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## Critical thinking: Primary concepts

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The goal of a critical thinking course is to enable you to understand and analyze **arguments**. By the end of the course you should be able to recognize such arguments and determine if they are **good** (i.e. if a rational person, upon hearing such an argument, should be convinced by it.)

**1. Basics of Argumentation**

**Argument:** An attempt to convince, using reasons<sup>1</sup>. An argument consists of two parts:

A **conclusion**, which is the sentence that the argument is arguing for, or that part of the argument that the arguer is trying to convince you of. The **conclusion** is always a claim.

The **premises**. These are sentences that are supposed to support, lead to, provide evidence for, prove or convince that the conclusion is true. An argument is an attempt to convince someone (though not necessarily someone in particular) that a certain **claim** is true.

For example, this is an argument:

Mr. Johnson's fingerprints, and only Mr. Johnson's fingerprints, were found at the crime scene. A knife was found on Mr. Johnson's person, and it matched the wounds on the victim, and contained traces of the victim's blood. Mr. Johnson's cellmate testified that Mr. Johnson confessed to the crime, and hidden cameras recorded this confession. Therefore, Mr. Johnson is guilty.

The last sentence is the conclusion. The other sentences are premises. Here's another:

When I left the house there was cake in the refrigerator. You're the only other person with a key to the house, and now the cake is gone. So you ate the cake.

Again, the last sentence is the conclusion, the others are premises. Here's another:

You should complete your college education. People who graduate from college not only earn, on average, more money than college dropouts, they also report much higher levels of satisfaction in life.

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<sup>1</sup> This definition comes from Epstein, *Critical Thinking*

In this case, the first sentence is the conclusion, and the rest are premises. You should be able to note this because the other sentences *give reasons that you should accept the first sentence*. That is, they act as premises, or evidence, for the conclusion. Another way to see that this is the conclusion is to ask yourself: what is the person trying to convince me of? It's not "college graduates earn more money." He's telling me that without any evidence. But, if that's true, *that's a reason to graduate from college*. In other words, it's a premise. **The premise is presented as evidence for the conclusion.**

## 2. Claims

Only certain sorts of sentences can be used in arguments. We call these sentences **propositions, statements** or **claims**.

**Statements** or **claims** have the following characteristics:

They are either **true** or **false**.

They are **declarative** (that is to say, they are not questions or commands; they are sentences that describe how things are, were, will be, would be, could be or should be.)

They are clearly written or stated such that there is no ambiguity as to their meaning (i.e. they don't have two or more highly distinct interpretations, as in sentences like "I saw the waiter with the glasses") and they are not so vague as to make it impossible to say under what conditions they would be true.

There are lots of ways for a sentence to fail to be a **claim**, just as there are a lot of way for a sentence to fail to be a question, or description of a dog, or a command.

Which of the following are **claims**:

1. All dogs have four legs.
2. John F. Kennedy was the 35<sup>th</sup> president of the United States.
3. Don't go into Central Park at night.
4. Why do people always talk on their cell phones on the J train?
5. Barack Obama is very tall.
6. There is life on other planets.

Answers:

1. Is a claim. It's false (there are dogs that have lost a leg, thus three-legged dogs.) The fact that it's false means that *it must be a claim*. ONLY claims can be false.

2. Is a claim. It's true. The fact that it's true means that it *must be a claim*. ONLY claims can be true.
3. Not a claim. It is a command; it is neither true nor false (though it might be good advice.)
4. Not a claim. It is a question. Questions are never true or false, though sometimes they *imply* claims.
5. Not a claim. "Very tall" is too vague. We have no standard, agreed upon method for determining if someone is "very tall." By Danish standards (where the average male height is 5'11") Obama is probably not "very" tall. By Vietnamese standards (where the average male is 5'4") Obama might well be considered "very" tall. We could turn this sentence into a claim by changing it to "President Obama is 6'2" tall."
6. This is a claim, but we don't know if it's true or not. Still, it's clearly *either* true or false, so it must be a claim.

## 2b. Subjective and Objective claims

Claims are either *subjective* or *objective*. These words have a special, technical sense in philosophy. A claim is subjective if it is *about* thoughts, feelings, or other internal states of the mind. A claim is objective if it is *about* something that is not dependent on a state of the mind. It's important to keep in mind that you might have used "subjective" and "objective" differently from this, and like all words these have multiple senses. For our purposes, though, we'll be using subjective and objective only of **claims**, because only claims are true or false, and here subjective and objective describe something about the **truth conditions** for a claim.

**The truth condition** for a claim is whatever it would take to make that claim true. For example, if you said, "It is snowing right now outside my window!" that claim is true if, and only if, at the moment you say it, it is in fact snowing outside your window. The snow falling outside your window constitutes the **truth condition** for the claim. Importantly, it's *not* that you saw it snow, or that someone reliable told you it was snowing, that makes the claim true. Those might count as **evidence**, that is, reason to believe it is snowing. But it's the actual falling snow that makes the claim true, and is the claim's truth condition. One way to think of this is on the analogy of a court of law. You could be on a jury and hear testimony and see evidence that convinces you that the defendant is guilty of the crime. But your belief that "Mr. Johnson murdered Mr. Ono" comes from the evidence, the **truth** of the claim comes from Mr. Johnson actually having murdered Mr. Ono. You could, in other words, have compelling evidence but be wrong. In fact, it's possible that no one will ever know if Mr. Johnson murdered Mr. Ono (perhaps Mr. Johnson blacked out and lost memory of what

occurred during Mr. Ono's death), but the claim is true or false regardless of who believes it. The claims "Mr. Johnson murdered Mr. Ono," and "it is snowing right now outside my window" are **objective claims** because their truth conditions are not found in anyone's thoughts or feelings or mental content; they exist independently of what anyone thinks or feels.

Whereas, for example, "I'm itchy," is a **subjective** claim. "I feel hot," "John is tired," "Anita loves Keyshawn," "Thomas believes in God," and "The Black Keys are my favorite band," are all **subjective** claims. This is because their *truth or falsity* depends upon what someone thinks or feels, or, we can say, the **truth conditions** for these claims are found in someone's mental content. If I say, "I feel nauseated," that claim is true if, and only if, I actually have the feeling of nausea, and false if, and only if, I do not have that feeling. So if I'm trying to get out of doing something, I might say "I feel nauseated" when I had no such feeling, that is to say, when the **truth condition** does not exist.

The following claims are objective: "Dan is six feet tall," "The Empire state building is made of cheese," "New York is the largest city in the United States," and "God exists." In each of these cases, though I might have a subjective belief about the claim, the actual truth condition is external to my thoughts and feelings.

Note that the second claim is a *false* objective claim. The Empire State Building is not made of cheese. But the *truth or falsity* of the claim is independent of what anyone thinks or feels. It's a fact about the world outside of our minds. Similarly, "God exists" is an objective claim. Some people believe it to be true, some people believe it to be false, but their beliefs do not make the claim true or false any more than one's belief that New York is the largest city in the world would make that claim true. God exists, or fails to exist, whether or not we believe or think that God exists. However, if I said, "I believe that God exists," that would be a **subjective** claim. In fact, any objective claim can be turned into a subjective claim by prefixing the words "I think that..." or "I believe that..." to it. That's because the truth conditions for "I believe there is butter in the refrigerator" are found in my (and only my) beliefs, regardless of whether there is butter in the refrigerator, whereas the claim "there is butter in the refrigerator" is true if, and only if, there is butter in the refrigerator, regardless of what I believe.

Notably, truth is a very complex philosophical topic, and there are interesting disputes about its nature. But at the basic level, pretty much everyone working on the topic agrees that the claim "there is a dog on my bed," is true if and only if there is a dog on my bed. That is, there is general agreement about the need for **truth conditions** (which, minimally, means that there is always some difference between a true claim and a false claim.) For our purposes, then, we'll divide claims up as **subjective** or **objective** depending on the nature of their truth conditions.

For the following claims, say if they are subjective or objective:

1. There are over 1200 species of beetles in the world today.
2. The Yankees will win the World Series in 2034.
3. Alissa's head hurts.
4. I'm tired of hearing about the economy.
5. There is no God but Allah and Mohammed is his prophet.
6. There are over 9 billion people living in Brooklyn.

Answers: 1 is an objective claim. 2 is also objective: though it refers to a future event, it's not the case that our thoughts or feelings can make it true or false; we just have to wait to see if it's true or false. Its **truth conditions** will be independent of thought or feeling. Some hold that it is temporarily neither true nor false; most philosophers, though, hold that claims about the future are true or false but that the truth conditions are simply placed at a different point in time from the claim's utterance. 3 is subjective: it refers to a feeling that Alissa has. 4 is subjective; it refers to a feeling or thought had by the speaker. 5 is objective: many people believe it to be true, many others do not, but it's true if and only if there is, in fact, one God, that God's name is Allah, and Mohammed is the prophet of that God. My thoughts or feelings on this cannot alter its truth value. 6 is objective: there are not, in fact, 9 billion people living in Brooklyn, and we can ascertain that by counting, looking at the census, or just noting the impossibility of getting 9 billion people into the existing housing in Brooklyn.

**Note: we distinguish subjective from objective claims to aid in argumentation and conversation.**

Generally, we have to be very careful about giving subjective premises for an objective conclusion. "I feel like God exists" or "I feel like Sarmatians are sneaky people" are probably not good premises for the conclusions "God exists" or "Sarmatians are sneaky people."

It's also important to understand that, if someone makes an objective claim, we can't respond with "that's true for you but not for me." Objective claims, by their nature, are not true relative to some person. An objective claim can be *false*, but it can't be simply relative to a person's beliefs—if it is, it's not an objective claim. Further, just because a claim is *controversial* does not make it subjective! Most of the truly controversial claims are objective. We don't develop a lot of controversy over claims like "I feel tired," but there is a great deal of debate over claims like "There is only one God and He is the creator of the world."

Finally, when someone makes a subjective claim but states it as though it were an objective claim, this can cause needless disagreement. If Tammy says “Metallica is the best band in the world,” she probably just means that Metallica is her favorite band. If Lamar responds with “no way, Arcade Fire is the best band in the world!” they could be on the verge of a pointless disagreement. There is no set standard for “best band in the world,” so there’s no settling this by argument. Instead, recognizing that Tammy was actually making a subjective claim, Lamar might ask, “really, what do you like about Metallica?”

### 3. Indicator words

An argument can be thought of as **premises that present evidence** for a **conclusion which is supported by the evidence**.

In ordinary language, the following words often appear before a conclusion. We call them “**conclusion indicators**”

Thus	Therefore	So	In conclusion	Implies that
Hence	Consequently		Wherefore	Indicates
Entails	It follows that		It must be	

The following terms act as **premise indicators**:

Since	Because	Given That	Inasmuch as
Insofar as	For the reason that	As	

### 4. Basic arguments.

Often, in ordinary argumentation, there are no premise or conclusion indicators. You should still be able to tell if a group of sentences is an argument because it will be an attempt to convince by giving reasons. An indicator of this is that all but one of the sentences will aim at, or give support for, the remaining sentence. In other words, the premises give *reasons* for the conclusion. Is the writing an example of someone giving reasons for a particular claim? If so, it’s probably an argument. Is it simply someone describing something, or complaining, or explaining how to do something? Then it’s probably not an argument. An argument always attempts to give you reasons to believe a particular statement. The reasons might not be good reasons, and they might not be convincing, but they are *attempts* at convincing.

Here are some basic arguments. Underline the conclusions. If you’re not sure which is the conclusion, ask yourself: What is the person trying to convince the listener of? Are there reasons given? If so, the reasons are **premises** and the sentence that the speaker or writer is trying to convince the listener/reader of is the **conclusion**.

**Example:**

1. Mom, you should let me go to the movies tonight. I finished all my homework.

Is the speaker trying to convince her mother that she finished her homework? No, she's just asserting it. But *why* is she telling her mother she finished the homework? She's clearly doing it to convince her mother to let her go to the movies. So the conclusion, the thing that the speaker is trying to convince the listener of, is "you should let me go to the movies." Think of it this way: if the speaker's mother believes that the speaker finished her homework, but still doesn't let her go to the movies, then the speaker has clearly not accomplished her goal. But if the speaker's mother let's her go to the movies even though she doesn't believe she finished the homework, the speaker's goals have been met. The goal was: get mom to believe she should let me go to the movie. Therefore, the conclusion must be "you should let me go to the movies tonight."

2. Drinking while driving is dangerous. My cousin got drunk once, and he ran over a dog and then died of a heart attack.

3. If good men do nothing then evil will triumph. Right now, we stand idly by as children starve to death and innocent people are butchered in the conflict in the Congo. And yet, we do nothing. Clearly, the time has come to take action.

4. The ten commandments say "thou shall not kill." So some people say that God made it so that killing was wrong. But if that's true, then God could have made it so killing was right just by saying "thou shall kill." That's hard to accept, since killing causes harm and we generally do all we can to avoid being killed. So, it's not that killing is wrong because God said it's wrong, rather, God said "thou shall not kill" because it is in fact wrong to kill.

5. Look, either you support Bush's policies in regard to torturing, I mean interrogating, prisoners, or you're on the terrorists' side. I know you're not on the terrorists' side, right? So you'll have to support Bush's policies.

6. People who give money to charity are easy to swindle. I just swindled Terrence out of 40 bucks. So I bet he gives money to charity.

7. I know that God exists. I mean, I feel like he exists. So he must exist, right?

8. Compact florescent bulbs use about 1/5 the power of standard light bulbs, and they fit in standard light bulb sockets. The light they produce is slightly different from standard incandescent bulbs, but it's nearly indistinguishable to the naked

eye. Switching one incandescent bulb for a compact florescent bulb saves about 30 dollars a year in energy cost, and the compact florescent bulb lasts between 6 and 20 times as long as the incandescent bulb. While the initial price of a compact florescent is about double that of an incandescent, you more than make the money back in reduced energy expenditure and increased lifespan of the bulb. You should really switch to compact florescent bulbs.

9. English is the language this country uses in colleges and in business. If a student can't pass a test in English, he should not be given a diploma. By giving diplomas to those who don't understand English, you create the illusion that students who can't communicate in the work place are nonetheless prepared for college or the workforce.

10. You should graduate from college. College grads earn more than non-graduates, on average. Also, college graduates report greater happiness in their lives than non-grads. Plus, if you don't graduate, you'll always wonder what you could have done if you did graduate.

11. All Dogs are loyal and all cats are friendly. So if you have a dog, you'll have a loyal animal, but if you have a cat, you'll have a friendly animal.

12. Michael Bloomberg is running for governor. He was once found consorting with the Devil. He eats babies for breakfast and killed his own mother. Anyone who can consort with the devil, eat babies, and kill their own mother would have plenty of courage. Courage is the single most important trait a governor can have. In fact, courage alone would make someone a good governor. You should vote for Michael Bloomberg.

### **5.Distinguishing Arguments from Non-Arguments**

It's important to note that not all passages contain an argument. Newspaper **reports** are generally not arguments: they simply describe what happened. There is no one sentence that all the other sentences aim at. It's also the case that sometimes polemical writings that seem angry and pointed do not contain an argument, because they have no premise-conclusion relations.

For example, we might read the following in the paper:

The Illinois House wasted little time today in voting to impeach Gov. Rod Blagojevich, with just one representative in the 115-member chamber voting against the measure. It's the first time in Illinois history the governor has been impeached. A Blagojevich spokesman says the governor won't resign, which means he faces a trial in the Senate next week, the *Chicago Tribune* reports.

There's no argument there, just a report on what happened. But in the course of the debate over Blagojevich, a legislator might say, "Rod Blagojevich's should be impeached. He has violated state law, he has violated our trust, and he has tarnished the reputation of Illinois." The first sentence is a **conclusion**, the second sentence a compound premise (a **compound sentence** is a sentence that combines shorter sentences by using conjunctions like "and" or "but.")

However, if the legislator has said, "Blagojevich is a stain on our state. I am ashamed of him. He makes a mockery of our electoral process. And he never even consulted the legislature before making his senate pick. Plus, I heard he cheats on his wife." That would not be an argument because there's no conclusion. Each sentence is an attack on Blagojevich, but they don't all give evidence for any one sentence in the set. It's an attack, but not an argument.

For the following, distinguish the arguments from the non-arguments by **underlining the conclusions** of the arguments.

1. All liberals want the United States to be defeated. John Kerry is a liberal: you can see that quite clearly in his congressional voting record. So if you voted for John Kerry, you voted for someone who wanted the United States to be defeated.
2. One in seven American adults in the US—about 32 million people—have such low literacy skills that they cannot read a newspaper story or a prescription bottle, a new federal study says. "They really cannot read paragraphs (or) sentences that are connected," says an Education Department researcher. The numbers aren't improving: The US adult population increased by 23 million between 1992 and 2003, 3.6 million of whom were functionally illiterate, *USA Today* reports.
3. You shouldn't smoke, because it can cause lung cancer.
4. Joe Biden arrived in Pakistan today at the start of a tour of Southwest Asia, AFP reports. The vice-president-elect is leading a congressional delegation that includes Republican Sen. Lindsey Graham. Talks with President Asif Ali Zardari and other Pakistani leaders are likely to focus on the war on terror and relations with India, expected to be Biden's next stop.
5. Anyone who voted for Barack Obama is an idiot. Why would you vote for him? A lot of people don't care about this country. I bet they'll all be sorry in four years when he's destroyed the economy.
6. Water boils at 100 degrees Celsius because at that temperature the weak bonding between the water molecules can't overcome the force of their

movement, and the molecules push off one another, causing the water to go from a liquid to a gas.

7. Cellular respiration is the set of the metabolic reactions and processes that take place in organisms' cells to convert biochemical energy from nutrients into adenosine triphosphate (ATP), and then release waste products. The reactions involved in respiration are catabolic reactions that involve the oxidation of one molecule and the reduction of another.

8. Pat Robertson is opposed to abortion in all cases. In other words, he wants women to be treated as second class citizens whose bodies are nothing but baby making machines. So we have to oppose Robertson's view, because really it's just a way of making women into slaves.

9. I hate Reggaeton music! I can't imagine why anyone would listen to it. People should listen to good music. And they blast that Reggaeton so loud on the car stereos on my block. It's annoying!

10. Enrique is a member of the American Communist Party. All members of the American Communist Party are communists. All communists are in favor of overthrowing the U.S. government. All terrorists are in favor of overthrowing the U.S. government. It stands to reason that Enrique is a terrorist.

## 6. Conditional Statements; Necessary and Sufficient Conditions

A **conditional statement** is an "if...then" statement, or a statement that can be rewritten as an "if...then" without changing its meaning. A conditional statement, all by itself, is generally **not an argument** (if it is an argument it's of the type we call "enthymemes," which is to say arguments that are missing either premises or a conclusion.) Conditionals, however, figure in many arguments, and are centrally important to logic.

The part following the "if" is called **the antecedent**, and the part following the "then" is called **the consequent**.

Sometimes, the "then" is left out. Sometimes the words "when" or "whenever" are used in place of "if." And sometimes the antecedent, or "if clause," comes *after* the consequent, or "then clause."

Identify the antecedents and consequents of the following conditional statements. If the statement is not in standard "if...then" form, think of how you'd rewrite it to put it in that form, and use that as the basis for identifying the antecedent and consequent.

1. If it rains, I'll go outside.

2. I'll give you a dollar if you tell me what mom got me for Christmas.
3. Whenever Keisha comes over I feel sick to my stomach.
4. If you don't know what time it is then you should buy yourself a watch.

### Necessary and Sufficient Conditions

In a conditional statement, two conditions are given: a **necessary** and a **sufficient** condition.

#### Sufficient Conditions:

A is a **sufficient** condition for B whenever A is all that is needed to make B true, or whenever the occurrence of A is all that is needed for the occurrence of B.

If Fido is a dog, then Fido is a mammal.

“Fido is a dog” is all that’s needed to make it true that “Fido is a mammal.” So “Fido is a dog” is a sufficient condition for “Fido is a mammal.” Similarly, “Fluffy is a cat,” “Pokey is a rhinoceros,” “Trunky is an elephant,” and “Ollie is an ocelot” would be sufficient conditions to make each one of them mammals.

If it rains, the sidewalk will be wet.

If a dog pees on it, the sidewalk will be wet.

If someone spills soda on it, the sidewalk will be wet.

If someone sprays a hose on it, the sidewalk will be wet.

In each case, the antecedent expresses a sufficient condition for “the sidewalk will be wet.”

**Necessary conditions:** B is a *necessary* condition for A whenever A cannot occur without B also occurring, or whenever A cannot be true without B also being true. So, in all the cases above, the *consequent* is a necessary condition.

If Fido is a dog, then he is *necessarily* a mammal.

If I spray a hose on it, the sidewalk will *necessarily* get wet.

If John is older than Kevin, and Kevin is older than Lanai, then John is *necessarily* older than Lanai.

In each case, the word “necessarily” is not needed, because the conditional sentence already asserts the necessity.

For the following, fill in the blanks with “necessary” or “sufficient.”

1. Being a quarterback in the NFL is a \_\_\_\_\_ condition for being a football player.
2. Being a football player is a \_\_\_\_\_ condition for being an NFL quarterback.
3. Being able to fly a plane is a \_\_\_\_\_ condition for being an airplane pilot.
4. Spraying a hose on a dog is a \_\_\_\_\_ condition for making the dog's fur wet.
5. Being a guitarist is a \_\_\_\_\_ condition for being a musician.
6. Being a musician is a \_\_\_\_\_ condition for being a guitarist.
7. Firing an unsilenced gun is a \_\_\_\_\_ condition for making a loud noise.
8. Being famous is a \_\_\_\_\_ condition for being a movie star.
9. Being a movie star is a \_\_\_\_\_ condition for being famous.

Now, rewrite each of the above as a conditional sentence.

Because necessary conditions are distinct from sufficient conditions, the antecedent and consequent of a conditional statement cannot be reversed if you wish to maintain the truth and meaning of the sentence. In other words, saying:

Whenever a patient is feeling pain, the pre-occipital lobe of the brain is active.

is not the same as saying:

Whenever the pre-occipital lobe of the brain is active, the patient is feeling pain.

These cases should make that clear:

If that's a dog, then it's a mammal.

If that's a mammal, then it's a dog.

If you have five dollars, you have some money.

If you have some money, you have five dollars.

If you go outside in winter then you'll feel cold.

If you feel cold, then you've gone outside in the winter.

If you find a sentence where the meaning stays (essentially) the same when you've reversed antecedent and consequent, then you've found a case of what we call a **biconditional**. The biconditional is usually written as "if, and only if..."

## 7. Deduction, Induction, Validity, Truth, Soundness and Cogency

An argument is said to be **deductive** if it is claimed that the truth of the premises would guarantee the truth of the conclusion. If in fact the truth of the premises would guarantee the truth of the conclusion, the argument is said to be **valid**.

In other words: A valid argument is one where it is IMPOSSIBLE for the premises to be true and the conclusion false at the same time.

So: If I argue:

John was found with a gun in his hand, running from the apartment where Tom's body was found. Three witnesses heard a gunshot right before they saw John run out. The gun in John's possession matched the ballistics on the bullet pulled from Tom's head. John had written a series of threatening letters to Tom. In prison, John confessed to his cellmate that he had killed Tom. Therefore, John is the murder of Tom.

I have NOT produced a valid argument! Because it is still *possible*, though unlikely, that John is not the killer. Think of how this could be.

If you can imagine a scenario where all the premises are true and the conclusion is false, no matter how unlikely that scenario is, the argument is not valid.

An argument like the one above is called an **inductive** argument. That's an argument where the premises are meant to give good reason to believe the conclusion, but their truth does not guarantee the truth of the conclusion. If the premises make the conclusion very likely, the argument is said to be **strong**.

But if I argue:

John is from Mars.  
Everyone from Mars is the murderer of Tom.  
Therefore, John is the murderer of Tom.

Then I've produced a valid argument. There is no possible scenario wherein the premises would all be true and the conclusion false. One way to think of this is: imagine you had absolute power. You still couldn't make it so that it was true that (1) All dogs are mammals and (2) all mammals are animals and simultaneously false that (3) some dogs are not animals. There's simply no way for the premises to be true and conclusion false, no matter how wild the scenario you dream up. If the conclusion is false, at least one of the premises has to be wrong.

Valid arguments are **never** said to be strong. The word "strong" applies only to inductive arguments.

Notably, the actual truth of the premises is irrelevant when determining if the argument is strong or if it is valid. Strength and validity are only about the relation between premises and conclusion, not about the truth of any of the statements in the argument.

**Remember the following definitions, and learn to apply them:**

**Cogency:** If an argument is strong and the premises are true, the argument is said to be **cogent**.

**Soundness:** If an argument is valid and the premises are true, the argument is said to be **sound**.

**7a. Exercises in Validity**

Remember: if the argument is valid there is no *conceivable* way for the premises to be true and the conclusion false. If you can conceive of some way for the premises to be true and the conclusion false, no matter how far-fetched the conception, then the argument is not valid! One way to show that an argument is not valid is to describe a situation in which the premises would be true and the conclusion false at the same time.

**Example:** Mary and John are married. Mary sees John holding another woman's hand, and then kissing that woman. John then gets into bed with the other woman, and they continue to kiss. Therefore, John is cheating on Mary.

Not valid: Mary might be watching John in a play where he and the other woman are acting the part of a married couple.

A common mistake in this exercise is to write a description that contradicts one of the premises. So for example, if I said:

All dogs are friendly. John has a dog. So John's dog is friendly.

And you wrote:

Not valid: Maybe John has an unfriendly dog.

You'd be incorrect, because the first premise states that *all* dogs are friendly. Just because we know that to be false doesn't mean that the argument is invalid!

Validity is **not about the truth of the claims in the argument**. It is only about whether or not those claims, *if they were true*, would guarantee the conclusion. So the following are valid arguments:

George Bush is from the planet Krypton. Everyone from the planet Krypton can fly and shoot heat beams from their eyes. So George Bush can fly and shoot heat beams from his eyes.

Basketballs are made of yarn. Everything that's made of yarn is flammable. And all flammable things are the emperor of Jupiter. So basketballs are the emperor of Jupiter.

Try the exercise on the following examples:

1. All people over 6 feet tall are from Mars. Barack Obama and George W. Bush are both over 6 feet tall. So both Barack Obama and George W. Bush are from mars.

Valid Or Invalid?

If Invalid, describe how the premises could be true and conclusion false:

2. My friend Don owns a gun shop, and he's a member of the NRA. Plus, he owns 30 guns. So Don must like guns.

Valid Or Invalid?

If Invalid, describe how the premises could be true and conclusion false:

3. There are 31 days in May. Yesterday was 17<sup>th</sup> of May. So today is the 18<sup>th</sup> of May.

Valid Or Invalid?

If Invalid, describe how the premises could be true and conclusion false:

4. I have five dollars in my pocket, and gumballs cost exactly 25 cents, so I have enough money in my pocket to buy a gumball.

Valid Or Invalid?

If Invalid, describe how the premises could be true and conclusion false:

5. Keisha is six feet tall. Lawrence is four feet tall. Lawrence is taller than Jaime. So Keisha is taller than Jaime.

Valid Or Invalid?

If Invalid, describe how the premises could be true and conclusion false:

6. John gave Frederique one hundred dollars. Frederique then gave John a gram of cocaine. So John bought cocaine from Frederique.

Valid Or Invalid?

If Invalid, describe how the premises could be true and conclusion false:

8. John and Frederique went to the opera. So John went to the opera.

Valid Or Invalid?

If Invalid, describe how the premises could be true and conclusion false:

9. Frederique killed John. So Frederique is a murderer.

Valid Or Invalid?

If Invalid, describe how the premises could be true and conclusion false:

Note that 4 and 5 are interesting cases. Valid arguments can sometimes be written in symbolic form (that is, removing the words and replacing them with symbols.) If that can happen, the argument is said to be *formally valid*. For example, the argument

All dogs are canines.

Spot is a dog.

So Spot is a canine

Would be written as

$(x)(Dx \supset Cx)$

Ds

$\therefore Cs$

And the rules of formal logic can be used to prove the validity of the argument. However, some arguments can be thought of as valid even though they're not in one of the standard valid forms.

Example 4 reads:

I have five dollars in my pocket, and gumballs cost exactly 25 cents, so I have enough money in my pocket to buy a gumball.

Some might argue that I have could have debts to pay, or owe someone money, so I don't have enough. But that's not a real objection here: if I have five dollars, maybe I *shouldn't* spend it on gumballs, maybe I'll regret it, and maybe I should pay my debts, but the money I have, five dollars, is *enough* to buy a gumball. However, for this to work we need to know the meanings of the words "dollars" and "cents," so we can't formalize it as valid without adding a premise, "A dollar is equivalent to 100 cents." But because we're so acquainted with dollars and cents, we should be able to accept this as valid. Again, though, we could imagine that next week, dollars are ruled to be equal to 2 cents. That, again, is not an uninteresting objection, and makes this case mildly controversial.

Finally, example 5 reads

Keisha is six feet tall. Lawrence is four feet tall. Lawrence is taller than Jaime. So Keisha is taller than Jaime.

In order to accept this, we have to know what "taller than" means. There is no logical symbol for that term, so this argument is not (without some additions to

the logic system) *formally* valid. But once we know what those words means, it's clear that if the premises are true the conclusion must be true.

In cases 4 and 5, we have validity by virtue of *knowing the meaning of the terms*. Those cases are still (arguably) valid, because, it seems, if the premises are true the conclusion must be true. But if the meanings of the words shifted, the arguments *wouldn't* be valid. So these are cases where meaning is necessary to validity, instead of just the form of the argument being sufficient to produce validity.

### **7b. Exercises in Soundness**

For the following, decide if the argument is *sound* or not. If it's not sound, say why not. Remember, there can be two reasons for an argument to be unsound: it is invalid, or at least one of the premises is false.

1. All dogs are canines. Lassie was a dog. So Lassie was a canine.
2. All cats are felines. So if Felix is a feline, then Felix is a cat.
3. President Obama is the 44th President of the United States. Thus, whoever succeeds him as President will be the 45<sup>th</sup> President of the United States.
4. All dogs are friendly. Lassie was a dog. So Lassie was friendly.
5. All United States Presidents were born in the United States. Barack Obama is the President of the United States. So Barack Obama was born in the United States.

## 8. Strength and Weakness

Inductive arguments are said to be either **strong** or **weak**. There's no absolute cut-off between strength and weakness, but some arguments will be very strong and others very weak, so the distinction is still useful even if it is not precise.<sup>2</sup>

A **strong** argument is one where, if the premises were true, the conclusion would be *very likely* to be true. A **weak** argument is one where the conclusion does not follow from the premises (i.e. even if the premises were true, there would still be a good chance that the conclusion could be false.)

Most arguments in courts of law attempt to be strong arguments; they are generally not attempts at valid arguments.

So, the following example (which we saw above as well) is a strong argument.

John was found with a gun in his hand, running from the apartment where Tom's body was found. Three witnesses heard a gunshot right before they saw John run out. The gun in John's possession matched the ballistics on the bullet pulled from Tom's head. John had written a series of threatening letters to Tom. In prison, John confessed to his cellmate that he had killed Tom. Therefore, John is the murder of Tom.

Given that all the premises were true, it would be very likely that the conclusion would be true.

Importantly, strength has *nothing to do with the actual truth of the premises!*

This is something people frequently forget, so it's worth repeating: **A STRONG ARGUMENT NEEDN'T HAVE ANY TRUE PREMISES! ALL THE PREMISES OF A STRONG ARGUMENT CAN BE FALSE!**

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<sup>2</sup> There's a fallacy associated with claiming that, because a distinction is not absolutely precise, it is not useable. This is called the "line-drawing fallacy."

The argument is strong because: *if the premises WERE true, the conclusion would be likely to be true.*

So the following arguments are strong:

98% of Dominicans have superpowers. Lucy is Dominican. I saw Lucy leap from the top of a tall building last week and walk away unscathed. Lucy has superpowers.

People from the lost continent of Atlantis have been manipulating the world's governments for years by placing Atlantean wizards in positions of power. Whenever possible, they place an Atlantean wizard in the executive position of the most powerful government on earth. They did this in the Roman empire, the Mongol empire, and the British empire. Currently, the United States is the most powerful country on earth. Barack Obama was born in Hawai'i, where about 45% of the people are actually Atlanteans. While he was a Senator from Illinois, he received over 10 billion dollars in funds from a mysterious holding company called "Atlantis Incorporated." Several journalists claim that they have seen Barack Obama perform feats of magic. For example, Shep Smith of Fox News said he saw Barack Obama walk on water. Barack Obama is clearly an Atlantean wizard.

Two leading researchers in genetics have found that, in every sample of DNA they looked at, there were traces of kryptonite. They examined 1600 samples, from 1600 separate individuals, including an equal distribution from all continents. The results were then replicated in another, larger study of 2700 samples, also taken from all continents. We conclude, then, that normal DNA contains kryptonite.

**Cogency:** If an argument is **strong** *and* all its premises are true, the argument is said to be **cogent**.

The following arguments are **weak**. The premises provide little, if any, evidence for the conclusions:

I saw your boyfriend last night and he was talking to another girl. So he's cheating on you.

Senator Bonham served 8 years in military, whereas his opponent, Mr. Malham never served one day of military service. So you should vote for Senator Bonham.

More people buy Juff™ brand peanut butter than any other brand, so you should buy Juff™!

It's notable, again, that the truth of the premises is irrelevant. A weak argument can have true premises and a true conclusion. What makes it weak is that the premises do not provide good reason to believe the conclusion.

## 9. Good and Bad arguments

Clearly, we can have valid or very strong arguments that are not convincing because the premises are implausible. So in determining if an argument is good, then, we need to know more than the way in which the premises relate to the conclusion.

**Strong, weak** and **valid** refer only to the *relation between premises and conclusion*.

A **good argument** (and here we'll be adopting a technical sense of "good argument") is one that (1) is either valid or strong, (2) all premises are plausible, and (3) the premises are more plausible than the conclusion.

The last condition requires some explanation. Failing to meet that condition results in a fallacy called "begging the question":

**Begging the question:** an argument is said to "beg the question" if the conclusion simply repeats one of the premises, or (less commonly) if any of the premises are less plausible than the conclusion.

The following argument begs the question:

Of course God exists. We know this because God wrote the Bible, and God would never lie, and the Bible says that God exists.

Here, the conclusion "God exists," is more plausible than the premise "God wrote the Bible." If you accept that God wrote the Bible, you accept not only that God exists but that he wrote a book. Since that sentence contains two conditions (God's existence, and his authorship of the Bible) it is necessarily less plausible than the conclusion, which contains only one of those conditions.

Here's another question-begging argument:

Why should I be in charge? I should be in charge because I'm the boss!

If the conclusion is “I should be in charge,” and the premise is “because I’m the boss,” then the premise and the conclusion are essentially saying the same thing: the boss is, by definition, the person in charge. So the question hasn’t been answered, nor the conclusion supported.

We now have the three conditions for a **good argument**. A **bad argument**, then, is any argument that fails to meet *any one* of the three conditions.

**Bad arguments fail one or more of the tests for good arguments.**

### **9b exercises for good and bad arguments**

For the following arguments, say if the argument is *valid, strong or weak* and then say if it is *good or bad*. If it is bad, say which test it fails.

1. All John Jay students are lawyers. And all lawyers are corrupt. So all John Jay students are corrupt.
2. Ishmael attends a fundamentalist mosque in Brooklyn. Ishmael has repeatedly said that he thinks the U.S. should withdraw all financial support for Israel, and pull all troops out of all Muslim countries. Therefore, Ishmael wants the U.S. government to be replaced by a fundamentalist Muslim government.
3. Historian David Irving claims that the Holocaust, that is, the systematic murder of Jews in Hitler’s Germany, did not take place. But there are thousands of eyewitness reports of the death camps from U.S. and allied soldiers. There are documents from top Nazi officials detailing the orders for the death camps. The remains of the camps still stand. Further, there are hundreds of survivors whose stories cohere and who all report the extermination of Jews and others at the camps. And soldiers and reporters photographed the camps, including photographs of piles of dead, emaciated prisoners and mass graves. So, clearly, David Irving is wrong, and the Holocaust did take place.
4. A group of 6000 college students from across the United States was randomly, and blindly, divided into two equal groups. One received Coldstop anti-cold medicine; the other group received a placebo. Neither group knew which they had received. At the end of the semester it was found, by self report and nurse follow-up, that 35% of the placebo group had had a cold during the course of the semester, whereas only 4% of the Coldstop group had had a cold. Therefore, Coldstop is effective in preventing colds.
5. UFOs land on the White House lawn all the time. I've totally seen them landing there. And weird space aliens get out of the UFOs and they go into the White

House. This happens two or three times a week! Recently, Barack Obama signed a bill giving space aliens a fast-track to US citizenship. He gave a speech about how space aliens, “if they exist,” (that's what he said) should be greeted and treated as friends. So obviously space aliens have been meeting with the president.

6. All humans are mammals. And all humans have opposable thumbs. John is a mammal with opposable thumbs. So John must be a human.

7. You should vote for Senator McMahon. She's a former pro-wrestler and she once killed a mugger. She's not afraid of anything. And she's a huge fan of the local football team!

8. In controlled experiments, homeopathic remedies have been shown to be no more effective than placebos. Placebos are medically inert pills, usually just sugar, used in experiments. There have been hundreds of such experiments, and in summing across all the experiments, researchers have repeatedly shown that homeopathic pills have no medical effect. And yet the homeopathy industry charges people for these medically useless pills, and makes millions of dollars each year. Presumably, people buy these pills because they believe the pills will help them with ailments, as the pills are advertised to be effective against colds, flus, insomnia, pain and other maladies. People who turn to homeopathy might be missing out on actual, effective, evidence-based medicines that could provide them some relief. The homeopathy industry is ripping people off.

### 10 Standard Format Arguments

Arguments are often easier to deal with if we put them in what's called “standard format.” This involves writing each premise on a separate, numbered line, and then writing the conclusion at the end.

**Remember: each premise is one sentence!** This is merely a convention. Obviously, it's often the case that several sentences link together to make a single point. But for ease of display, we write *each sentence on a separate line*.

So, to put an argument in standard format, you must first *find the premises and the conclusion*. Then, write each premise on a separate, numbered line, then, on another line, write the conclusion.

For example, the following argument is **NOT** in standard format:

You should really stop going out with Tom. He never calls you. He didn't even remember your birthday. And last week, when your mom died, and you called him, he said he'd call you later because *Lost* was on and he really wanted to see that episode. That's a

really crappy thing to do! Plus, you lent him 500 dollars and he never paid you back. Also, he kind of smells bad.

But we can put it in **standard format** like this:

Premises:

1. [Tom] never calls you.
2. He didn't remember your birthday.
3. When your mother died, and you called him, he said he'd call you later because *Lost* was on and he really wanted to see that episode.
4. You lent him 500 dollars and he never paid you.
5. He smells bad.

Conclusion: You should really stop going out with Tom.

Note that the first sentence had to be slightly re-written. We can do this because the word "He" in that sentence clearly referred to Tom, so we can substitute Tom's name in so that the sentence makes sense in isolation. Further, we dropped the sentence "That's a really crappy thing to do." It's questionable whether that's a premise or not. Some sentences are just filler and are not premises or claims. It's an open question, in some cases, which sentences are not premises. Here, "that's a really crappy thing to do," was dropped, but if you think it adds real information to the argument, you can include it.

If you have a short argument with only one premise, you can write it in standard format like this:

(Premise) Tanya misses you.

(Conclusion) You should call her.

Here's another example of an argument that is not in standard format:

Raising taxes raises state revenues. State revenues can be spent on infrastructure. Infrastructural improvements create higher profits in business. Those higher profits will mean even more tax money! So if we raise taxes, we'll have an increasing spiral of state revenues.

Now put it in standard format:

This one might be more difficult:

My opponent says that we have no money in the system for schools. Should we simply accept that our schools will deteriorate? We should not! Should we simply accept that our students will not learn? We should not! Now, my opponent has no trouble voting for a defense bill that costs 50 billion dollars. And my opponent has no trouble voting for a tax break for telecommunications companies that will cost the government 100 billion dollars in revenue. So I think my opponent can find a few million dollars for our schools!

Here it is in Standard Format:

Premises:

1. My opponent says there is no money in the system for our schools
2. We should not accept that our schools will deteriorate.
3. We should not accept that our students will not learn.
4. My opponent has no trouble voting for a defense bill that costs 50 billion dollars.
5. My opponent has no trouble voting for a tax break for telecommunications companies that will cost the government 100 billion dollars in revenue.

Conclusion: So I think my opponent can find a few million dollars for our schools.

Note that I condensed the rhetorical questions and their answers; this is allowed only if the answers are clearly stated (as they are here) or very clearly implied. We'll talk more about implication later in the semester, but it's important not to assign meanings that a speaker or writer did not imply.

Here's another:

Joe: Have you seen Tom?

Keisha: No, but he told me he was either going to the park or the gym.

Joe: I was just at the gym and he wasn't there.

Keisha: Then I guess he's at the park.

Put it in standard form:

Now, write ten short arguments in standard format.

## 11 Finding arguments in texts

One of the trickiest aspects of critical thinking is finding arguments in texts or speech. Often, an argument will be embedded in a longer text or conversation, and only some of what is said or written is part of the argument. The skill of finding the arguments takes time and practice. This section merely introduces the idea. You'll need to look at places where arguments are commonly found and see if you can extract them from their settings and put them in standard format. It's a good idea to read the op-ed pages of newspapers (you can do this at their websites) as practice. You'll find lots of arguments there. Many of these arguments will be bad, and their badness will become more apparent once you put them in standard format so that you can easily see if the set of premise leads to the conclusion.

You should also be able to find arguments in your textbooks from other courses, and in historical and contemporary texts in philosophy, political science, religion, popular politics, and any other source where someone is writing with the intent of convincing the reader to believe something.

**Example 1** Here's an excerpt from a classic philosophy text, *Apology*, where a man named Socrates presents an argument (the text is quoting from Socrates' speech at his trial for corrupting the youth of Athens):

**Apology, 25c-26b:** But besides, tell us, for heaven's sake, Meletus, is it better to live among good citizens, or bad? My friend, answer; for I am not asking anything hard. Do not the bad do some evil to those who are with them at any time and the good some good? "Certainly." Is there then anyone who [25d] prefers to be injured by his associates rather than benefited? Answer, my good man; for the law orders you to answer. Is there anyone who prefers to be injured? "Of course not." Come then, do you hale me in here on the ground that I am corrupting the youth and making them worse voluntarily or involuntarily? "Voluntarily I say." What then, Meletus? Are you at your age so much wiser than I at my age, that you have recognized that the evil always do some evil [25e] to those nearest them, and the good some good; whereas I have reached such a depth of ignorance that I do not even know this, that if I make anyone of my associates bad I am in danger of getting some harm from him, so that I do this great evil voluntarily, as you say? I don't believe this, Meletus, nor do I think anyone else in the world does! [26a] but either I do not corrupt them, or if I corrupt them, I do it involuntarily, so that you are lying in both events. But if I corrupt them involuntarily, for such involuntary errors the law is not to hale people into court, but to take them and instruct and admonish them in private. For it is clear that if I am told about it, I shall stop doing that which I do involuntarily. But you avoided associating with

me and instructing me, and were unwilling to do so, but you hale me in here, where it is the law to hale in those who need punishment, not instruction.

First, let's ask what Socrates is arguing. Since this is a court of law, and he's been accused of corrupting the youth, and corrupting the youth is the topic of this paragraph, it certainly makes sense that he's arguing that he does not corrupt them. And he says, at 26a: **either I do not corrupt them, or if I corrupt them, I do it involuntarily.**

That seems like the conclusion because it's what Socrates needs to and wants to prove. Does he give evidence for it?

Much of what he says will be in the form of questions, but we can convert these to statements, and the intended answers, which are clear, will serve as premises. So when he says.

Is it better to live among good citizens, or among bad?

He clearly means: It is better to live among good citizens than among bad. And that's premise 1. And when he asks:

Do not the bad do some evil to those who are with them at any time and the good some good?

He means

The bad do some evil to those who are with them at any time and the good some good.

In other words: Bad people injure those around them, good people aid those around them. This is premise two.

Socrates then asks, and Meletus answers:

Is there anyone who prefers to be injured? "Of course not."

In other words: **No one prefers to be injured.** That's premise three.

Next, Socrates asks, and Meletus answers:

Come then, do you hale me in here on the ground that I am corrupting the youth and making them worse voluntarily or involuntarily?  
"Voluntarily I say."

In other words: Socrates is accused of voluntarily corrupting the youth. That's premise four (it's really the point Socrates is seeking to refute, but we'll include it as a premise because it's important to the argument.)

Socrates then notes:

Are you at your age so much wiser than I at my age, that you have recognized that the evil always do some evil [25e] to those nearest them, and the good some good; whereas I have reached such a depth of ignorance that I do not even know this, that if I make anyone of my associates bad I am in danger of getting some harm from him, so that I do this great evil voluntarily, as you say?

Unpacking this, the main points Socrates is making are:

I know that the evil always do some evil [25e] to those nearest them, and the good some good

I know that If I make anyone of my associates bad I am in danger of getting some harm from him.

These are the final premises. Let's put the argument together now, numbering our premises and marking the conclusion.

1. It is better to live among good citizens than among bad [paraphrased from 25]
2. Because: "The bad do some evil to those who are with them at any time and the good some good." [25c]
3. But no one prefers to be injured. [paraphrased from 25d]
4. And Socrates is accused of voluntarily corrupting the youth. [paraphrased from 25d]
5. But he knows that "the evil always do some evil [25e] to those nearest them, and the good some good."
6. And that "If I make anyone of my associates bad I am in danger of getting some harm from him."

Conclusion: "either I do not corrupt them [in other words, make them bad, and therefore injurious to me], or if I corrupt them, I do it involuntarily [because clearly I wouldn't *want* to be injured!]."

**Example 2.** John and Keisha have a conversation about their friend Tony. Read it all the way through, then go back and pick out *only* premises and the conclusion to the argument they construct. Note: *very few* of the sentences they utter are premises! You have to find them by finding the conclusion, and then asking: which of these sentences *leads to* or *supports* the conclusion.

John: Did you hear about Tony?  
 Keisha: No, what?  
 John: I heard he missed school like 10 times already this semester.  
 Keisha: Huh. I know his mom, she's nice.  
 John: Is she that red-haired lady I saw him with?  
 Keisha: no! that's his older sister. His mom's kind of old, with gray hair.  
 John: O, I don't know her.  
 Keisha: Yeah. You know what, I see her a lot because we both volunteer at the homeless shelter. She said Tony seemed weird lately.  
 John: How so?  
 Keisha: Like he was glassy-eyed and kind of out-of-it.  
 John: Who isn't! I'm so tired lately I can barely stay awake.  
 Keisha: No, I think this is something else. I mean, I didn't think about it until you mentioned him missing school.  
 John: What do you mean?  
 Keisha: Who does Tony hang out with?  
 John: Lately, he's been hanging out with Peter Medvechek.  
 Keisha: Who's that?  
 John: He's some jerk, he's always trying to sell weed and stuff at school.  
 Keisha: See?  
 John: What? Oh! Damn! Do you think?  
 Keisha: Yeah, I think Tony's on drugs.

## **12 Writing the critical thinking term paper.**

*What follows is a rough outline for a set of assignments leading up to an 8-10 page paper. Instructor teaching writing intensive courses, or those wishing to more fully incorporate critical thinking into their students writing process.*

### **12a Basic considerations for the critical thinking paper:**

#### Writing Your Argumentative Essay

You've been assigned to write an 8 to 10 page paper. That seems like a lot, but if you break it down using argument structure, you'll see it's much easier.

Suppose your topic is biking in New York City. You could simply write a report about how much biking goes on here, who bikes, who doesn't, rate of bicycle accidents, etc. But maybe after doing some research on biking, you want to support some point, or hold a position, and for that you'll need an argument.

You'll note that the argument should start to develop after you've done some research. Simply having an opinion isn't enough, and if you attempt to simply support your opinion, you might blind yourself to opposing points of view.

So if you've been wondering about the debates about biking in New York, where some people are angry about the added bike lanes, and some people support them, you should probably do a little research and find out why people hold these opinions.

Now let's say you've done that, and you want to argue that we should encourage more biking in the city. Now you have an idea of the conclusion you're aiming at, and you'll need to support it with premises.

Paper assignment part 1:

Begin by laying out, in standard format, some of the elements of your argument.

1. Bicycles produce far less pollution than cars.
2. Biking is good aerobic exercise, which is one of the best forms of exercise for weight control and heart health.
3. Bicycle/pedestrian collisions are less dangerous than car/pedestrian collisions.

C: We should support biking in the city

These premises provide some support for the conclusion. But can we just accept the premises? Probably, we need to argue for them as well.

Paper assignment part 2:

Identify the premises that need support, and begin to support them.

1. Bicycles produce far less pollution than cars.
2. Here, in standard format, you'll start to lay out your research. How much pollution do cars produce? How much pollution is produced by the manufacture of cars? How much by the manufacture of bicycles? Be careful to compare apples-to-apples! The total amount of pollution produced in the manufacture of cars isn't directly comparable to the total amount produced in the manufacture of bicycles. Think of how many passengers are supported by each mode of transportation, and what the pollution savings would be for switching. If cars almost always only contained a driver and no passengers, then bikes and cars would be easy to compare. If cars, on average, contained two passengers, then each car is doing the job of two bikes. Further, you should think about mile-for-mile comparisons as well as rider-for-rider comparisons.
3. Biking is good aerobic exercise, which is one of the best forms of exercise for weight control and heart health.
4. Here, a little research on the effects of biking shouldn't be too hard to find. Use Google. Use PubMed. Cite sources!
5. Bicycle/pedestrian collisions are less dangerous than car/pedestrian collisions

6. The city of New York keeps records on road deaths. Do a little research on total numbers. See what you can find!

C: We should support biking in the city

In other words, produce arguments for the premises of your initial argument. Your first paragraph will be the initial argument. Each succeeding paragraph will argue for one of your premise. Your conclusion will draw from the prior paragraphs to restate the argument in stronger terms.

### Paper Assignment Part 3

Now, argue against your argument! That is, find what the leading objections to your position are, and lay them out fairly, clearly, and strongly.

For example, people are worried about bicycles running into pedestrians. People are worried that bicycles increase motor vehicle accidents by cutting across lanes. People have noted that bicyclists do not obey traffic laws. Find these arguments in, for example, newspaper editorials. Summarize these arguments in the strongest possible terms. If you find an argument that is weak, see if you can strengthen it.

You can do this for particular parts of your argument—is the manufacture and care of bicycles actually not less polluting, because people replace bicycles more regularly than cars? Should the government have any interest in promoting “good aerobic exercise,” or is that in fact an overreach of government powers, and not something that should be the subject of legislation? Etc.-- or simply raise objections to the conclusion: that is, we should not support biking in the city because it’s a nuisance, bicyclists are scofflaws, etc.

After fully writing out an argument against your argument, respond to it. Show why your argument is still strong, or adapt your argument to the information you discovered in the counterargument. So this assignment should have the format:

- a. Your argument, in brief
- b. An objection to your argument
- c. A response to the objection.

### Paper Assignment part 4

Now rewrite your paper in full including the counterarguments and the counter-counterarguments. Place each counterargument after the paragraph that includes

the premise the counterargument objects to. Include general objections before the conclusion.

Paper Assignment part 5: Clarifying your conclusion, outlining your paper.

Look for weaknesses in your position and your paper. What is missing from your work? For example: How should we support biking in the city? “We should support biking in the city” is a little vague. What your research may have turned up is that adding bike lanes encourages biking. Maybe you could change your conclusion, so that it follows from this argument:

1. Seeing as bikes are less polluting, healthier, and less dangerous (assuming our premises are true!) we should support biking in the city.
2. And the best way to support biking is to have bike lanes.
- c. So we should support the added construction of bike lanes in the city.

Ok, how are we going to pay for these bike lanes? Are there objections to paying for the bike lanes? You may need to add more arguments, counterarguments, and responses.

For this assignment, write a criticism of your own paper, pointing out what is lacking.

Paper assignment part 6

Now let's outline the entire paper

1. Bicycles produce far less pollution than cars.
  - a. Premise supporting 1
  - b. Premise supporting 1
  - c. Premise supporting 1
  - d. etc.
2. But some say that bicycles are producing their own pollutants through overmanufacture and the fact that bicyclists replace their bicycles more regularly than drivers replace cars.
  - a. any support for this claim
3. However, I would note that even though some pollution is produced by bicycles, they are still overall less polluting...
  - a. any support for this claim
- 4.. Biking is good aerobic exercise, which is one of the best forms of exercise for weight control and heart health.
  - a. Premise supporting 4

- b. Premise supporting 4
- c. Premise supporting 4
- d.. etc.

- 5. But is it the government's business to promote exercise?
  - a. Any support or elucidation of this claim

- 6. Response to 5

- 7. Bicycle/pedestrian collisions are less dangerous than car/pedestrian collisions.
  - a. Supporting argument

8-etc. further arguments and counterarguments and responses.

9 (or whatever). Seeing as bikes are less polluting, healthier, and less dangerous (assuming our premises are true!) we should support biking in the city.

10. The best way to support biking is to have bike lanes.

- a. support for 10

11. However, some people are opposed to bike lanes.

- a. explanation, argument

12. I would respond that...

- a.. Replies to individual premises

13. So in conclusion, though we must be careful about [reasonable objection from opposing position], we needn't worry about [unreasonable objection from opposing position], and in on the whole, the benefits outweigh the risks, such that the city should continue to institute, maintain and support bike lanes.

Paper assignment 6:

The final write up! And remember: use claims! Do not use vague sentences! Present the opposing point of view as strongly and fairly as possible. And most importantly: make sure your argument is strong! When you've written it out in standard format, analyze it for strength. Could I accept all the premises and refuse to accept the conclusion? If so, maybe the argument is strong enough. Think about why you might accept the premises and reject the conclusion, and then either strengthen your argument by addressing your critique, or, just maybe change your opinion!