

Critical Thinking

© Robin Wood 2002

Permission is granted to reproduce this document for personal use, or not-for-profit distribution, as long as the entire document is reproduced, including this notice.

What is Critical Thinking?

Critical Thinking is the process of using reasoning to discern what is true, and what is false, in the phrases and "sound bytes" we hear everyday.

Part of it involves being familiar with logic and logical fallacies - those bits of false reasoning that are used to manipulate and mislead us.

Part involves being able to separate facts from opinions.

Part involves being fair and open minded; not dismissing anything without examination, and not accepting anything without examination, either.

Part of it involves asking questions, of yourself and of others, because that is how we uncover the truth, and the motivations behind the arguments.

Part involves self-regulation; the ongoing process of making sure that you have not fallen into any of the logical fallacies or rationalizations yourself.

Ideal critical thinkers are open minded; ready and eager to explore all ideas and all points of view, including those alien or opposed to their own.

They are not threatened by opposing views, because they are looking for the truth; they know that if they have it already, it will stand any scrutiny. And if they don't have it, they are willing to drop the falsehoods they have, and embrace it.

Critical thinkers question everything; using their tools to ferret out the truth, wherever it may hide.

The tools they use are Logic, Research, and Experience.

Critical thinking can not only make you manipulation proof, it can open new vistas for you, as things previously hidden become clear.

What is Truth?

There are two kinds; **Objective Truth**, is true regardless of viewer, based on the definitions of the words used. Many objective truths can be measured, but not all can. For instance, concepts such as love or justice are true for everyone, based on the definitions of the words. An example of Objective Truth is the statement, "Cats are quadrupeds."

Subjective Truth, which varies from individual to individual, depending on that individual's beliefs and life experiences. An example of Subjective Truth is the statement, "I love cats."

Subjective truths are usually not worth arguing about, since they only affect the person who holds them, and no one else.

What is Opinion?

Opinions are the conclusions that an individual forms regarding questions where the truth is not yet plain, or is impossible to discern. Opinions can be formed about either objective or subjective truth.

Many opinions concern the future. We can make predictions, based on what we know about the present and the way things similar to this have played out in the past. But we

cannot know the future until we get there. So we form opinions, and argue about it.

We also form opinions about the motivations of people we don't know, such as political figures or celebrities, and about things that are on a continuum, such as whether or not a particular person is moral, or if a window display is garish.

As a general rule, the opinions of others should not be lightly dismissed; especially the opinions of those who disagree with you. But sometimes, the opinions are clearly off base.

As an example, exaggerated for clarity, think of the color of the sea at a white sand beach in the Bahamas. You may think of it as blue. Someone else may call it blue-green, or aqua, or turquoise. All of these are valid. But if someone says it's "Cat." and starts to dangle a string in front of it, they are clearly way off base.

All opinions should be considered. But some will clearly be erroneous. Not all opinions are equally valid.

Critical thinking will help you sort out the valid ones, and help you change your own so that they become more valid.

What is Logic?

There are two kinds of logic. Formal logic deals almost exclusively with the form that arguments take. (All statements are considered arguments in formal logic.) It reduces everything to formulas, which are inherently either valid or fallacious. You can plug any statement you want into the formula to test it. Content doesn't matter. For all valid arguments, if the premises are true, the conclusion will also be true. (For the fallacious arguments, the conclusion may be either true or false, whether or not the premises are true. That's why they are fallacious; they neither prove nor disprove anything.)

Informal logic deals in the sloppy context of vernacular English. It includes testing our own ideas for internal bias, realizing how the environment we live in shapes our thoughts, and examining our own reasoning process. It also involves reasoning based on the content of the arguments, not simply their form.

What is an argument?

Basically, an argument is one or more premises (statements) and the conclusion that can be drawn from them. Both premises and conclusions can be either true or false.

There are two types of arguments; **deductive** and **inductive**.

A deductive argument provides all the support needed to arrive at its conclusion. An inductive argument provides some, but not complete, support.

A good deductive argument is known as "valid." If all the premises are true, the conclusion will also be true. An example is the statement, "All cats are quadrupeds. Purr is a cat. Therefore, Purr is a quadruped."

A good inductive argument is known as strong or cogent. If all the premises are true, the conclusion is likely to be true as well. "Most Siamese cats have blue eyes. Purr is a Siamese cat. Purr probably has blue eyes."

What are errors and fallacies?

A logical fallacy is an error in reasoning. A deductive fallacy can have a conclusion that is either true or false, even if all the premises are true. An example would be, "All cats are mammals. My dog is not a cat. Therefore, my dog is not a mammal." (This is the fallacy of

Denying the Antecedent.)

An inductive fallacy is simply an argument where the premises are not strong enough to support the conclusion. Even if they are true, you can't reach that conclusion from here. "Purr is the only Siamese cat I know. Purr is very quiet and friendly. Siamese cats are probably very quiet and friendly." (This is the fallacy of Hasty Generalization. Basing a conclusion on a sample that is too small.)

You can also have simple factual errors. These are not difficulties with reasoning, but simple mistakes (or lies) about the facts. An example would be "The Earth is the fourth planet from the Sun," when, in fact, it's the third. The only way to guard against those is to do research.

But isn't it bad to judge things?

There is a difference between forming judgments and being judgmental, although it's true that the two are often confused in our language. (Using that confusion to persuade people not to think is the fallacy of Equivocation, by the way.)

The first involves forming an opinion, or evaluating the truth or falsehood of a claim, based upon discernment, logic and comparison.

The second involves attaching an emotional value of good or evil, generally a harsh one, to a person, place, thing, or idea.

As you can see, they are two very different ways of thinking. Being judgmental is the opposite of Critical Thinking, since part of the essence of critical thinking is not forming emotional attachments to your opinions, being fair, and looking simply for truth (not for good or evil.) Also, in practice, judgmental thinking usually involves a lot of logical fallacies.

What is the purpose of Critical Thinking?

This is where you begin to exercise these skills. You may have different purposes, depending on the circumstances.

The first thing you have to do is to be clear about your purpose. Discover if it conflicts with the purpose of the person you are speaking with. (For instance, if you want to find out about breeds of dogs, but they want you to take home the stray that is in the backyard.)

Also, if you are trying to find the best breed of dog for you, what do you mean by best? What would make it the best? Is it important that it can spend long hours alone? Does it need to be friendly with children? Do you want it for a companion or a watchdog? "Best" is a relative term. You need to be clear about what you want.

In addition, although the whole point of Critical Thinking is to arrive at the truth, that is an ideal. We often lose track of ideals, as they are crowded out by other things. This is where the self regulation really comes into play. We need to make sure that we aren't forming arguments just to support a position we have become emotionally attached to, or because we can't stand the person we are arguing with and we want to show him up, or because we are tired and grumpy, or for a host of other reasons. It's important not to lose sight of our goal.

We also need to be aware of our own paradigms. Each of us has them; they are the assumptions we make about the world; our world views. And they color all the inferences we make, and all our inductive reasoning. We cannot avoid them, and we don't necessarily have to change them (although it's healthy to do so if our reasoning shows that they were faulty.) But we do need to be aware of what they are.

What is my Comfort Zone?

This is the place you have always lived. These are the thoughts you are used to thinking, the way you are used to behaving, the assumptions that are familiar to you. This is the comfy couch of your mind.

And, just like you need to get off your physical couch if you are going to be active, you need to get off your mental couch if you are going to be intellectually active.

You need to examine the barriers you put in the way of critical, logical thinking. You need to let go of your "centrisms" (ego, ethno, and socio) and realize that your way is not the best simply because it's yours.

You need to start examining everything you do, and think, and figure out why you do and think it. Even your religion needs to be examined. Why do you believe what you believe? Only then can you believe it with your mind, and not just with your emotions. You need to keep your brain with you at all times.

Truth can always stand all the examination we want to subject it too. Only that which is false will fall to cogent arguments and logic. So, if you are trying to shield your beliefs from reason, what does that say about what you actually believe about them, deep inside?

You need to risk being different, looking foolish, looking disloyal. You need to be willing to change your mind, if the facts warrant it. You need the courage to admit that you have been wrong, if you want to be right.

You need to stop rationalizing (starting with a conclusion, and finding evidence for it,) and start reasoning (starting with the evidence, and arriving at a conclusion from it.)

It's hard. But making the same mistakes over and over again, in my opinion, is harder.

Okay. How is it done?

You begin by examining the claims being made by the person whose words you are listening to, or reading.

Every claim has four attributes. Three are determined before you begin reasoning. The fourth you arrive at by reasoning.

First; is the claim **descriptive**, or **prescriptive**? Descriptive claims talk about the way the world is. Prescriptive claims talk about how the world should be. "There are many gay people living in the United States," is a descriptive claim. "Gay people should be permitted to marry each other," is a prescriptive claim.

Second; is the claim **objective** or **subjective**? Is the claim made for everyone, everywhere? Or just for the speaker or members of his group? "An apple is a type of fruit" is objective. "I love apples" is subjective.

Third; is the claim **absolute**, or **relative**? Does it say that things are this way, and they never vary throughout time and space? Or does it say that this is the way this thing is right now? "Snow crystals are formed from water vapor." is an absolute claim. "It's snowing." is a relative claim.

Fourth; is it **true** or **false**? It's true if it corresponds with consensual reality, either in the physical or nonphysical world. (Remember, there are many parts of consensual reality that are nonphysical. This includes most of our concepts, like freedom, friendship, etc. We pretty much agree about what they mean, so they are part of our consensual reality.)

How do you reason? Are there rules for Deductive Reasoning?

Indeed there are. These are known as Valid arguments. As I mentioned above, if the premises are true, the conclusions will have to be true as well, based on the form of the argument.

Modes Ponens (Affirming) - If **P** then **Q**. **P**. Therefore, **Q**. *Ex. If there is smoke, something is burning. There is smoke, therefore, something is burning.*

Modes Tollens (Denying) - If **P** then **Q**. Not **P**. Therefore, Not **Q**. *Ex. If you spill the water, the floor will be wet. The floor is not wet. Therefore, you did not spill the water.*

Transitivity - If **P** then **Q**. If **Q** then **R**. **P**. Therefore, **R**. *Ex. "If you spill the water, then the floor will be wet. If the floor is wet, then it needs to be mopped up. You spilled the water, so the floor needs to be mopped up."*

Valid Disjunctive Syllogism - **P** or **Q**. Not **P**. Therefore, **Q**. (or **P** or **Q**. Not **Q**. Therefore **P**.) *Ex. It's Monday or Tuesday. It's not Monday. Therefore, it is Tuesday. (or) It's Monday or Tuesday. It's not Tuesday. Therefore, it is Monday.* Disjunctive syllogisms are dependent on the "or" being exclusive. In other words, it must be one or the other, but cannot be both. If the "or" is inclusive, that is meaning one, the other, or both, this becomes a logical fallacy.

These are a few of the basic valid arguments. There are also a whole lot of logical fallacies, which are listed at the back of this paper.

Basically, when faced with an argument that takes a form you are not familiar with, break it down into its parts. (**P**, **Q**, **R**, etc.) Then, substitute something silly, like dogs, cats, penguins, and so on into those slots. If the argument becomes ridiculous, it's a fallacy.

You say that valid deductive arguments will always arrive at a true conclusion if the premises are true. How can I know if they are?

Ah. That's where research and experience comes in. No one said this was going to be easy.

In fact, it's difficult, and it takes time. But I think the results are worth it.

Research involves finding the information you need, and then checking the credentials of whoever wrote it. In many cases, it means that you have to get your information from more than one source, and check your sources against each other. You have to do a lot of homework.

You have to skip the predigested sound bytes and ready made opinions so prevalent in this society, and actually plow through the raw stuff for yourself. For example, don't simply accept what some commentator, any commentator, says about a bill currently being considered in the Senate. Go to Senate.gov, type the bill number into the little search box

in the lower left hand corner, and read the whole thing yourself. It's the only way to really get the information, in context, without any editorializing.

You can also hold the argument up to the yardstick of your own personal experience. But be aware, when you do so, of your own paradigms, and make sure that they're not influencing your logic. For example, if someone says, "All teenagers experiment with drugs," I can refute that from my own experience. The claim is a descriptive, objective absolute; so all it takes is one negative example to refute it. I never experimented with drugs as a teenager, so it's a false claim. Finding the validity of the claim that "most" or "many" teenagers experiment with drugs would be more difficult.

What is "Fuzzy Logic?"

In classical Boolean logic, every argument is either completely true, or completely false. No argument can fall in the middle, and be partially true and partially false. No argument can be neither true nor false.

This "black and white" approach doesn't work in the real world, where things are often shades of gray, or purple, or green. Real questions often have answers that lie somewhere on a continuum.

Fuzzy Logic brings the old theories up to date, by allowing degrees of true or false. These can be thought of as the graph between true (1) and false (0.) Different questions bring up different graphs.

For instance, the question, "Is Jon tall?" will not return a value of true or false, but a decimal somewhere between, say .57; just a bit taller than the average man.

This becomes even more complex if the tallness is combined with sex and age, to yield a result that shows that Jon, who is only 14, is indeed taller than most boys his age.

It's important to note that Fuzzy Logic doesn't conflict with the older forms at all, since for values of 0 or 1 (completely false or true) it works exactly the same way. This makes classic logic, with its black or white approach, simply a subset of Fuzzy Logic; it's the special case of those cases which return a value of either 0 or 1.

Why do you say that learning this will help make us "Manipulation Proof?"

There is a great deal of pressure in this society not to think. To simply accept what we are given, and repeat what we have been told. This starts with our earliest childhood training, is strictly reinforced in most schools, and continues on into the factory or boardroom.

In essence, this turns us into sheep. Easy to control, easy to herd; a faceless mass without our own opinions which can be wound up and set off to combat the other "Players." (Those who are in control, either politically, economically, or spiritually.)

If you look into a mirror, though, you won't see a sheep. You will see a man or a woman. It's time to take back our own power, and make our own decisions.

It's time to stop doing what we are told, and do what we decide is the right thing for us to do.

The first step is to start examining everything that we are given. Look at all the news, all the opinion pieces, all the proclamations made by the spiritual leader of your choice, all the ads you see. Then, decide the merits of what they are saying based on clear and critical thinking, and use that as the basis for your actions or opinions.

To do that, you have to understand not only logic, but logical fallacies. You have to be

able to spot red flags, which are an indication that the words before you may be designed to manipulate. You have to become a true skeptic; not disbelieving everything on general principles (a false skeptic) but examining everything that you are told.

This is true, whether you are listening to CNN or to the latest report from a fringe group. Whether it comes from Jerry Falwell or the Dalai Lama. Nothing should be automatically dismissed, and nothing should be automatically swallowed. If you treat everything with an air of inquiry, and actually think about all of it, you will be surprised at how much knowledge you can gather from the most unlikely sources.

And, best of all, you will be able to explain that reasoning to anyone who asks, without feeling threatened or unprepared.

What do you mean, Red Flags?

Red flags are the signal that the argument is designed to keep you from thinking at all. They are designed to play on your emotions, and so circumvent your intellect entirely.

Among them; **appeals to loyalty**, including words like "family," "patriot," "American," "9/11," etc. Be especially careful if these are gratuitous, or have nothing to do with the actual subject of the premises. *Ex. "Due to the tragic events of 9/11, we need to maintain normalcy, which means implementing the tax cuts as planned."* The two are unrelated. In fact, if anything, we need to not implement the tax cuts, since 9/11 and the government's reactions to it have drained the last of the surplus and put us far into the red.

The Bandwagon approach; "9 out of 10 ..." or "87% of those polled agree..." etc. The truth of a statement, or the correctness of an action, is totally independent of the number of people who believe it. Therefore, there is no point in mentioning those numbers in an argument designed to persuade unless someone is trying to manipulate you. (If they are reporting current trends, that is different; but it is still often invalid and needs to be carefully examined.)

Appeal to authority; "According to Dr. Name, of the Applied Research Institute..." This is a tricky one, because if the question regards Dr. Name's field of expertise, this might be a valid argument, and not designed to manipulate at all. But if Dr. Name is a well known geologist, and they are quoting his opinion on child care, he is no more likely to be correct than anyone else. This is often used with a celebrity as the authority. "I'm not a doctor, but I play one on TV..."

Appeal to Pity; These often start with pictures of people in very bad circumstances - broken bodies, crying children, etc. As always, if what they are trying to prove is true is not actually closely connected with those pictures, this is a red flag. If they are a charitable organization, these pictures are appropriate, because that is what they are all about. If they are a political or religious organization, they may not be. Find out what the organization is actually doing about the people in these situations before you buy it.

Appeal to Novelty; "New!" New things are not automatically better than the things that they are replacing. Decide based on the merits of the thing itself, not on its novelty.

Appeal to Fear; "If we are not willing to give up our personal freedoms, the terrorists will be able to attack us whenever they want to." This is a powerful manipulator, because often fear causes us to clamp down our thinking process altogether. We don't want to take the time to think, we just want to run away so we will be safe. But this is precisely the time when it is most important to think. When you hear this, think carefully about what the speaker wants you to do, and decide if that will actually make it harder for the terrorists to operate, or if it will have little or no effect on them, but will make it easier for the speaker to manipulate or regulate the population.

Appeal to Faith; "As a Good Christian, you....," "True Pagans all agree that....," "It's obvious to all enlightened people ...," etc. This is really a special instance of loyalty and bandwagon combined, but it can be very powerful. No one wants to appear to go against her faith. This is particularly dangerous if someone is speaking for the deity. Watch for it, and examine any claims made very carefully.

Ridicule and name calling; "Ellen Degenerate, in her ridiculous new show..." This works because most of us are reluctant to side with someone who is being ridiculed, lest we be ridiculed in turn. It's also frequently the hallmark of someone who knows that they cannot win this argument on valid, logical grounds. They know they haven't a leg to stand on, but rather than admit it they resort to ad hominem attacks. (of course, they might also just really hate the person in question, and be venting their bile.) This one is used a lot.

Once again, this is hardly an exhaustive list of red flags. But it will give you an idea of what I mean, and what to look for. Whenever someone appeals to your emotions to change your mind, it's a red flag.

Okay. We understand all of this. Now what?

Now you practice. Critical thinking is a skill, and like any other skill, the more you use it the better you will become at doing it.

Start by not simply taking my word for any of the things I've just told you. You need to examine them for yourself, and decide if they have merit on their own, not as something I've said. (I try to be as accurate as possible at all times, but I can be mistaken, too.)

You do that by checking what I've said about critical thinking against what others have said. If you have internet access, you can put the term "critical thinking" into a search engine, and read the articles that it finds. There are thousands of them.

This paper has necessarily been brief. I haven't even touched on modalities, I've given you a bare handful of valid logical arguments, I've hardly mentioned syllogisms. There is a lot more to learn, if you are interested.

If you don't have internet access, you might want to consider going to a public library and using a terminal there. Or you might want to check out books or magazine articles about the subject.

While you are at it, look up "symbolic logic" and "logical fallacies." Check out "web research" for sites that tell you how to use the web to find reliable information. Use what you have found here as a springboard, and start to explore on your own.

Above all, keep your brain with you at all times.

Think!

Some Web sites that I find particularly helpful

<http://www.philosophy.unimelb.edu.au/reason/critical/> Critical Thinking on the Web.

This site is full of links to other sites about critical thinking. I find it useful and interesting. Updated nearly every day, with interesting articles by critical thinkers.

<http://www.sjsu.edu/depts/itl/> Mission:Critical an online course in critical thinking.

<http://www.datanation.com/fallacies/> Stephen's Guide to the Logical Fallacies, a site maintained by Stephen Downes that explains many of the fallacies, with examples etc.

<http://gncurtis.home.texas.net/index.html> Another fallacy site, with real life examples from current news. You guess at the fallacy being committed, and then click a link to see if you spotted it correctly. I relied heavily on this one while writing this paper.

<http://www.earlham.edu/~peters/courses/log/loghome.htm> and <http://www.earlham.edu/~peters/courses/log/loglinks.htm> The web sites for a course in Symbolic Logic being taught by Peter Suber at Earlham college in Richmond, Indiana. Explains logical notation, and many other key concepts.

<http://www.ithaca.edu/library/Training/hott.html> A site that teaches how to use Critical Thinking to evaluate the content of web sites.

A Short List of Logical Fallacies

(Be aware that the use of any of these does not guarantee that the argument has a false conclusion. It simply shows that the argument is not valid, or cogent, and therefore says nothing about the conclusion, which may be either true or false.)

For many of the fallacies, I will be using variables (capital letters) to substitute for parts of the argument. This strips the argument of any content, so you can look at the form alone. I also use examples and counter examples. The examples show how the argument might be used. The counter examples are *reductio ad absurdum* - reduced until it becomes absurd, designed to point out why the argument is a fallacy. I have also included a way to show that it is a fallacy to those who might be using it.

Fallacies of Induction

Accident - A sweeping generalization is used when an exception to the general rule is warranted. *Ex. Dogs are not allowed in here, so your seeing eye dog has to stay outside.* To counter it, show that there are exceptions to the general statement, and this should be one of them.

Biased Sample - N% of sample S has characteristic C (where S is not representative of the general population P) Therefore, N% of population P has characteristic C. *Ex. 66% of the men in Dr. Spitzer's study of the "Ex-Gay" movement reported good heterosexual*

functioning, therefore 66% of all homosexual men can change when 78% of the men in the study were on the payrolls of "Ex-Gay ministries," or had publicly spoken in favor of such programs. Counter-Ex. 72% of the six year olds polled say their bedtime is before 9 PM, so 72% of Americans go to bed before 9. This is bad methodology, but it's used all the time to prop up the Appeal to Popularity. Americans are usually impressed by large numbers, so large numbers are used, however they are arrived at. Check the methodology; if it's not available, that's a red flag, too. To prove this a fallacy, show how the difference between the biased sample and the general population would change the outcome of the poll.

Circular Argument - an argument in which the conclusion also occurs as an unsupported premise. *Ex. Eating cactus is unhealthy, so you shouldn't eat cactus, because it's unhealthy.* No valid evidence about whether eating cactus is or is not unhealthy has been presented here. If you agreed with this statement before you heard it, you will still agree. If you disagree, you will not accept this statement. If you have no idea, this statement won't help you figure it out. Counter it by explaining that the conclusion has been used as a premise, and so the argument is circular.

Converse Accident - An exception is used where a generalization is warranted. *Ex. If it's okay for him to bring his seeing eye dog in here, we should all be allowed to bring our pets in.* Point out the exception, again, and explain why it should not replace the generalization.

False Analogy - **A** is like **B**. **B** has property **P**. Therefore, **A** has property **P** (where the likeness between **A** and **B** is tenuous, or they have a difference that affects **P**.) *Ex. Young men are like horses. You train your horse, and never let it make any decisions on its own, so you should train your sons the same way. Counter-Ex. Horses and cats are both animals with four legs. We saddle and ride horses. Therefore, we should saddle and ride cats.* No analogy is perfect. The strength of an argument based on an analogy depends on the strength of the analogy. To gauge that, you need to know something about both subjects. To prove this a fallacy, all you need to do is show that the two vary in some important way that would affect the analogy. For instance, in the above example, horses are not sentient, and will never be expected to live on their own. Young men will.

Hasty Generalization - This fallacy arises when the actions of a very small sample are applied to a large, heterogeneous group. *Ex. My three year old is reading on a second grade level, so all three year olds should read. Counter-Ex. My cats have blue eyes, so all cats have blue eyes.* This might work for all pure bred Siamese cats, which are a fairly homogenous group. But certainly not for all cats in general. The greater the variety in the group, the greater the sample size needed to obtain any valid information about the group as a whole. To prove it a fallacy, simply show that the group is not homogenous, and that there is a great enough variation to render the sample size too small.

One-Sidedness (Fallacy of Exclusion) - Presenting the evidence for one side of an argument, and ignoring the evidence for the other side. This is something that you have to watch out for in your own reasoning. (People who are trying to persuade you will naturally be doing this. It's your job to find the evidence for the other side.) *Ex. There shouldn't be any new houses built, because there are lots of houses already, it's bad for the*

environment to build more. This completely ignores the fact that the population is continuing to increase, especially in certain areas. Those new people have to live somewhere. To prove this a fallacy, present the opposing evidence, and show how it would change the conclusion.

Fallacies of Distraction - Misuse of an Operator

Argument from Ignorance - Assumes that if there is no evidence against (or for) something, that thing must be true (or false.) Misuse of the NOT operator. *Ex. There is no evidence proving that hobbits don't exist, so hobbits must exist.* No evidence is simply no evidence, and proves nothing. The conclusion may still be either true or false. To prove this a fallacy, point that out.

False Dilemma - Either **P** or **Q**. Not-**P**. Therefore, **Q**. *Ex. You are either for us or against us. You are not for us. Therefore you must be against us. Counter-Ex. You are either African or European. You aren't African, therefore, you must be European.* (What happens if you are Japanese?) Misuse of the OR operator, this one uses Contraries as if they were contradictories. Contraries are two statements, at most one of which can be true, but both of which might be false. (*You are 24 years old, or you are 42 years old.*) Contradictories are two statements exactly one of which must be true. (*You are 24 years old, or you are not 24 years old.*) To prove this a fallacy, give an example of a third choice.

Slippery Slope - (Causal version) If **A** is permitted, then by a series of tiny steps through **B**, **C**, and so on we will eventually be permitting **Z**. We should not permit **Z**. Therefore, we should not permit **A**. Misuse of the IF-THEN operator. *Ex. If we let the races intermarry, the next thing you know, we will be allowing marriage between anyone! Between father and daughter, between man and animal, between a woman and her household appliances.* This one is used all the time to try to halt social change that some find uncomfortable. It is fallacious in direct proportion to the connections between the steps. The farther it is from **A** to **B**, the weaker this argument is. To prove it fallacious, identify the final event, and show that it is not inevitable.

Loaded or Complex Question - A question that actually combines two questions, treats them as one, and presupposes an answer to the first one. Misuse of the AND operator. *Ex: Have you stopped beating your wife?* These cannot be answered directly, because there is no answer that gives a true response. In the above case, if you say "Yes" you are admitting that you used to beat her. If you say "No" you are admitting that you are still beating her. There is no response that says, "I never did," or "I'm single." These are used a lot as poll questions, to yield misleading answers. A recent example, *Who do you think is responsible for the current recession; Alan Greenspan, or the Clinton Administration?* No matter which one you pick, the pollsters will be able to say, "n% of the population think that Alan Greenspan is responsible for the current economic troubles of the nation, while n% think it is the fault of the Clinton Administration." No other possibilities are even entertained. Watch for this when reading polls. If it's not listed as a possibility, it wasn't on the poll, and no one could choose it no matter what they thought. To prove this fallacious, identify the two questions, and show that they each require a separate answer. In the above example, for instance, the two questions

really are, "Do you think that the current recession is the fault of either Greenspan or Clinton?" and "Which one?"

Syllogistic Errors, Fallacies of Propositional Logic, and Non-Sequitors

Affirmative Conclusion from a Negative Premise - any three statements that lead to an affirmative conclusion while having at least one negative premiss. *Ex. All notarized documents are valid. Some forged documents are not valid. Therefore, some forged documents are valid. Counter-Ex. All hawks are birds, some birds don't eat birdseed, therefore some hawks do eat birdseed.* To prove this a fallacy, show an example reduced to the absurd proportions shown above.

Affirming the Consequent - if **P** then **Q**. **Q**. Therefore, **P**. *Ex. If poverty was the result of government regulation, we would see an increase in it. We do see an increase in it. Therefore, poverty is the result of government regulation. Counter-Ex. If it's spring, then the flowers will be blooming. The flowers are blooming. Therefore, it's spring.* This is a famous one, used in all kinds of manipulative arguments. As you can tell from this example, it's meaningless. Flowers also bloom in the summer, fall, and even the winter depending on your location. None the less, it's used for everything from selling soap to selling politics. Don't buy it. (The argument, not the soap.) To prove it a fallacy, point out other things that might be causing **Q**.

Affirming a Disjunct - **P** or **Q**. **P**. Therefore, not-**Q**. *Ex. It's crisp or clean. It's crisp. Therefore, it's not clean.* This one is tricky, because it works if the "or" in the statement separates two contradictories; that is, two statements which cannot both be true, but one of which must be true. (It's Tuesday or it's not Tuesday.) But, in common speech, which is usually pretty sloppy syllogistically, that is not necessarily the case. So watch for this one, and decide for yourself if it's possible to have both at once. To prove it is a fallacy, point out how it can be both.

Commutation of Conditionals - If **P** then **Q**. Therefore, if **Q** then **P**. *Ex. If you are gay, you have a good sense of style. Therefore, if you have a good sense of style, you are gay. Counter-Ex. If you are President, then you are over 35. Therefore, if you are over 35, you are President.* Sorry, it doesn't work that way. Prove it is a fallacy by pointing out an exception.

Denying the Antecedent - If **P** then **Q**. Not **P**. Therefore, not-**Q**. *Ex. - If you use Soap X you will have soft skin. You don't use Soap X, therefore, you won't have soft skin. Counter-Ex. If you are a cat, you will be a mammal. You are not a cat, therefore you are not a mammal.* This one is used all the time in advertising and government, just like Affirming the Consequent, above. Don't believe it. To prove it a fallacy, show that **Q** can exist independently of **P**.

Denying a Conjunct - Not both **P** and **Q**. Not **P**. Therefore, **Q**. *Ex. You can't be a conservative and sympathize with the terrorists. You aren't a conservative, therefore you sympathize with the terrorists. Counter-Ex. It can't be too hot and too cold. It's not too hot. Therefore, it's too cold.* Uh-huh. Sure. This is the reverse of the actual valid argument, (Not both **P** and **Q**. **P**. Therefore, Not **Q**.) Don't confuse them. In the fallacious form, it is

possible for both statements to be false. In the valid form, one is known to be true. To prove it invalid, show that there are possibilities besides **P** or **Q**.

Exclusive Premises - No **A** are **B**. No **B** are **C**. Therefore, no **A** are **C**. *Ex. No liberal likes Rush Limbaugh, no one who likes Rush Limbaugh thinks for themselves, therefore, no liberals think for themselves either. Counter-Ex. No young people are old. No old people are under 30. Therefore, no young people are under 30.* This fallacy uses two negative premises to come to a conclusion. In order to have any kind of valid categorical syllogism, at least one of the premises must be affirmative. Prove it a fallacy by citing an example of an **A** who is **C**.

Inconsistency - Parts of the argument contradict or are contrary to other parts. *Ex. Sue is a better teacher than Alice. Alice is a better teacher than Harvey. Harvey can out teach Sue any day of the week.* Assuming that there aren't two teachers named Sue, this won't work. To show the fallacy, point out the inconsistency by assuming that one is true, and using it to show the others cannot all be true as well.

Illicit Conversion - All **P** are **Q**. Therefore, all **Q** are **P**. (or Some **P** are not **Q**, Therefore, some **Q** are not **P**.) *Ex. All KKK members are white. Therefore, all whites are KKK members. Counter-Ex. All cars have wheels. Therefore, all things with wheels are cars. (or Ex. Some people are not sane, so some of the insane are not people. Counter-Ex. Some birds are not penguins. Therefore, some Penguins are not birds.)* These are tricky, because they are the reverse of actual validating arguments. Don't be fooled. Prove it a fallacy by showing examples which don't follow the conclusion.

Illicit Major - All **A** are **B**. No **C** are **A**. Therefore, no **C** are **B**. *Ex. All communists are atheists. No conservatives are communists. Therefore, no conservatives are atheists. Counter-Ex. All budgies are birds. No penguins are budgies. Therefore, no penguins are birds.* The error lies in a premise that refers to some members of a group, while the conclusion refers to all of them. In the above example, the premise refers to some atheists (those that are also communists) but the conclusion refers to all atheists (and claims there are no conservatives among them.) To prove it a fallacy, show that there are people who belong to both groups.

Illicit Minor - All **A** are **B**. All **B** are **C**. Therefore, all **C** are **A**. *Ex. All terrorists are extremists. All extremists are radicals. Therefore, all radicals are terrorists. Counter-Ex. All oaks are trees. All trees are plants. Therefore, all plants are oaks.* Once again, the subject of the conclusion refers to all of something, while the premise refers to only some of them. (All radicals in the conclusion, but only those that are also extremists in the premise.) Watch for this one. It's used a lot to make you think that all members of a group are going to behave like a tiny minority do. To prove it's a fallacy, show that someone or something can be **C** but not **A**.

Improper Transposition - If **P** then **Q**. Therefore, if not **P** then not **Q**. *Ex. If you follow this diet, you will be healthy. Therefore, if you don't follow this diet, you won't be healthy. Counter-Ex. If you murder your wife, she will die. Therefore, if you don't murder her, she won't die.* This may seem plausible, but it's a logical fallacy, like denying the antecedent. To prove it a fallacy, point out a way that **Q** can exist without **P**.

Undistributed Middle Term - All **A** are **C**. All **B** are **C**. Therefore, all **A** are **B**. *Ex. All computer programmers use computers. All criminal hackers use computers. Therefore, all computer programmers are criminal hackers. Counter-Ex. All cats have four legs. All dogs have four legs. Therefore, cats are dogs.* A very famous fallacy, and one that is used a lot. Basically, it assumes a connection between two unconnected categories because they share a common trait. To prove it a fallacy, explain that the two categories are in fact unconnected in ways that are important to the conclusion.

Fallacies of Ambiguity

Accent - The emphasis of a statement leads one to believe the opposite of what the statement actually says. *Ex. My husband came home sober last night.* (which implies that he is usually drunk.) This is used to smear people, but in such a way that the attacker can say they were only telling the truth. Clear it up by pointing out what the statement actually says, and avoiding assumptions.

Equivocation - a fallacy resulting when the speaker and listener are using different definitions for the same words. *Ex. I pray to the Lord every day,* when the listener defines "Lord" as Jesus, and the speaker defines "Lord" as the Horned God. It can also take a form where the ambiguous word is used twice, to equate two things that are nothing alike. *Ex. Evolution is a theory, and theories are just guesses, so evolution is just a guess.* In the first instance, "theory" refers to a specific scientific term, in the second, to the vernacular meaning. To counter it, ask for the definition the speaker is using, or point out that he is using two different definitions for the same word. Never assume that your definition exactly matches that of someone else.

Ambiguous Middle - A three term argument, with an ambiguous middle term. *Ex. Wolves are wild animals. All dogs are related to wolves. Therefore, dogs are wild animals. Counter-Ex. All life is sacred. Germs are alive. Therefore, it would be wrong to kill a germ.* In the first case, it really depends on how closely they are related, doesn't it? The second is dependent on the definition of life. Counter it by asking for a definition of the middle term.

Amphiboly - A fallacy caused by ambiguous grammar, as opposed to ambiguous words. *Ex. He used a fallacious argument to sell me soap, but I didn't buy it.* It's unclear whether "buy it" refers to the argument, or the soap. This one is usually a trap, when you assume one meaning while the other was meant. But it can also be used purposely to prop up an invalid argument, and make it seem valid, or to play into the assumptions of the listener (The most famous example was the oracle telling Croesus that if he went to war, he would destroy a mighty country. What she didn't say was that it was his own.) Counter it by identifying the ambiguity, and asking for a clearer definition.

Quoting Out of Context - Quoting part of what a passage says in such a way that the original meaning of the quote is lost or distorted. *Ex. Blessed is the man who walketh not.* (From Psalm 1:1, which actually says, "Blessed is the man who walketh not in the councils of the ungodly...". My dad often quoted this as a joke excuse to take the car, and a lesson in quoting out of context for us.) This is common in political debates, where the opposing candidate is quoted in such a way that he seems stupid or

malicious; but it can happen anywhere. Counter it by finding the quote, and reading the whole thing in context.

Changing the Subject and Misdirection

Appeal to Authority - Authority **A** believes **P** is true, therefore **P** is true. Authorities can be mistaken, too; and often have been in the past. This is particularly true when the authority's name is being used, but the belief is not in her field of expertise. Find out if the authority is an authority on this topic, what kind of research she has done, if her methodology is sound, if most of the other experts in the field agree or disagree with her (and why) if she is being misquoted, or if she was joking or being sarcastic at the time. (Yes, this one always takes research.)

Appeal to Force - Not really an argument at all, not even a fallacious one. *Ex. If you know what's good for you, you'll agree with me.* But it has often been used to win arguments in the past (usually when the side applying the force knows its losing through logic.) Counter it by identifying the threat, and showing that it has nothing to do with the accuracy or inaccuracy of the statement.

Appeal to Popularity - Idea **X** is popular. Therefore, **X** is correct. *Ex. 9 out of ten Helens agree...* This one is used, once again, to sell everything from soap to politics. But it's not a valid argument. 20,000 Frenchmen can, in fact, be wrong.

Argument ad Hominem - introducing irrelevant personal remarks about your opponent. *Ex. How can you believe what he says about the economy? He had an affair!* The two have nothing to do with each other. But this one is used all the time; generally, again, by those who know that they are losing the argument on logical grounds. Counter it by identifying the attack, and showing that it is completely irrelevant to the topic being discussed.

Bad Company or Guilt by Association - **P** accepts idea **Q**, therefore **Q** must be wrong. (where **P** is a person or group the audience doesn't want to be associated with.) *Ex. Communists favor socialized medicine, therefore socialized medicine is wrong. Counter-Ex. Hitler was a vegetarian, therefore vegetarianism is wrong.* This is used all the time, to keep people from thinking about the actual merits or defects of an idea or a thing. Counter it by identifying the tactic, and showing that the two have nothing to do with each other.

Red Herring - a completely irrelevant argument thrown in to distract the audience. *Ex. You may say that cats make excellent pets, but I had a parrot once...* Just ignore them.

Straw Man - In this fallacy, a false (usually weak and/or extreme) position is attributed to an opponent, the position is defeated, and the debater claims victory. Meanwhile, the opponent's real positions are ignored. *Ex. The ultraconservatives believe that no one should ever receive medical aide from the government. If this happens, children will die! They are clearly wrong.* or *The bleeding heart liberals think that everyone should have all his needs fulfilled by the government. The lazy bums aren't willing to work for anything; they just want a handout. They are obviously wrong.* This is used a lot in political debates.

Whenever you hear an extreme view attributed to someone, look for a straw man. (Of course, you won't always find one. Some people are really that extreme. But they are fairly rare, and usually neither side wants them. Jerry Falwell and Fred Phelps come to mind.) Counter this by finding or explaining the real opponent's real positions.

Tu Quoque - Turning any criticism back on the accuser, instead of answering it. *Ex. There is no blue dress in the Enron case!* This is a red herring, but it is used a lot, since it often has the effect of making the accuser become defensive. It can also make her reluctant to pursue the line of inquiry. Counter it by pointing out that it has nothing to do with the discussion at hand.

Two Wrongs Make a Right - Justifying wrong actions by pointing a finger at someone else who has done something wrong. *Ex. I kept the expensive sweater that Cathy left at my house because she lied to my friend Joan.* This one is the favorite of terrorists, militants, and others who want to strike out. They all claim that because a government or group did something they find morally objectionable, they are justified in committing morally objectionable actions themselves. Counter it by pointing out that wrong behavior is wrong behavior.

Fallacies of Causality

Cum Hoc, Ergo Propter Hoc - Event **C** and **E** both happened at once. Therefore, **C** caused **E**. (or Events like **C** are always accompanied by events like **E**. Therefore, **C** type events cause **E** type events). *Ex. It always rains when I wash my car, so washing my car must cause rain.* In some cases, it's simple coincidence, or it doesn't actually always happen. In other cases, a third event is causing both of the first two. (Joint Effect) Prove it's a fallacy by finding a probable third event, or asking how the first event could cause the second.

Post Hoc - Event **C** happened immediately before event **E**. Therefore, **C** caused **E**. *Ex. The kid was playing computer games just before he committed suicide. Therefore, the games made him kill himself. Counter-Ex. The pipes whistle just before the water stops running. Therefore, the whistling makes the water stop.* While it's true that events may cause events that happen afterwards, they don't always do so. Sometimes they are unrelated. Sometimes, as in the example with the pipes, the supposed cause is actually another effect of the real cause. In all such arguments, further evidence is in order.

Wrong Direction - This fallacy occurs when a cause and effect are connected, but the effect is assumed to be the cause. *Ex. The sun doesn't show up until it is light, so the light must condense to make the sun.* To counter it, show the actual causal relationship.

These are only a few of the fallacies that are used, intentionally and unintentionally, in arguments. Be aware of them. Don't fall into the trap of using them yourself, and don't believe them when others do.

Anyone can learn to think clearly, and I believe you will find the result well worth the effort.