic of compulsory arbitration of labor-management disputes, one affirmative team outlined a need based upon the abuses of massive union power. The negative countered that what was needed was not compulsory arbitration, but applying the anti-trust laws to labor unions: breaking up the large international federations into small company-sized unions. This counterplan seemed

more tailored to the problem that the affirmative had presented, and less bureaucratic. It was also a stance for which the affirmative had not prepared.

Regarding the topic of nationalization of the petroleum industry, perhaps a viable counterplan addressing the issue of high prices would be price controls. This directly and immediately solves the problem for which it was created (but raises some long term questions about the workability and disadvantages of the counterplan).

Some negative teams respond to certain need arguments by saying that the status quo did not cause the problem. I see that as a moot point (and therefore not an adequate refutation). The status quo is merely the present attempted solution. In order to change to a new solution, it is not essential to show that the old solution brought about the problem, but only that the old solution (i.e., present system) has been unable to solve the problem. Let's return to the nuclear weapons topic.

Resolved: that nuclear weapons should be controlled by an international organization.

Most affirmative teams on this resolution developed need arguments emphasizing the danger of nuclear weapons being used in war, or even with test explosions, while some focused on the great costs of weapons programs. These problems clearly stemmed from the status quo: the maintenance of nuclear weapons. However, if the affirmative wanted to have a plan for a NATO-style nuclear alliance, the need might be that the status quo has not been adequate in deterring communist aggression. Since communism started in 1917 and nuclear weapons did not come on the scene until 1945, we could not say that nuclear weapons were

responsible for the rise of communism. However, nuclear weapons were a solution that the U.S. developed in World War II to combat totalitarian regimes (Nazi Germany and Imperial Japan) and then the U.S. maintained its nuclear arsenal to deter Soviet expansion in the post war world. So, in that sense, nuclear weapons were, by the 1950s, responsible for (i.e., they have been assigned the task of) controlling communism. If communism expanded after the U.S. had developed its nuclear arsenal, then nuclear deterrence had failed, and a new system was needed.

Resolved: that a constitutional amendment should be passed developing a national system of comprehensive health care.

Here the need would be that people are receiving inadequate health care (i.e., people are dying or suffering). The present private insurance system is not causing their diseases or accidents, it is just not adequate for providing good health care, and that is the need for change.

The affirmative team does not have to limit itself to exposing only one problem. The affirmative can have an **independent array** of need arguments, such that if any one of them is established, there is a need for change. For example, on the petroleum topic, the affirmative might lay out several problems requiring nationalization.

- **Need Argument #1:** U.S. oil and gasoline prices are too high.
- **Need Argument #2:** Private ownership of oil extraction and refining has led to environmental damage.
- **Need Argument #3:** Multinational ownership of oil extraction and refining is a national security vulnerability.

If any one of these need arguments stands, there is a need for the affirmative plan, even if the negative has successfully refuted the other two.

For another example, consider again the nuclear weapons topic: an affirmative team could create several different scenarios under which a nuclear war might occur. If any one of these scenarios presented a significant risk, that was a big problem in need of a solution.

- A war with conventional weapons might grow bigger and bigger and finally escalate to the use of nuclear weapons
- An accidental launch of a missile might trigger an all out nuclear exchange
- One side might have a technological breakthrough enabling it to attack the other side without fear of retaliation
- One side might pre-empt the other side fearing that the enemy is getting close to a technological breakthrough
- A mad man might gain control of nuclear weapons and not be deterred from using them

The affirmative's use of multiple scenarios gave it an independent array: if any one of these was plausible, that was adequate for establishing a need for change. Confronting such an independent need array makes it essential for the negative to refute each scenario. Such an approach makes it very unlikely for the negative to find a counterplan (or patchwork of status quo repairs) meeting all of these needs.

Another approach that an affirmative might take on the need issue would be to construct a **dichotomy**: there are only two possible outcomes, and both show a need for change. For example, on the nuclear weapons topic, one affirmative team said that under the status quo, we will either have a nuclear war (which would be a catastrophe) or we will continue to have mutual deterrence and an arms race (which is expensive). In confronting a dichotomy of scenarios, it is adequate for the negative to show that one of the two alternatives is not that bad, or that there is a third alternative (not mentioned by the affirmative).

One generally ineffective refutation used by some negatives against the need arguments is to point out that the status quo has some advantages (as well as the disadvantages implied by the affirmative's need arguments). Such an argument is largely a red herring. Negative teams may be tempted to use this approach especially when the affirmative need arguments have caught them off guard, and they do not know what else to say. Such arguments do not deny the need for a change. Indeed, such arguments are only pertinent if the affirmative plan cannot duplicate the advantages of the status quo. In other words, it is premature to present such arguments prior to the affirmative presenting its plan for comparison. If it is then apparent that the affirmative plan lacks these advantages of the status quo, the proper way to introduce these arguments would be as disadvantages of the plan (i.e., as a benefits argument).

Always remember that debates take place in front of an audience, and in the case of competitive policy debates, that means a panel of judges. It is important to know what type of persons are being used as judges. In many high school tournaments at the local level, the judges are teachers and parents of the participants. These judges are certainly not

experts in the topic areas (and perhaps not in critical thinking and argumentation either). There is no such thing as “proof” in the abstract. A point is always proved to the satisfaction of an audience (i.e., the judge in a debate contest, the jury in a criminal case, the voter in a political campaign). There are many ways to attempt to refute a point made by the opposing team

- Challenge the credibility of their sources
- Counter their evidence with different sources
- Evoke examples with which the audience is already familiar
- Point out that the factual point, even if true, does not support the opposition’s conclusion (i.e., change the analysis)

Here are some phrases that might come in useful for an affirmative side about the need for change.

<i>Situation</i>	<i>Appropriate AFFIRMATIVE phrase</i>
Status Quo is OK now, but will be inadequate in the future.	Yesterday's successful programs may be formulas for failure in the future.
Negative keeps denying the need.	"The only person who likes change is a wet baby." - Roger van Oech
Negative keeps denying the need.	We live in an age in which the handwriting is on the wall, and some people merely criticize the quality of the penmanship.
Negative advocates modifications of status quo	"Don't be afraid to take a big step if one is indicated; you can't cross a chasm in two small jumps." - David Lloyd George

Here are some good phrases for the negative to use on the need issue.

<i>Situation</i>	<i>Appropriate NEGATIVE phrase</i>
Need is inadequate.	Any proposal for change should be matched in scope, nature, and magnitude by a reason for change. A call for drastic change must be accompanied by a drastic need.
Need is inadequate.	If the diagnosis is health, and the prognosis is excellent, don't perform radical surgery or experiment with untried medication.
Need is inadequate.	This solution attempts to fix a watch that is not broken.
Need is hypothetical risk.	Just because a man's appendix might someday become diseased is no reason to give him an operation now.
Status quo fails in certain situations.	Marriage has a 50% failure rate, and I would not call for its abolition.
Status quo modification	The proposed plan is like going after an insect with a shotgun when all we need is a good fly swatter.
Status quo modification	The affirmative wants to call out the fire department to put out a candle.
Status quo modification	"Like using a guillotine to cure dandruff." - Clare Booth Luce
Status quo modification	"The hole and the patch should be commensurate." - Thomas Jefferson
Status quo modification	Why get a new house when the old one just needs a patched roof?
Status quo modification	Why get a new car when the old one just has a flat tire?

Once the need has been laid out, the next issue in the construction of the affirmative prima case is to outline the basic elements of a workable plan incorporating the resolution. Usually, in a high school or college policy debate situation, this takes between two and five minutes and touches on such points as

- Administration: who will be responsible for daily operations and decision making (e.g., a special board, a government agency)?
- Finance: how will funds be raised and allocated (e.g., a new tax)?
- Enforcement: how will the administrative body be able to inspect, adjudicate and ensure compliance? What sanctions will be used?

Certain resolutions may not require some of these points of plan outline, and other resolutions may require other points to be clarified.

Right after the affirmative presents its plan, that side must then clearly explain how the plan meets the need. Remember: the need is a problem requiring a solution, and the plan must be that effective solution. The need identifies an end for which we should strive, and the plan must be a means capable of attaining that end. The acceptance of the plan is the conclusion, and the needs are the premises. The plan is a question of *how* the change will be made, the need is *why* we are making the change.

At this point, the affirmative team has weighed in on the issue of benefits: the plan is beneficial because it meets the need(s). Once the affirmative has presented its plan and explained how it meets the need(s) for which it was created, the affirmative has finished its prima facie case and satisfied its burden of proof.

Some affirmative teams will go one step further and then claim some additional advantages for their plan (above and beyond meeting the needs already advanced). This sometimes helps in countering forthcoming disadvantages, as if the pros could balance out the cons (and some less sophisticated debate judges do think this way). However, some negative teams will just rightly regard these additional advantages as underdeveloped need arguments, and then challenge the affirmative to show that there are problems to begin with under the status quo.

Some affirmative teams will also take an additional step in trying to pre-empt some possible disadvantage arguments. Theoretically, debate judges are not supposed to hold either side responsible for refuting arguments not advanced by the other side. Negative teams should not have to refute need arguments (problems under the status quo) not advanced by the affirmative. The affirmative should not have to refute disadvantages (problems arising under the plan) not advanced by the negative team. However, some judges do forget the rules and vote according to arguments that occur in their own minds.

When it comes to attacking the affirmative plan, the negative has several options. On some resolutions, the negative can safely avoid the plan, and just concentrate on showing that there is no need for changing to the plan. On other resolutions, the negative can (and perhaps must) devote the bulk of the attack to the plan.

The least effective negative strategy (for most resolutions, most affirmative cases, and most judges) is to do a picky attack, going through each plank of the affirmative plan and raising questions. This technique is only legitimate in those cases in which the affirmative has so skimmed on the details that you don't have enough to know how to mount your plan

attacks. If the judge agrees that the plan is skimpy, then this line may have some traction, otherwise, the “twenty questions” approach appears desperate. All the affirmative team has to do is to come back and give an answer and (unless those answers offend the judge) the affirmative team has met its burden. Many judges of high school tournaments will not hold the affirmative team responsible for coming up with a lot of technical details, but just a bare outline of a plan’s concept.

Unlike my opponent, who asks the wrong questions, and gives no answers, I shall give you the right questions and the right answers.

Another questionable negative approach on the plan is to point out that there are other problems that the plan does even try to solve. Unless the new plan does substantially worse than the present system (or the negative counterplan) this is at best a moot point, and at worst, a red herring for distracting the audience. Nevertheless, this is a technique commonly used in political advertisements on ballot propositions: “... but Prop 92 will not raise one more penny for our inner city schools” (while that proposition was not created for that purpose, but for higher education).

Yet another questionable approach for the negative is to attack previous historical examples. In general, these refutations are ineffective, especially when the claim is “it won’t work now because it didn’t work then” and there is not much in depth explanation as to why it didn’t work. The affirmative can simply respond: “those objections were not tied to our specific plan.” For example, on the nuclear weapons topic, some negative teams raised the point that the League of Nations did not succeed in stopping the 1930s aggressions of Germany, Italy or Japan. The affirmative

team had an easy rebuttal: our plan is different because our international organization will have nuclear weapons, and the League of Nations did not.

Of course, both sides can play this game. The affirmative might claim that their plan will work because a similar approach worked at some other time or in some other location. This can be highly effective if all the negative did was to raise a list of questions about the details of the plan's workings. For example, on the compulsory arbitration topic, an affirmative team could respond to a long list of questions about workability by saying, "of course the implementation of the plan can address all these questions and overcome all the problems; compulsory arbitration has been a workable approach in Australia for decades, and was used in the U.S. during World War II." The same approach can be used for nationalizing petroleum or medical care: many nations of the world have government ownership of these industries.

On those resolutions where some possible historical examples might exist, it would be a good tactic for the negative to nail down the affirmative, perhaps in cross examination: "is your plan similar to one that has been successfully established at another point in history? Perhaps in another country? Or at the state or local level?" If the affirmative says "yes" and gives an example, then the negative can present evidence about problems with that historical example (or deny that the affirmative plan is as good as that historical example). If the affirmative says "no" then the negative has a better footing on the plan workability arguments, and can preface them by saying that we really need to raise the bar on these workability issues because the affirmative plan ventures off into uncharted territory.

Theoretically, one big workability argument could win the debate for the negative, but it would have to be a fatal flaw that renders the plan completely incapable of getting off the ground or accomplishing anything. Such arguments are rare.

One line of plan attack generally regarded as illegitimate is one that goes something like this: "they would never adopt such a plan." Here are some examples on some of the above topics.

- **Resolved:** that nuclear weapons should be controlled by an international organization: *You could never get the Soviets and the Red Chinese to join such an organization.*
- **Resolved:** that foreign aid should be eliminated: *You could never get Congress to defy the Israel lobby.*
- **Resolved:** that there should be compulsory arbitration of labor-management disputes in basic industries: *The Supreme Court will declare that unconstitutional.*

Such arguments are speculative: we don't know for sure who will actually accept the plan. Furthermore, it is not part of the burden of proof for the affirmative team to show that Congress, the Supreme Court, or foreign nations will adopt the plan, only that the plan *should* be adopted by a policy setting body.

Probably the best strategy for most negative teams (with most resolutions, most affirmative cases, and most judges) is to reframe most plan workability arguments as disadvantages or "plan objections." This is because most workability problems can be solved, if we are willing to put up with the bureaucracy, costs, and constraints on freedom.

- Administration: bureaucracy will be created
- Finance: the costs will be excessive
- Enforcement: the government will end up limiting many freedoms

Merely pointing out that some aspect of the affirmative plan might be unconstitutional is not a legitimate objection. (It harkens back to the point that the plan *should* be adopted, not that the high court *will* approve it). Some resolutions (or affirmative teams) pre-empt this argument by having a constitutional amendment be part of the resolution (or the affirmative plan). Here are some examples.

CONGRESSIONAL DISTRICTS: Should a constitutional amendment be passed abolishing local congressional districts, and apportioning representation by proportional vote of national parties?

ELECTORAL COLLEGE: Should a constitutional amendment be passed replacing the electoral college with a direct popular vote in presidential elections?

JURY SYSTEM: Should a constitutional amendment be passed abolishing trial by jury and replacing it with a three judge panel?

PARLIAMENT: Should a constitutional amendment be passed abolishing the office of the president, replacing the executive branch with a prime minister selected by Congress?

SELF-INCRIMINATION: Should a constitutional amendment be passed repealing the fifth amendment, and requiring defendants to testify?

One reason more resolutions do not include “pass a constitutional amendment” in their wording is to avoid

Giving negative teams a chance to respond “you don’t need to pass a constitutional amendment, you just have to ...”

In general, each negative plan argument should be well developed enough to constitute a fatal flaw of the affirmative plan, such that if the negative wins that argument, it has won the debate. If the negative advances a disadvantage that is not as compelling as the advantages stemming from the plan meeting the need, then the judge will probably discount such disadvantages. So, a negative team needs to fully develop such arguments, and remind the judge of the importance of each. The negative must also worry about pre-empting some possible refutations to the disadvantage arguments, because the affirmative team will have the last stand on the floor.

A stealthy way for the negative to use the bureaucracy, cost, and freedom arguments is to advance them at the beginning of the debate as a set of criteria which set up a high burden of proof for the affirmative on the need issues. For example, on the topic of universal service, one negative team started off referring to the resolution as a call for “forced labor.” This metaphor was very effective in framing the debate by providing a very high standard of need: “before America goes down the road of forced labor, there must be a clear cut, comprehensive, and compelling need.” Going through the individual problems of the status quo, the negative kept asking “Is that sufficient to warrant forced labor”?

Perhaps the best negative attack on the plan is when it will not meet the need for which it was created. Usually, the best way to do this is to show that the same causal dynamics that created and sustained the problem under the status quo, will also exist under the affirmative plan. For example, for the nuclear weapons topic in 1965, one negative team said

The reason why we had a nuclear arms race after World War II was because the communists stole our secrets. We could not trust the communists then. We cannot trust the communists now, and that is why we need nuclear weapons to deter them. We will not be able to trust the communists to fully comply with nuclear disarmament.

On the topic of the petroleum industry, it could be argued that the problem of high prices is due to current levels of high demand and low supply of gasoline. It does not matter who is running the oil companies: those supply and demand factors spell high prices. Indeed, a problem for many countries that have nationalized oil is that governments (e.g., Mexico) are tempted to keep the price of oil high as a way of getting extra revenue. The only way to get prices lower than supply and demand would be to have the government subsidize gasoline prices.

I reject my opponents' plan, not because I disagree with his goal, but because I am smart enough to realize, and honest enough to tell you, that their proposed means will not attain that worthy goal.

Some resolutions appear to reverse the roles of negative and affirmative by calling for an abolition or elimination of some aspect of the status quo. However, the burden of proof does not switch: the affirmative team still shoulders the burden of proof because it is calling for a major change from the status quo. Here are some examples of those resolutions.

CAPITAL PUNISHMENT: Should a constitutional amendment be passed abolishing the death penalty in all U.S. jurisdictions?

SPACE: Should government end funding for the manned space program?

Such resolutions do little more than call for the end to the status quo. These propositions give the affirmative a great deal of latitude in crafting a plan: what comes next to replace the status quo. So, it may be hard for the negative to have much preparation on workability and disadvantage arguments, except that the affirmative plan must deal with the problems that the status quo was created to solve. For example on the capital punishment topic: what will be done with those criminals now on death row? Another problem for the negative team is that it is more boxed in (especially with counterplan options): the negative must defend some key aspect of the status quo.

On the other hand, the disadvantages and unworkability of the status quo are more obvious, and become arguments for the affirmative's need to change. For example, on the capital punishment topic, one need for change is that the present system has a risk of executing the wrong person, and another need is the cost of the appeals process.

<i>Situation</i>	<i>Appropriate AFFIRMATIVE phrase</i>
When negative has picky plan attacks.	An objection is nothing more than a request for information.
When negative has picky plan attacks.	Some people would rather live with a problem they cannot solve rather than accept a solution they cannot understand.
Need is strong, but plan's unworkability is questionable.	On the one hand we have the possibility of salvation, on the other, the certainty of failure.
Plan only solves part of the problem.	"We cannot do everything at once, but we can do something at once." - Calvin Coolidge

<i>Situation</i>	<i>Appropriate NEGATIVE phrase</i>
Plan has poor administration.	Like Dracula guarding the blood bank.
Plan is unworkable	"Any Jackass can kick down a barn, but it takes a good carpenter to build one." -Grandpa's Law
Plan is unworkable	"He who cannot hit the nail on the head should, please, not hit it at all." - Nietzsche
Plan is unworkable	That's hitching the wagon to a blind horse.
Plan does not meet need.	That's not putting the solution where the problem is.
Plan does not meet need.	Never mistake a slogan for a solution.
Plan does not meet need.	Modifying the appearance of the effect does not alter the nature of the cause.
Overriding disadvantages: cost	The affirmative plan is like an ink jet printer on sale: it looks pretty cheap at the beginning, the cost of those consumable cartridges just keeps growing.
Overriding disadvantages: cost	"When the bait is worth more than the fish, it is time to stop fishing." - African American Proverb
Overriding disadvantages	"The more effective the prescription, the more horrendous the side effects." - Laurence J. Peter
Overriding disadvantages	Does it cure our sufferings or leave us suffering from the cure?
Overriding disadvantages	That plan puts us between the dog and the hydrant.
Overriding disadvantages	The biggest source of most of our present problems that we see so clearly is our previous solutions that we did not look at long enough.

There are different kinds of opportunities that both sides will have to advance their position. **Constructive** speeches are

chances to advance new arguments (need arguments for the affirmative, plan arguments for the negative) as well as present initial refutations of the other side's arguments.

Rebuttals are opportunities to review previous arguments and refutations (but not advance new arguments). Rebuttals are not used effectively if they merely repeat the same evidence previously advanced. Judges think: "he has nothing else to say"? The most effective use of the rebuttal is to present new evidence and reframing analysis. The rebuttals must also address what the opposition has been saying. It helps a little to point out inadequacies in the opposition's arguments (e.g., lack of evidence). It helps a lot more to point out major inconsistencies in the opposition, especially a **dilemma**: "if this is true, then their need evaporates, but if this is not true, then their plan will not solve that need."

The **cross examination** periods are the opportunities to ask questions directly of the opposing team. (Usually the questioner is recognized as having control of the time and may cut short an answer if it appears to stray from the topic or become too self-serving. The best use of the cross examination period is to

- Clarify the opposition's argument (so that you don't end up trying to refute the wrong points)
- Force the opposition to concede some of your points (e.g., that gasoline prices are too high, nuclear war would be horrible) or to admit that they lack evidence on a point
- Get the opposition to promise to take some of their future speech time to explain a point in greater depth
- Set up a dilemma

For example, on the compulsory arbitration topic, the negative team could ask the affirmative "Do you think that big labor unions will not go out on strike if there are clear and enforceable penalties for doing so"? If the affirmative said "yes" then the negative had a workable counterplan: no need for compulsory arbitration, just ban strikes. If the affirmative said "no" then the negative had a plan-meets-need argument: the affirmative plan will not be able to stop strikes either. Only if the affirmative could have foreseen both scenarios of the dilemma would they have been able to rehearse an answer such as

It depends on whether labor's demands are being given a fair consideration. If we just ban strikes, and ignore their just demands, they will strike illegally. If they can get their grievances heard fairly in an arbitration tribunal, they won't have to go out on strike.

If the affirmative had this answer in cross examination, they looked good, and this precluded the negative's argument. If they only made this explanation in the last rebuttal after the negative had already pinned the affirmative down in cross examination and constructed a major argument, this looked like a desperate attempt at damage control.

In general, open ended questions lead the opposition to give long and self-serving answers. For example, if one side asked "Why are gasoline prices so high today"? the other side could set forth, at length, its theoretical and historical foundation, and even sneak in a few more quotations and statistics make its points.

There are several commonly employed formats for formal debates on policy issues. Most of these formats involve two clearly identified sides: one supporting the resolution and

other opposing the resolution, and time limits for how long each will be able to stay on the floor. When each side has but one member, this is known as **Lincoln-Douglas** because it is reminiscent of the great topics addressed by the candidates for the Illinois race for U.S. Senate in 1858.

Lincoln-Douglas format

- affirmative constructive 8 minutes
- cross examination 3 minutes
- negative constructive 12 minutes
- cross examination 3 minutes
- affirmative rebuttal 6 minutes
- negative rebuttal 6 minutes
- affirmative rebuttal 4 minutes

Most high school and college competitive debate tournaments have two speakers on each team.

Tournament Format for two-person teams

- first affirmative constructive 8 minutes
- cross examination 3 minutes
- first negative constructive 8 minutes
- cross examination 3 minutes
- second affirmative constructive 8 minutes
- cross examination 3 minutes
- second negative constructive 8 minutes
- cross examination 3 minutes
- first negative rebuttal 4 minutes
- first affirmative rebuttal 4 minutes
- second negative rebuttal 4 minutes
- second affirmative rebuttal 4 minutes

The **parliamentary** format is similar to that of governmental legislative bodies.

Parliamentary Format for legislative deliberation

- prime minister 8 minutes
- leader of opposition 8 minutes
- member of the government 8 minutes
- member of the opposition 8 minutes
- leader of the opposition 4 minutes
- prime minister 4 minutes

Notice that in all of these formats, the side supporting the resolution gets both the first stand on the floor and the last stand on the floor (sort of a compensation for having the burden of proof).

Decree & Discussion

The use of formal debate, with its heavy emphasis of presumption for the status quo, is an excellent approach for avoiding a wrong action, but it is too cautious an approach to guarantee timely action. When extended deliberation is more costly than the disadvantages that it protects us from, we must find a faster way to act.

The quickest approach is to have a designated leader. Call him (or her) a chief, general, potentate, boss, CEO, or pope. The leader speaks, and it is to be done: no further time wasted by distractions of deliberation. The German Third Reich 1933-1945 had such a system: *ein volk* (one people), *ein reich* (one government), *ein fuhrer* (one leader). The one government was that of the one party: the National Socialist

German Workers Party (the Nazis). Their one leader was Adolf Hitler. This system allowed decisions to be made rapidly. Some observers assume that Germany's rapid economic growth in the 1930s may be attributed to Hitler's domestic policies (though this may be an example of a post hoc fallacy). The rapid military advances of 1939-1941 are also attributed to quick decision making. However, after 1943, with German armies in retreat in Russia, Italy, France, and North Africa, the war became more complicated, but Hitler insisted on micromanaging some of the battles, leading to massive defeats in Stalingrad and Normandy.

Yet, the greatest flaw of the Third Reich was not that its military defeats led to economic ruin for the nation (and all of Europe) by 1945, but that it led to one of the most morally reprehensible events in human history: the Holocaust. In the formal debate, the disadvantages of a proposal must be carefully considered, while under dictatorship, the goal is to swiftly and effectively carry out the decree of the leader. Soon after coming to power, there was one religious group that seemed to resist the Nazi call for loyalty to the Third Reich and military service: the Jehovah's Witnesses. This was a small community, and not very popular, so when they were rounded up and put in detention camps, there was no great protest. When a eugenics program arranged for euthanizing of some mentally retarded and severely disabled persons, there was not much in the way of publicity or protest. Then more groups were targeted for the camps (e.g., political dissenters and homosexuals). More active anti-semitic events, such as the Nuremberg laws limited the rights of Jewish citizens, and the "Crystal Night" that destroyed Jewish shops and businesses, did not generate enough backlash to stop the Nazis. During the height of the war, the plans for systematic extermination of entire ethnic groups (Jews and Gypsies) were formulated in secret and then carried out through systematic deceit and deception.

It is easy to condemn the architects of the Holocaust as evil men. It is easy to praise those who figured out what was happening and risked their own lives to help hide potential victims, or like Oscar Schindler and Raoul Wallenberg, found a way to help many escape. It is difficult to accept the fact that many seemingly "average" Europeans (not just Germans, but Austrians, Hungarians, Ukrainians, Lithuanians, Croats, etc.) helped round up, detain, and execute the victims. Some harbored a strong hatred of Jews or Gypsies, but many rationalized their actions by telling themselves something like

- These people must have done something very bad, or else they wouldn't be here.
- Everybody else is following orders, so I guess I should. I must not disobey.
- If I say I won't do this, I will be sent to the Russian front.

As social psychologist Philip Zimbardo says: it is the bad barrel that corrupts the apples. Many otherwise normal people thrust into a bad situation will do bad things. The solution is not just to condemn the individual participants, but to prevent the kinds of situations that bring out the worst in people.

That is the greatest problem with dictatorship: it creates situations in which the followers are encouraged to implement orders in the most effective and rapid fashion: no time for critical thinking on the moral implications, and no time for mercy. This conclusion is not a hasty generalization from one German example, for we see it throughout the 20th

century in every regime in which power was concentrated: Japan, Italy, Spain, USSR, China, Cambodia, Vietnam, Cuba, Iraq, Iran, Syria, Libya, North Korea.

An alternative to both debate and dictatorship is discussion. Discussion is like debate in that each side gets its say, but now we are not limited to two sides. Indeed, if discussion has only one side (or two sides with one having a clear majority) there is the risk of **group think**. This is a kind of uncreative and rigid solution in which there is insufficient exploration of alternatives, workability questions, whether not a given solution meets the need, and overriding disadvantages. This term was coined by Irving **Janis**, who examined many of the worst decisions made fifty years ago (e.g., Ford's decision to launch its 1958 Edsel model, the Kennedy administration's Bay of Pigs invasion in 1961). In both cases, there was too much initial agreement, and a fear to speak up against what appeared to be a smooth implementation of something that had been largely agreed to. A later example would be the design of the Challenger Space Shuttle which exploded in 1986 because of a design flaw which some engineers had worried about, but were unable to get the design committee to pay attention. The difficult dynamic is that at a certain point, a group may think that it has already invested so much time and effort with a given solution that anyone who disagrees is just obstructive. In certain processes of group decision making, what becomes cumulative is not the collective weight of knowledge, but the collective weight of ignorance. What gets multiplied is not wisdom, but folly.

There are two keys to effective group discussion as a tool for decision making: genuine listening and genuine action. Neither can be held out as an excuse for avoiding the other. Perhaps these two take place in alternating stages, but the stages need to be short, and whenever we are in a listening

mode, all must know that action will be forthcoming, and whenever we are in an action mode, all must know that listening will still take place.

"The golden rule of friendship is to listen to others as you would have them listen to you."

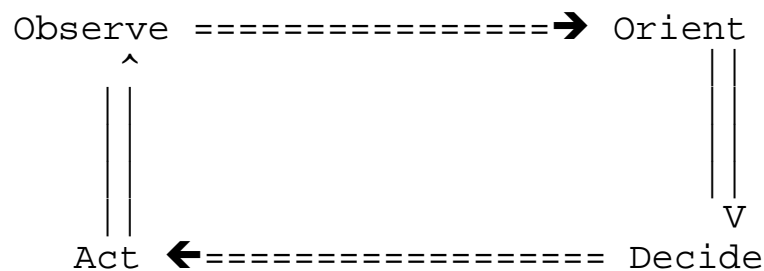
- David Augsburger

	<i>Dictatorship</i>	<i>Debate</i>	<i>Discussion</i>
Format	Hierarchical	Structured	Fluid
Process	Point in time	Linear	Cyclical
Decision	Decree	Verdict	Action point in cycle
Opportunity for reframing	None	Limited	Frequent
Success is defined as	Obedience	Winning	Action based on consensus
Error is seen as	Disobedience	Losing	Learning event
Success & error are	Opposites	Opposites	Points in the cycle
Blame	Avoid by covering up	Assigned to Status Quo or Plan	None; refocus on solution
Sides	One	Two	Many
Where appropriate	Bureaucracy	Tournament Court Legislature	Committee Task force Team
Action is	End point	Pointed to	Continuous

This can be perceived as a cycle, spiral or loop, and the way to make this effective is by continuously reframing both the problem to be solved and the range of solutions that can be employed (and also the roles of the participants in the discussion).

<i>Debate</i>	<i>Multilog Discussion</i>
“Why don’t you”?	“How can we”?
List points with clarity	Listen with sincerity.
Defend our position.	Hear their concerns.
Give precise proposals.	Mutually explore options.
Compare plan to status quo.	Create a plan that subsumes and transforms the status quo, becomes the new status quo, and then inspires an even better plan.
Status quo and plans are goals to be defended.	Status quo and plans are temporary means to building a better future.
Dichotomy: we win or they win (which means we lose).	We strive for a solution under which we ALL win.
Beat the opposition.	Transform the opposition into partners.
Final verdict	Dynamic process

Let’s look at **OODA loops**. This acronym stands for *observe, orient, decide and act*. This is a process used by emergency response teams that must continually reassess the nature and magnitude of the situation that they confront.



This is not a sequence of four steps, because at the end (action) there is another opportunity to assess the changing situation and adjust what we do based upon the changing situation.

Take the example of the war in Iraq. The situation kept changing, especially who was the identified enemy. As one threat dissipated, another arose. The war began under the assumption that Saddam Hussein had weapons of mass destruction. After the Iraqi army was defeated and Saddam was driven into hiding, the problem was an insurgency led primarily by his Baathist party supporters. After Saddam was apprehended, the major source of actions against U.S. troops shifted to foreign Al Qaeda fighters. The surge suppressed Al Qaeda, but then Shi'ite militias became the major internal threat. Each of these changes has required a revisioning of the U.S. strategy in Iraq.

<i>Phase #1: early 2003</i>	
Observe	Saddam reluctant to permit inspections
Orient	Saddam has Weapons of Mass Destruction(?)
Decide	Goal is to remove WMD
Act	Invade

<i>Phase #2: after fall of Iraqi army</i>	
Observe	Saddam flees Baghdad; Baathist insurrection
Orient	Danger of Baathist comeback(?)
Decide	Goal is to put down insurrection
Act	Search & destroy Baathists

<i>Phase #3: after apprehension of Saddam</i>	
Observe	Saddam apprehended; Al Qaeda prominent
Orient	Danger of Al Qaeda takeover(?)
Decide	Goal is to put down Al Qaeda
Act	Search & destroy Al Qaeda; Surge

<i>Phase #4: post Surge</i>	
Observe	Al Qaeda threat reduced; Shi'ite militias rebel
Orient	Danger of civil war, splitting of Iraq(?)
Decide	Goal is to control Shi'ite militias
Act	Strengthen Iraqi government & Iraqi army

Some people who opposed the Iraq invasion in 2003 point out that since the war was initially framed as a need to prevent an anti-American dictator from getting weapons of mass destruction, and since none were found, the war was unnecessary. That would be true if the Bush always knew that Saddam never had WMD, and that Bush decided to use the threat of WMD as a ruse to get the American people and Congress to support the invasion. If, on the other hand, the Bush administration sincerely believed that Saddam probably had (or was close to developing) such weapons, the action was justified as prevention of a risk. To complain about the lack of such weapons now is a moot point: the war has been through several OODA loops now with new objectives.

The fact that the war has changed its purpose from stopping weapons of mass destruction, to regime change, to creating a stable Iraq, is not a substantial objection to the Iraq war. Most emergency situations start out as one problem (with a given nature and scope) and then morph into another. This has been especially true of past wars. The Civil War began as a military operation to preserve the Union, and ended up as a campaign to end slavery. U.S. entry into World War I began as an attempt to defeat Imperial Germany, but then became, at least for President Wilson, a campaign to make the world safe for democracy. U.S. entry into World War II began as a response to the Japanese attack on Pearl Harbor, but quickly shifted to a campaign to secure the unconditional surrender of all of the Axis Powers, starting with Nazi Germany.

On the other hand, opponents of the Iraq war can point out that each OODA loop cycle so far has been very costly in lives and money, and has not produced a definitive victory. It is as if the defeat of each enemy has only unleashed another in its place. Inductively, we should be learning that

the only thing we are guaranteed by completing a cycle is more lives and money are being lost. Perhaps Saddam's dictatorship should not have been viewed as a problem, but as a solution to Iraq's previous problem of instability. When the U.S. removed his regime, that old problem returned.

SWOT analysis is a good technique for any organization to use periodically to assess where it is and where it should be going. This approach works best in a group context, and the group is composed of all stakeholders. For a corporation this might include management, workers, stock holders, government regulators, customers, people live downstream from the plants. For a university this might include administration, faculty, staff, students, donors, accrediting agencies, and the community around the geographical area.

	<i>Internal</i>	<i>External</i>
Good	Strength	Opportunity
Bad	Weakness	Threat

SWOT stands for strengths, weaknesses, opportunities and threats. The listing of strengths is more than a feel good boasting exercise. It is important to say what the organization is doing well, and what it can handle in the future. Weaknesses are a frank admission of what the organization cannot take on. These either translate into needs of what should be changed (or admissions that certain plans would be unworkable). Opportunities and threats are external forces and events that can be matched with strengths and weaknesses to determine the best course of action.

<i>SWOT analysis for Crafton Hills College</i>	
Strength	Dedicated faculty & staff
Weakness	Small college with limited offerings
Opportunity	Population growth of Inland Empire
Threat	Precarious state funding

One way of combining the streamlined efficiency of dictatorship and the thoroughness of discussion is to develop a decision responsibility matrix. This is sort of like the U.S. Constitution: clarifying which branch of government (executive, legislative, judicial or state level) will be in charge of what particular aspect of government. This divides and delegates authority as well as providing checks and balances. Similar delineations of power and responsibility are found in most businesses and non-profit organizations in terms of their organization charts and job descriptions.

<i>Decision Responsibility Matrix</i>	
Primary	Responsibility for initiating discussion and implementation
Veto	Must give consent or plan is rejected
Consult	Must have opportunity to give advice prior to decision
Inform	Must be informed after decision has been made

For example, here is the decision responsibility matrix on our ranch. My wife inherited it from her parents, and she is really the one with primary responsibility. Since the ranch is not really a profit making operation, I have to provide the funds, and that gives me a veto power. I cannot determine which crops will be planted this year but I can stop plans that cost too much by refusing to fund them. My brother-in-law lives there and manages the ranch, so we consult with him before we do anything. My wife usually follows his

advice, but because the ranch is in her name, and not his, she does not have to listen to him. After she makes the decision, the ranch hands working at the ranch are informed so they can carry out the plans.

<i>Decision Responsibility Matrix for Rancho Solis</i>	
Primary	G. Solis, owner
Veto	T.L. Brink, financier
Consult	J. Solis, manager
Inform	Ranch hands

In many organizations, the role of each person (or office) is not constant, but changes according to the topic being considered. A good example of this would be in a married couple. Neither the husband nor the wife has primary responsibility for all decisions in a marriage: which one has which level of responsibility depends upon the decision to be made. As children arrive and grow up, they can be added to the matrix, and given increasing responsibility. Here is what may exist in one family consisting of a couple in their early forties and their fourteen year old daughter.

<i>Decision Responsibility Matrix</i>					
	<i>Buy house</i>	<i>Buy car for him</i>	<i>Buy car for her</i>	<i>Daughter's school</i>	<i>Grad degree for him</i>
Primary	Wife	Husband	Wife	Wife	Husband
Veto	Husband			Husband	Wife
Consult		Wife	Husband	Daughter	
Inform	Daughter	Daughter	Daughter		Daughter

Perhaps the best discussion for the family to have is how the decision responsibility matrix will work: who is going to decide what?

THINK ABOUT IT

Abortion is a topic that has generated much passionate disagreement and little empathic listening over the past three decades. Each side has demonized the other as evil and intolerant, and a serious threat to somebody's most basic rights (either the right to life or the liberty to make choices about one's own body). What has been lacking is a dialogue open to the possibility of reframing the issue. Perhaps these questions could lead to a more fruitful interchange.

Instead of viewing abortion as a problem, can we view it as a less than optimal solution for a different problem (pregnancy)?

What are the criteria for a wise abortion policy? Or reframe this: what are the criteria for a wise pregnancy and prenatal policy?

What role in these decisions should be exercised by the federal government? State governments? The pregnant woman? Her parents if she is underage? The man who impregnated her? Who else needs to have a voice?

How can we shift from forbidding what is wrong to guiding people to exercise free choice in a more morally acceptable fashion?

We can come to the conclusion of this book by returning full circle to our starting point: the problem with stereotypes. Stereotyping another person as just another member of a certain category (people of that ethnicity, that gender, that age, that religious group) is mere defining a subject in terms of the (presumed) predicate. What discussion calls upon us

to do is to see other people as persons with unique perspectives on the facts and priorities of values. By cultivating empathy and engaging with other persons, we not only overcome stereotypes and prejudices, but we can reframe our own views on the problems that confront us all, and come to more creative solutions: not only more innovative, but more effective solutions.

Perhaps Jewish theologian Martin **Buber** said it best. Inspired by Kant's categorical imperative that we treat every other person as an end, not as a means, Buber said that we must strive for dialogue as opposed to monologue. When I deal with mere inanimate things, I am in a monologue, forming an *I-It* relationship with the thing that I categorize by predicates. But when I move into the interpersonal realm of dialogue, I must treat other persons as the subjects, the unique centers of consciousness that they are, with reverence and empathy. Buber's term for that kind of relationship was *I-Thou*.

All too often, the retreat from dialogue leaves the other not as a passive *it* that sacrifices with being categorized, but as an angry and defiant person. When we perceive the other as angry and defiant, it is easy to justify the prior decision not to engage in dialogue. Notice what has happened: dialogue has been replaced by demonization.

The phrase "No justice, no peace" is not just mouthed by those who would try to understand (or even justify) events such as urban riots (also known euphemistically as "insurrections"). Any side left out of dialogue may conclude that there is no peaceful alternative to violence, and this can be experienced on the right as well as on the left. Let's reframe the old statement of Lord Acton, that all power corrupts. The greatest corruption comes from being powerless and desperate.

Our imperative is to replace fences with bridges, and relativism with relationships, and envy with empathy. Listening better beats talking longer.

"No one cares how much you know, until they know how much you care."

- Theodore Roosevelt

There is no problem so fearful that we will not approach it. There is always an explanation, but it may be one that is more complicated and less comprehensive than what we would prefer, so we keep looking.

"The art of progress is to preserve order amid change, and to preserve change amid order."

- Alfred North Whitehead

There is always a solution, but it may be one that is more costly and less effective than what we would prefer, so we keep looking.

"Success is never final."

- Motto of Marriott Hotel executives

This endless journey of continuous improvement is not to be undertaken as a solitary pilgrimage. We can only succeed together. Hate talk does not pay. It simply excludes the

talents of too many members of the human species.

All actions have risks, but all inaction has risks. Wise decisions reduce overall risks. To make wiser decisions, replace insults with inquiries. Talk to the *thou* instead of stereotyping the *it*.