

# Critical Thinking by Example

By Mark Walker

Dedication: This little work is dedicated to my father, Alan Walker, who gave me my first critical thinking lessons.

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## Chapter 1: Elementary Evaluation

### Material covered in this chapter

- 1.1 Two Conventions for Standardizing
- 1.2 Five argument Types

### 1.1 Two Conventions for Standardizing

To standardize an argument is to break it down into its components in a manner that shows the logical relationships between the parts. An argument, in our technical sense, is a reason or reasons offered in support of a conclusion. So, for anything to qualify as an argument it must have two components: at least one reason and one conclusion. Standardizing involves identifying these component parts. Thus with respect to example 1.1:

#### Example 1.1: A simple argument

John is over two meters tall, so he is tall.

The conclusion is "he is tall", and the reason to believe the conclusion is "John is over 2 meters tall".

If all arguments were as elementary as example 1.1, there would be little call to develop standardization conventions, but arguments can be quite complex, and so we need to develop some notation to keep track of everything. One variant, 'standard notation', designates reasons or premises with a 'P' and an associated numeral, and a conclusion or conclusions with a 'C' and an associated numeral. Thus, example 1.1 in standard notation would be presented as follows:

#### Example 1.2: A simple argument in standard notation

P1: John is over two meters tall.

C: John is tall.

The premise, 'P1', is offered in support of the conclusion, 'C'. A second convention involves diagramming. We can insert numerals into 1.1 like so:

#### Example 1.3: A simple argument with numerals inserted

[1] John is over two meters tall, [2] so he is tall.

The associated diagram is given in 1.4:

**Example 1.4: Simple argument diagram**



We read diagrams from the bottom up, with each arrow representing 'therefore'. In other words, we read 1.3 as 1, therefore 2, and substitute in the propositions for 1 and 2, that is, [1] John is over two meters tall, therefore [2] John is tall.

**1.2 Five Argument Types**

The arguments we will discuss in this work are either one of the five types given in example 1.5, or a combination of two or more of these five argument types.

**Example 1.5: Five Argument Types**

<p><b>Simple Argument:</b> A single premise supports a single conclusion.</p>	<p style="text-align: center;">C ↑ P1</p>
<p><b>Serial Argument:</b> A premise set is used to support a subconclusion. The subconclusion serves as a premise for a further conclusion.</p>	<p style="text-align: center;">C ↑ P1 ↑ P2</p>
<p><b>Linked Argument:</b> Two or more premises are logically linked and work together to support a conclusion.</p>	<p style="text-align: center;">C ↑ P1 — P2</p>
<p><b>Convergent Argument:</b> Two or more premises are logically independent. They work independently to support the conclusion.</p>	<p style="text-align: center;">C ↑   ↑ P1   P2</p>
<p><b>Divergent Argument:</b> A premise set supports two or more conclusions.</p>	<p style="text-align: center;">C1   C2 ↑   ↑ P1</p>

We have seen a simple argument above (example 1.1). Here are examples of the remaining four:

**Example 1.6: Serial Argument**

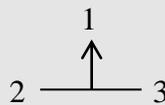
[1] Lassie is a mammal, [2] since Lassie is a dog. [3] So, Lassie is warm blooded.



Notice that the numbers function merely like names, their order or size make no difference. We could have just as easily written '157' as opposed to '1'. Also, look at 1 in the argument. It is a main premise because it supports the main conclusion, but 1 is also a conclusion, since 2 supports it. We will term this a 'subconclusion'. Something that is both a conclusion and a premise for a further conclusion is a subconclusion. 2 is a subpremise, since it supports a subconclusion, not the main conclusion. In other words, any premise that does not directly support a main conclusion is a subpremise.

**Example 1.7: Linked Argument**

[1] Lassie is a mammal, [2] since Lassie is a dog, [3] and all dogs are mammals.



Notice how in a linked argument the premises must work together to support the conclusion. [3] on its own does not support the conclusion without the knowledge that Lassie is a dog, and [2] does not support the conclusion without the knowledge that dogs are mammals. So, [2] and [3] need each other to provide any reason to believe the conclusion.

**Example 1.8: Convergent Argument**

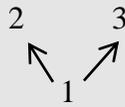
[1] Lassie is a great pet [2] because she is smart [3] and she scares away intruders.



Notice that both [2] and [3] on their own provide some reason to believe the conclusion. The two independent reasons converge on the same conclusion.

**Example 1.9: Divergent Argument**

[1] Lassie is a dog [2] so she needs regular walks and [3] an occasional good brushing.



Premise [1] is offered in support of two distinct conclusions: [2] and [3].

You may want to try the chapter exercises: <http://www.criticalthinkingbyexample.com/Chapter1/chapter1.html>

## Chapter 2: Elementary Argument Evaluation

### Material covered in this chapter

- 2.1 The definition of a good argument
- 2.2 Three Fallacies

### 2.1 The Definition of a Good Argument

A good argument is one that meets these three conditions: (1) The premise set is relevant to the conclusion, (2) the premise set is sufficient for the conclusion, and (3) the premises are acceptable.

#### Example 2.1: A good argument.

[1] All humans are mortal. [2] Socrates is a human. [3] So, Socrates is mortal.

The premises [1] and [2] are acceptable, since they are true. The premises are relevant to the conclusion [3] and sufficient, so this is a good argument.

### 2.2 Three Fallacies

It may help to understand the definition of a good argument by considering bad arguments, that is, arguments that fail to meet one of the three conditions for a good argument. We will define three fallacies, characteristic ways people make bad arguments, to illustrate failure of each of these conditions.

#### Fallacy of Irrelevant Reason

**Definition:** An argument contains this fallacy if the premise set is irrelevant to the question of whether we should accept the conclusion.

**Note:** example 2.2 is purposely ridiculous to exemplify the underlying pattern. Even though the premise is true, it provides us no reason to believe that the conclusion is true. The premise is irrelevant to the conclusion. Most arguments that commit the fallacy of irrelevant reason are more subtle than this, but the underlying pattern is the same.

#### Example 2.2: An argument that commits the fallacy of Irrelevant Reason

P1: Some people are worried about the fate of polar bears with the melting of the arctic ice.

C: Therefore, all polar bears are white.

**Fallacy of Hasty Conclusion:** An argument contains this fallacy if the premise set is insufficient to warrant the acceptance of the conclusion.

#### Example 2.3: An argument that commits the fallacy of Hasty Conclusion

P1: All the polar bears we saw at the zoo today are white.

<p>The conclusion is hasty because even if the premise is acceptable it does not provide sufficient support for the conclusion. The premise does not address the question of the color of polar bears that are not in the zoo. In other words, a good argument for the conclusion would include evidence about the color of polar bears wherever polar bears are found.</p>	<p>C: So, all polar bears are white.</p>
<p><b>Fallacy of Problematic Premise:</b> An argument contains this fallacy if the premise set contains a premise that cannot be granted (accepted by the audience) without further support.</p> <p>Notice that with example 2.4 the premise is relevant; it gives us some reason to believe the conclusion. Indeed, if the premise is true, it provides all the reason we need to believe the conclusion. To see the problem with this argument, imagine a friend of yours made this argument to you. Would you believe the premise? You probably wouldn't without further evidence. You might ask your friend to convince you that she had not mistaken brown bears for polar bears. Perhaps your friend might convince you that this did not happen, but still this means that P1 requires more evidence for it to be acceptable. As it stands, it is an unacceptable premise.</p>	<p><b>Example 2.4: An argument that commits the fallacy of Problematic Premise</b></p> <p>P1: All the polar bears we saw at the zoo today were brown and small.</p> <p>C: Not all polar bears are white.</p>

## Chapter 3: Necessary and Sufficient Conditions

### Material covered in this chapter

- 3.1 The meaning of necessary and sufficient conditions
- 3.2 Conditionals and necessary and sufficient conditions
- 3.3 The relationship between conditionals and disguised conditionals
- 3.4 Contrapositive

### 3.1 The Meaning of Necessary and Sufficient Conditions

'P is necessary for Q' is equivalent to 'P is required for Q'. In other words, for our purposes, necessary = required. 'P is sufficient for Q' is equivalent to 'P is enough for Q'. In other words, for our purposes, sufficient = enough.

#### Example 3.1: An example of a necessary and a sufficient condition.

Being a bachelor is sufficient for being a male. Being male is necessary for being a bachelor.

Being a bachelor is sufficient for being a male, since being a bachelor is enough to be a male. Being a male is necessary for being a bachelor, since being a male is required for being a bachelor.

### 3.2 Conditionals and Necessary and Sufficient Conditions

Conditionals are sentences of this form: If p, then q. In the sentence, 'If p then q', 'p' is the antecedent and 'q' is the consequent. P is sufficient for Q. Q is necessary for P.

#### Example 3.2: A true conditional.

If it is rainy, then it is cloudy.

The antecedent, it is rainy, is sufficient for the consequent, it is cloudy, since it is enough for it to be cloudy that it is rainy. The consequent, it is cloudy, is necessary for the antecedent, it is rainy, because a requirement for rain is cloudiness. The conditional does not tell us the relationship between not P (it not being rainy) and Q (it being cloudy). Consider that it is not necessary for it to be not rainy for it to be cloudy (because there are cloudy rainy days), and it is not sufficient because sunny days are non-rainy days. Likewise, not being cloudy is neither necessary nor sufficient for it being rainy.

**Example 3.3: A false conditional.**

If it is cloudy, then it is rainy.

This conditional says that being cloudy is sufficient for it to be rainy. Clearly this is false, since it can be cloudy without it being rainy. Likewise, it says that being rainy is necessary for it being cloudy—again this is false. We can prove this by constructing a counterexample. A counterexample is a cloudy day with no rain. This counterexample shows that being cloudy is not enough for it to be rainy, which demonstrates that the conditional is false.

**3.3 Disguised Conditionals**

There are a number of sentences that do not appear to be conditional sentence, but which in fact have the same logical structure as conditional sentences. The table below lists a number of these disguised conditionals.

Disguised Conditional	Example	P =	Q =	Relation		Rewritten
Q unless P	It is not rainy unless it is cloudy.	cloudy	not rainy	Q is necessary for not P	Not P is sufficient for Q	If not P, then Q
Q, if P	It is cloudy, if it is rainy.	cloudy	rainy	Q is necessary for P	P is sufficient for Q	If P, then Q
Q provided that P	It is cloudy provided that it is rainy.	rainy	cloudy	Q is necessary for P	P is sufficient for Q	If P, then Q
P only if Q	It is rainy only if it is cloudy.	rainy	cloudy	Q is necessary for P	P is sufficient for Q	If P, then Q
When P then Q	When it is rainy, it is cloudy.	rainy	cloudy	Q is necessary for P	P is sufficient for Q	If P, then Q
All Ps are Qs	All rainy days are cloudy days.	rainy days	cloudy days	Q is necessary for P	P is sufficient for Q	If P, then Q

**4. Contrapositive** Being a bachelor is sufficient for being a male, since being a bachelor is enough to be a male. Being a male is necessary for being a bachelor, since it is required that to be a bachelor one is male.

## 3.4 Contrapositive

The contrapositive of 'If P then Q = 'If not Q then not P'. The two sentences are logically equivalent. This tells us that not-Q is sufficient for not-P, and not-P is necessary for not-Q.

### Example 3.4: Contrapositive

The contrapositive of "If it is rainy, then it is cloudy" is "If it is not cloudy, then it is not rainy".

Notice that in constructing a contrapositive you must perform two operations: (1) switch the consequent and the antecedent, and (2) put negations in front of the antecedent and the consequent. Students often forget to do one or the other.

## Chapter 4: Validity

### Material covered in this chapter

- 4.1 Valid and invalid arguments

## 4.1 Valid and Invalid arguments

Definitions of validity:

Definition 1: An argument is valid if the premises are (or were) true, then the conclusion must be true.

Definition 2: An argument is valid if it is not possible that the premises of the argument are true, while the conclusion is false.

### Example 4.1: Example of a valid argument.

P1: I am over 50ft tall.

C: So, I am over 40ft tall.

Students struggle with validity because there is a temptation to claim that an argument is invalid because it has a false premise. Notice, however, that the definition of validity specifically rejects requiring establishing the truth of the premise set: we are asked to **ASSUME** that the premises are true. So, to evaluate the validity of an argument requires that you sometimes let your imagination run wild. In example 4.1 we must imagine something very implausible: that the author is 50ft tall. Of course no human is that tall. But imagine someone were that tall. If someone were that tall, then it would have to be the case that he or she is over 40ft tall. That is,

if the premise is true, then the conclusion must be true. Alternatively, we can see how the second definition of validity applies: if we imagine that the premise is true, then it is not possible that the conclusion is false. If someone is over 50ft tall, then it is not possible that they are not over 40ft tall.

**Example 4.2: Example of a invalid argument.**

P1: I am over 1ft tall.

C: So, I am over 2ft tall.

We can see why 4.2 is invalid: if the premise is true, it does not follow that the conclusion must be true. The author could be taller than 1ft and less than 2ft tall. So, the argument is invalid.

Hint: not everyone is helped by this hint, but enough that it is worth saying: to judge the validity of an argument it might help to imagine an “empty universe”. Next, imagine the universe is described only in the ways that the premises say. In example 4.1, we might imagine a universe with a single person over 50ft. tall. In the second case we imagine a single person over 1ft. In this way you can focus on what is at issue: whether the conclusion must be true in your imaginary universe.

## Chapter 5: Intermediate Standardizing

**Material covered in this chapter**

- 5.1 Premise and conclusion indicators
- 5.2 Missing premises

### 5.1 Premise and Conclusion Indicator Words

Thus far we have dealt with fairly simple and straightforward arguments. In this chapter you will learn techniques for standardizing more complex arguments. The task of standardizing requires us to “get inside the heads” of the persons making the argument. We want to figure out what point they intend to support (the conclusion), and what reasons (premises) they intend to offer. There is no infallible way of ascertaining intentions. We have all had the experience of misinterpreting others, e.g., not realizing that someone was joking. One good indicator of the authors’ intentions is premise and conclusion indicators: words used to signal premises and conclusions. Here is a list of some conclusion indicators:

Therefore	For all these reasons
Thus	On these grounds it is clear that
So	Consequently
Hence	Proves that
Then	Shows that
It follows that	Indicates that
In conclusion	We can conclude that

Accordingly	Means that
Demonstrates that	Suggests that

Here is a list of premise indicator words:

Since	On the grounds that
Because	For the reason that
For	As indicated by
Follows from	May be inferred from
As shown by	May be derived from
Given that	May be deduced from

A word of warning: sometimes the words in these lists may be used in other ways. Consider the following two examples:

**Example 5.1: The word ‘since’ as a premise indicator**

You should go to class today since there is a quiz.

**Example 5.2: The word ‘since’ not used as a premise indicator**

There has been no good music since the great music of the 1960s.

The word ‘since’ is on our premise indicator list. This suggests that we might standardize 5.1 thus:

P1: There will be a quiz today.

C: You should go to class.

This is a good reconstruction of the author’s thinking. The same can’t be said of the same reconstruction of 5.2:

P1: The great music of the 1960s.

C: There has been no good music.

There are obvious problems with this reconstruction, including the fact that P1 is not even a complete thought. The difference in the two examples is that the word ‘since’ is used as a premise indicator in 5.1 but in a temporal (i.e., time) sense in 5.2. A good trick to see if words on these lists are being used as premise or conclusion indicators is to try substituting a different word from the lists. If you can do so without altering the meaning of the passage, then it probably is a premise or conclusion indicator. If not, then it is probably not a premise or conclusion indicator. Thus, in 5.1 we can take out ‘since’ and substitute ‘because’ with no change in meaning. However, in 5.2 this same substitution will not work (in fact the sentence does not even make sense with this substitution).

## 5.2 Missing Premises and Conclusions

Premises and conclusions are sometimes not stated in an argument. Standardization requires that we identify any missing premises or conclusions, for only in this way can we properly evaluate an argument. Consider example 5.3:

**Example 5.3: An argument with a missing premise.**

Donald Trump is a capitalist. So, Donald Trump must die.

We can standardize the stated premise and conclusion thus:

P1: Donald Trump is a capitalist.

C: Donald Trump must die.

It is clear that there is a missing premise in this argument, for the stated premise seems to offer no support for the conclusion. Clearly the author must have some further thought in mind; something along the lines of: “All capitalists must die”. So, a complete standardization is as follows:

P1: Donald Trump is a capitalist.

MP2: All capitalists must die.

C: Donald Trump must die.

‘MP’, of course, stands for ‘missing premise’. The importance of supplying the missing premise clearly helps with the evaluation of this argument: the premises are relevant and sufficient for the conclusion, but MP2 is clearly problematic. By supplying the missing premise we are able to see exactly what is wrong with the argument.

Similarly, if the author had said: “Donald Trump is a capitalist, and all capitalists must die” we should construe this as an argument with a missing conclusion: MC: Donald Trump must die.

Arguments may have missing premises and conclusions; consider example 5.4:

**Example 5.3: An argument with a missing premise and missing conclusion.**

**Background:** Local government officials are considering changing the legislation to make all elective abortions illegal. Smith wrote a letter to the editor in support of changing the legislation. Jones responds with her own letter to the editor, a single

sentence:

**Argument:** “If the government makes all elective abortions illegal, we will live in a less just society.”

This single sentence is best understood as an argument with a missing premise: “We don’t want to live in a less just society”; and a missing conclusion: “The government should not make all elective abortions illegal”. We would standardize it thus:

MP1: We do not want to live in a less justice society.

P2: If the government makes all elective abortions illegal, we will live in a less just society.

MC: The government should not make all elective abortions illegal.

## Chapter 6: Relevance

### Material covered in this chapter

- 6.1 Twelve fallacies of relevance.

With a good argument, it is possible to answer “yes” to each of these questions:

1. Assuming that the premise set is acceptable, is the premise set relevant to the conclusion?
2. Assuming that the premise set is acceptable, does the premise set provide sufficient support for the conclusion?
3. Is the premise set acceptable?

A bad argument is one which answers “no” to one or more of these questions. In this chapter we will examine arguments where the answer to question 1 is “no” by examining twelve fallacies of relevancy:

### 6.1 Twelve Fallacies of Relevance

<b>Fallacy of Irrelevant Reason</b> An argument contains this fallacy if the premise set is irrelevant to the question of whether we should accept the conclusion. Note: the remaining eleven fallacies are specific forms of this fallacy. On quiz material, if you detect an argument that involves irrelevant reasons you should choose this fallacy only if none of the other eleven fallacies are appropriate.	<b>Example 6.1</b> "Mark's shoes are black. Therefore, all polar bears are white."
<b>Red Herring Fallacy</b>	Example 6.2

<p>This fallacy is committed when an unrelated issue is introduced into an argumentative exchange, as if it were relevant, in such a way as to shift the focus away from the original issue.</p> <p>Notice in example 6.2 how the topic quickly changes. Andy is arguing about the issue of whether the war was justified; Carlos is arguing about whether the US has done the morally right thing subsequently. The question of what the US did subsequently is irrelevant to whether the US was justified in the first instance.</p>	<p>Andy: "The war in Iraq is not justified, since the US only went there for oil."</p> <p>Carol: "Wars are started for all sorts of reasons. The important point here is that the US has tried hard to help the Iraqi people after the war. The US did not just up and leave, but has invested billions of dollars rebuilding the nation of Iraq."</p>
<p><b>Strawperson Fallacy</b></p> <p>This fallacy is committed when an opponent's position is substituted for a position that is weaker and easier to criticize than the opponent's actual position.</p> <p>In example 6.3, Juanita misrepresents Juan's position: universal health care is normally understood as a theory about access to health care; in particular, a government funded scheme for making available health care services. Juanita makes it sound as if universal health care means that not only would the services be provided, but that they would be forced upon those who would refuse such services. The question of whether we have a right to refuse medical treatment is irrelevant to the question of how access to medical services ought to be distributed.</p> <p>Notice too that the Strawperson fallacy diverts attention from the issue at hand, just as the Red Herring fallacy does. But it does so in a particular way: it does so by attributing a position not held by the argumentative opponent. So, the Strawperson fallacy is a specific type of the Red Herring fallacy. In other words, all Strawperson fallacies are Red Herring fallacies, but not vice versa.</p>	<p><b>Example 6.3</b></p> <p>Juan: "We should have universal health care."</p> <p>Juanita: "I don't know how you can say that Juan. Universal health care violates individual liberty. We have every right to refuse medical treatment: we don't want the state telling us what medical treatments we must receive—as if we are children."</p>
<p><b>Ad Hominem Fallacy</b></p> <p>This fallacy occurs when (i) an opponent's person, character or circumstance is attacked rather than the opponent's argument, and (ii) the attack has not been shown to be relevant to the acceptability of the opponent's argument.</p> <p>In example 6.4 the author attacks both Fox's circumstances—Fox had his license suspended—and his character—he has trouble getting along with others. The author says nothing about what reasons Fox offers for anarchism, nor why Fox's circumstances or character are relevant to the viability of anarchism as a political doctrine.</p>	<p><b>Example 6.4</b></p> <p>"Bob Fox's rant in favor of anarchism is just the sort of thing you would expect from someone who has had his driver's license taken away by the court and who can't seem to get along with anyone."</p>

<p><b>Tu Quoque Fallacy</b></p> <p>This fallacy is committed when (i) an opponent is accused of an inconsistency between position and actions, and (ii) the inconsistency has not been shown to be relevant to the assessment of the opponent's position.</p> <p>In example 6.5 the Beastie Boys do not address Pop's reasons for not smoking, but simply point out the inconsistency of his recommendation (don't smoke) and his actions (he's a smoker). Suppose Pop's reason for the conclusion, "don't smoke", is that smoking causes cancer. The fact that Pop smokes does not show that this reasoning is wrong.</p>	<p><b>Example 6.5</b></p> <p>"You gotta fight for your right to party Your Pop caught you smoking, and he said, "No Way!"</p> <p>That hypocrite smokes two packs a day."</p> <p>(The Beastie Boys)</p>
<p><b>Fallacy of Appeal to Ignorance</b></p> <p>This fallacy is committed when (i) a position P is asserted to be true (or false) based on the fact that there is no evidence for not-P, and (ii) the fact that there is no evidence for not-P is irrelevant to the truth (or falsity) of P.</p>	<p><b>Example 6.6</b></p> <p>Big Foot, a completely different species of hominid, exists, since no researcher has been able to show conclusively that Big Foot does not exist.</p>
<p><b>Fallacy of Guilt by Association</b></p> <p>This fallacy occurs when a position P (or person) is attacked on the basis of an association to Q, where the association to Q is not relevant to the acceptability of P.</p> <p>In example 6.7 the author tries to impugn vegetarianism by associating it with Hitler. The fact that Hitler did or believed X is not in itself relevant to whether we ought to believe or do X. After all, Hitler breathed oxygen, and presumably this is not something we ought to renounce.</p>	<p><b>Example 6.7</b></p> <p>"I can't believe you support vegetarianism. Did you know that Hitler was a vegetarian?"</p>
<p><b>Fallacy of Appeal to the Majority</b></p> <p>This fallacy occurs when a position P is said to be true because the majority believes that P, and the fact that the majority believes P is irrelevant to whether we should believe P.</p>	<p><b>Example 6.8</b></p> <p>"You should believe in God, the vast majority of people in this great country do."</p>
<p><b>Fallacy of Appeal to the Select Few</b></p> <p>This fallacy occurs when a position P is said to be true because not everyone believes P, and the fact that not everyone believes P is irrelevant to the acceptability of P.</p>	<p><b>Example 6.9</b></p> <p>"Most people simply believe in the religion of their parents. It is a rare, stronger type, who is capable of seeing the truth of atheism."</p>

<p><b>The Gambler’s Fallacy</b></p> <p>This fallacy is committed when it is argued that the past has an influence on a random event</p>	<p><b>Example 6.10</b></p> <p>“I can’t possibly leave my slot machine now! I’ve been losing for two hours straight—it has to get hot soon.”</p>
<p><b>Fallacy of Appeal to Tradition</b></p> <p>This fallacy occurs when it is asserted that a position P is true because it has always been believed, and the tradition is not relevant to the acceptability of P.</p>	<p><b>Example 6.11</b></p> <p>“Of course it is right to spank your children when they misbehave. My parents spanked me; their parents spanked them, and so on.”</p>
<p><b>Fallacy of Improper Appeal to an Epistemic Authority</b></p> <p>This fallacy occurs when one or more of the following conditions are not met.</p> <ol style="list-style-type: none"> <li>1. The authority must be identified.</li> <li>2. The authority must be respected in her field.</li> <li>3. The authority must be speaking about a matter in her field of expertise.</li> <li>4. The matter must be one in which there is a reasonable consensus amongst the relevant experts.</li> </ol> <p>In example 6.12 the first condition is not met: the authority is not identified sufficiently to identify him or her (there is more than one famous British physicist). Without knowing the identity of the physicist, it is impossible to ascertain whether he or she is respected in the field. The third condition is not met, since the question of whether we ought to genetically engineer humans is an ethical question, and there is no indication that the physicist is an expert in the realm of ethics. Finally, the fourth condition is not met, since there is no consensus amongst ethicists as to whether we ought to genetically engineer humans.</p>	<p><b>Example 6.12</b></p> <p>“We need to genetically engineer humans to be much smarter. Don’t take my word for it, I saw a famous British physicist make this claim on television last night.”</p>

## Chapter 7: Sufficiency

### Material covered in this chapter

- 7.1 Sufficiency and deductive and inductive arguments
- 7.2 Fallacies of Sufficiency

Recall that we said that with good arguments it is possible to answer “yes” to each of these questions:

1. Assuming that the premise set is acceptable, is the premise set relevant to the conclusion?
2. Assuming that the premise set is acceptable, does the premise set provide sufficient support for the conclusion?
3. Is the premise set acceptable?

With bad arguments it is not possible to answer “yes” to each. In this chapter we will examine arguments where the answer to question 2 is “no”.

It is important to emphasize that in evaluating whether a premise set is sufficient to warrant the acceptance of a conclusion, we *assume* that the premise set is acceptable. In other words, to say that the premise set is sufficient is to say that, if true, the premise set provides good reason to believe the conclusion.

## 7.1 Sufficiency and Deductive and Inductive Arguments

Arguments are often divided into two types: deductive and inductive. With deductive arguments, the intention is to make the conclusion *certain* given that the premises are true. With inductive arguments, the intention is to make the conclusion probable, given the premises are true.

### Example 7.1: Example of a deductive argument.

All humans are less than 8ft tall. Socrates is a human. So, Socrates is less than 8ft tall.

### Example 7.2: Example of an inductive argument.

99.99% of all humans are less than 8ft tall. Socrates is human. So, Socrates is less than 8ft tall.

Example 7.1 is a deductive argument because the intention is to make the conclusion certain, if the premises are true. Example 7.2 is an inductive argument because even if the premises are true, they only make the conclusion highly probable, not certain.

Assessing sufficiency in a deductive argument is a relatively straightforward matter: in a deductive argument a premise set is sufficient only if the argument is valid. If a deductive argument is invalid, then the premise set is insufficient.

Sufficiency is harder to assess with inductive arguments. In part this is because of the fact that, unlike certainty, probability comes in degrees. It will help to examine first why inductive arguments do not claim certainty for

the conclusion. Suppose there are 20,000 students at your university, and you randomly survey 9,999 of them. To your surprise, they all answer your questionnaire to the effect that marijuana should be legalized. You use this as a premise in an argument that concludes that the majority of students at your university believe that marijuana should be legalized. Despite the strength of your evidence, your argument is not valid; the conclusion is not certain even if the premises are true. In other words, it is possible that the premise is true and the conclusion is false. For example, suppose the other 10,001 students believe that marijuana should not be legalized, and you were very, very unlucky in whom you randomly sampled. You just happened to get exactly all and only those students who think it should be legalized. On the other hand, even though your argument is not valid, it is still a good argument. Assuming the premise is true, it gives us very strong reason to believe the conclusion is true.

How probable does the premise set have to be to support the conclusion? In practice we often accept different degrees of probability depending on the situation. In some legal jurisdictions (the U.S., for instance) different standards are applied in legal arguments in civil and criminal proceedings to meet the burden of proof. In civil proceedings the standard of proof is often the “preponderance of evidence”. If I am seeking financial compensation from you for my expensive garden gnome collection that I allege you destroyed, I would need to show that it is more probable than not that you were the responsible party. So, in effect, 51% probability that you are guilty is sufficient in civil court. In a criminal trial, the standard is often “beyond a reasonable doubt” and so 51% is not sufficient. In part, the difference in standards is explained by the severity of the penalties attached. In civil trials, the stakes are usually monetary, whereas in criminal proceedings at issue may be prison time, or even capital punishment. Since the costs of a wrongful conviction may be quite different in the two types of cases, we can see why it is good that there are different standards of probability.

Often it is possible to gain more evidence to strengthen an argument. This is not to say that we should always insist on doing everything we can to strengthen the premise set before accepting the conclusion of an argument. Suppose you argue that the best way to leave a building is by taking the east stairs and jumping from the second story. The fact that we could obtain further evidence for your argument by looking up the architectural plans of the building online is irrelevant if the extra time spent doing so would mean that we are engulfed by flames.

In general, we may say that the more probable the premises make the conclusion, the better the argument meets the sufficiency requirement. Whether an argument meets the sufficiency requirement will depend on a number of practical matters such as the consequences of accepting an argument, and the cost of obtaining additional evidence.

## 7.2 Fallacies of Sufficiency

<p><b>Fallacy of Hasty Conclusion</b></p> <p>An argument contains this fallacy if the premise set (even if true) is insufficient to warrant the acceptance of the conclusion.</p> <p>Note: the remaining fallacies of sufficiency are specific forms of this fallacy. On quiz material, you should choose this fallacy only if none of the other six fallacies are appropriate.</p>	<p><b>Example 7.3</b></p> <p>“All the polar bears we saw at the zoo today are white. So, many polar bears are white.”</p>
<p><b>Fallacy of Hasty Generalization</b></p> <p>An argument contains this fallacy if the premise set (even if true) is insufficient to warrant the acceptance of the generalization.</p>	<p><b>Example 7.4</b></p> <p>“All the polar bears we saw at the zoo today are white. So, all polar bears are white.”</p>
<p><b>Fallacy of Affirming the Consequent</b></p>	<p><b>Example 7.5</b></p>

<p>This fallacy is committed when the necessary condition in a conditional argument is cited as sufficient for the conclusion.</p> <p>Note that the fact that it is cloudy is relevant to the conclusion that it is rainy. Imagine someone trying to prove to you that it is rainy. The fact that it is cloudy would provide some evidence that it is rainy, even though the presence of clouds is not in itself sufficient evidence.</p>	<p>P1: If it is rainy, then it is cloudy.  P2: It is cloudy.  C: So, it is rainy.</p>
<p><b>Fallacy of Denying the Antecedent</b></p> <p>This fallacy is present when the denial of the sufficient condition in a conditional argument is cited as sufficient for the conclusion.</p> <p>Note that the premise set is relevant to the conclusion in example 7.4. The fact that it is not rainy provides some evidence that it is not cloudy, even though the absence of rain is not sufficient for it not being cloudy.</p>	<p><b>Example 7.6</b></p> <p>P1: If it is rainy, then it is cloudy.  P2: It is not rainy.  C: It is not cloudy.</p>
<p><b>Post Hoc Fallacy</b></p> <p>This fallacy occurs when the fact that event A precedes event B in time is said to be sufficient evidence that A causes B.</p> <p>Although causes typically proceed effects in time, we can see in example 7.5 that establishing that one event proceeds the other in time is not sufficient to show that there is a causal relationship; in particular, it may simply be a coincident that I washed my car and then it rained.</p>	<p><b>Example 7.5</b></p> <p>P1: I washed my car.  P2: It then rained.  C: Washing my car caused it to rain.</p>
<p><b>Fallacy of Jumping from Correlation to Causation</b></p> <p>This fallacy occurs when the correlation of two event types, A and B, is cited as sufficient evidence that A causes B.</p> <p>As example 7.6 illustrates, even if two events are perfectly correlated, if unemployment always goes down after the Democrats win, this in itself does not show that a Democratic victory is the cause of reduced employment. For example, it might be the case that there is a business cycle where unemployment regularly goes up and down, and that high unemployment causes the Democrats to win.</p>	<p><b>Example 7.6</b></p> <p>P1: Every time the Democrats win, unemployment goes down.  C: The Democrats being in power causes lower unemployment rates.</p>
<p><b>Fallacy of Improper Sampling</b></p> <p>This fallacy occurs when the sample cited in the premise set does not properly represent the population cited in the conclusion.</p> <p>In example 7.7 we can see that the population described in the conclusion is women, that is, the conclusion says something about how women in general view their husbands' contribution to household chores. The sample, however, is taken from subscribers of <i>Women's Good Housekeeping Magazine</i>. We have no evidence that those that subscribe to this magazine are representative of women in general. Perhaps subscribers are wealthier than average, or they are in more "progressive" relationships. A better way to support the conclusion</p>	<p><b>Example 7.7</b></p> <p>P1: In a random telephone survey of subscribers, <i>Women's Good Housekeeping Magazine</i> found that 93% of all married women believe that their husbands do an equal amount of the household chores.  C: It is false that women think that men do not do an equal amount of the household chores.</p>

would be to take a random sample of women in general.

## Chapter 8: Accepting Premises: Questions of Logic and Language

### Material covered in this chapter

- 8.1 Fallacies in accepting premises
- 8.2 Logical considerations in accepting premises
- 8.3 Considerations of language in accepting premises

Recall that we said that with good arguments it is possible to answer “yes” to each of these questions:

1. Assuming that the premise set is acceptable, is the premise set relevant to the conclusion?
2. Assuming that the premise set is acceptable, does the premise set provide sufficient support for the conclusion?
3. Is the premise set acceptable?

A bad argument is one that answers “no” to one or more of these questions. In this chapter and the next we will examine arguments where the answer to question 3 is “no”. Since question 3 is so broad, I propose that we subdivide it into these two questions:

Is the premise set logically and linguistically acceptable?

Is the premise set evidentially acceptable?

In this chapter we will deal with the former question. I will first list some fallacies, and then discuss some general strategies for thinking about whether premises are logically and linguistically acceptable.

### 8.1 Logical and Linguistic Fallacies in Accepting Premises

<p><b>Fallacy of Begging the Question</b></p> <p>This fallacy is present when the conclusion is the same as a premise.</p> <p>In example 8.1, the conclusion and the premise are the same despite the different wording: ‘Darwinianism’ is simply another name for the ‘theory of natural selection’.</p>	<p><b>Example 8.1</b></p> <p>“You should believe in Darwinianism because the theory of natural selection is true.”</p>
<p><b>Fallacy of False Dilemma</b></p> <p>This fallacy is present when a premise fails to mention all the relevant alternatives.</p> <p>In example 8.2 the author conveniently neglects the alternative that he or she may be the guilty party.</p>	<p><b>Example 8.2</b></p> <p>“Detective Colombo: here is what happened. Only five of us were on the island: me, the victim, Andy, Betty and Charlie. So, the guilty party must</p>

	be Andy, Betty or Charlie.”
<p><b>Fallacy of Equivocation</b></p> <p>This fallacy is present when an argument appears successful only because of an ambiguous premise.</p> <p>In example 8.3, the premise only appears to adequately support the conclusion because of the ambiguity of the word ‘bank’. In one sense it may refer to a type of financial institution, in another sense it refers to the land adjacent to rivers. Presumably the radio report refers to the latter sense of the term, and the conclusion about wet money to the former sense of the term.</p>	<p><b>Example 8.3</b></p> <p>“I heard on the radio that the rains have swelled the river so much that the banks have been flooded. So, your money in the bank must be soaked.”</p>
<p><b>Fallacy of Vagueness</b></p> <p>This fallacy is present when an argument appears successful because of the vagueness of the premise set.</p> <p>In example 8.4, the term ‘bald’ is vague. It can mean anything from some loss of hair, to having no hair on one’s head. Since the premise is not more precise, it does not tell us whether the actors have some or no hair, we can’t adequately assess whether the premise supports the conclusion.</p>	<p><b>Example 8.4</b></p> <p>“The intern said that all the actors auditioning are bald. So, we won’t need to worry about how their hair looks, since they have none.”</p>
<p><b>Fallacy of Persuasive Definition</b></p> <p>This fallacy is present when a term is surreptitiously redefined to make an argument appear stronger.</p> <p>In example 8.5, the author redefines the word ‘anarchist’ without letting the audience know that the term has been redefined. (Normally it refers to the view that there is no legitimate political authority).</p>	<p><b>Example 8.5</b></p> <p>“We are all anarchists because anarchists are people who break the law, and we have all broken the law at one time or another. For example, who among us can say that they have never gone over the speed limit?”</p>

## 8.2 Logical Considerations in Accepting Premises

One logical consideration in accepting premises is the prescription that we ought to reject circular arguments. It is perhaps best to explain why we shouldn’t accept circular reasoning with an example. Suppose I argue, “Socrates is the greatest teacher because Socrates is the greatest teacher.” If you doubt the conclusion, “Socrates is the greatest teacher”, then you have reason to doubt the premise, “Socrates is the greatest teacher”. After all, the premise and the conclusion are the same; the premise adds nothing in way of support of the conclusion. On the other hand, if you believe the premise, then you have no additional reason to believe the conclusion, since the conclusion and the premise are one and the same. Rarely do circular arguments appear in such an obvious fashion; often the premise and conclusion express the same idea with different words. In the above example, the premise might be stated differently as: “No teacher equals or exceeds Socrates in terms of teaching ability.” The circularity in this instance would be a little less obvious, but the argument still commits the fallacy of begging the question, since the conclusion and premise express the same idea in different words.

As we have said, arguments attempt to give us reasons to believe or do something. Whether we ought to believe or do X will often depend on how plausible the alternatives are, and arguments that do not consider all the alternatives, in effect, rig the outcome. The associated fallacy is called “False Dilemma”, because often

arguments that commit this fallacy offer only two choices when there are in fact more options that should be considered, e.g., either you are a friend or an enemy, either you are a Republican or Democrat, either you are an atheist or a theist. In these instances there are other alternatives that might be considered: you might be an acquaintance, a social democrat, or agnostic.

In some cases there are only two relevant alternatives. The premise, either you are a friend or you are not a friend, covers all the possibilities. For not being a friend covers the case where you are an enemy, an acquaintance, or unknown to me. Note too that just because more than two alternatives have been given in an argument does not mean that all the relevant alternatives are present. In example 8.2 the author mentions three possible suspects but neglects to mention him or herself as a possible suspect.

### 8.3 Considerations of Language in Accepting Premises

Turning to considerations of language, it is important to note that almost every argument will contain instances of vague and ambiguous language. The reason is that arguments are made in human languages, and human languages are brimming with vague and ambiguous terms. For example, most terms that refer to material objects in our environment are vague. You might think the term ‘chair’ is not vague, since it is clear when something is a chair, and when it is not: we are not likely to confuse a chair with a refrigerator, for example. But think about this. Imagine your favourite four legged chair and then imagine cutting a centimetre off of each leg of the chair. Is it still a chair? Probably. Now imagine cutting another centimeter, and another centimeter, and each time asking whether it is a chair. At some point it may be hard to say whether it is a chair or not. It is not clear where exactly something stops being a chair. The same is true of ambiguity. If you flip through a dictionary, you will see that many terms have multiple meanings.

So, it should not be surprising then that the mere presence of vagueness or ambiguity is not sufficient to demonstrate that the fallacies of vagueness or equivocation are present. Consider this argument: “John has no hair, so John is bald. The announcer said that anyone who is bald is eligible for a prize. So John is eligible for a prize.” The fact that a premise of this argument, John is bald, is both vague and ambiguous does not make this a bad argument. The term ‘bald’ is vague because it is not clear where baldness starts. Despite this vagueness, there are clear examples of when someone is bald, including John: he has no hair. The term ‘bald’ is also ambiguous as it can mean (among other things) ‘forthright’ or ‘blunt’. It would be very uncharitable to think that the author is arguing that John is blunt because he has no hair. So, although ‘bald’ is ambiguous, this ambiguity presents no problem in the above example. Again, vagueness and ambiguity are common phenomena, and the associated fallacies only come into play when these phenomena are exploited to make a weak argument appear stronger.

Since language is often vague and ambiguous, arguments will sometimes employ definitions to clarify matters. There are different types of definitions. A reportive definition seeks to report how a term is commonly used; dictionaries are prime examples of repositories of reportive definitions. They tell us how words are typically used. Two common problems with reportive definitions is that they are too wide or too narrow. A reportive definition is too wide if it includes individuals that are not normally included under the term. A definition is too narrow if it excludes individuals that are normally included under the term. Consider this example: the definition of “bachelor” is “an unmarried person”. This definition is too wide because if it were true, then it would include females as part of the definition of bachelors. Since no female is a bachelor, the definition is too wide. Now consider the definition an “unmarried person” is a bachelor. This definition is too narrow: it excludes females. Females are among unmarried persons. It sometimes helps students to visualize definitions as lassoes. A good reportive definition of X will lasso all and only the things that X refers to. In the first example, the definitional lasso “bachelor means unmarried person” captures females in the lasso. The lasso is too wide, the definition captures too much, because it captures females. In the second case the lasso is too narrow, because it captures only males. A good definition of “unmarried person” should also capture females.

Sometimes a definition can both be too wide and too narrow. Consider this definition: “A Professor is someone who gives final exams.” This lasso is too wide because it will capture some non-professors, e.g., high school

teachers often give final exams, but they are not professors. On the other hand, the lasso is too narrow because it excludes those professors who do not give their classes final exams. (I'm told this happens). So, this definition is both too wide and too narrow.

Stipulative definitions are redefinitions of existing terms, or definitions for newly introduced terms. Often a stipulative definition is used to clarify ambiguity or vagueness in our ordinary terms. In some legal jurisdictions, for example, a 'child' is defined as a person under the age of 21. This clarifies the vagueness of the term 'child' as it is used in common parlance: it is not clear at what age someone stops being a child in our ordinary use of the term. It also clarifies an ambiguity: one sense of 'child' means 'offspring', e.g., "I am my mother and father's child."

Persuasive definitions pass themselves off as reportive definitions when in fact they are disguised stipulative definitions. In example 8.5, it looks like the author has reached a rather remarkable conclusion: we all unwittingly hold a very unpopular political philosophy: anarchism. Once we realize that the author has stipulated a new meaning for 'anarchism' the conclusion is not particularly impressive.

## Chapter 9: Accepting Premises: The Question of Evidence

### Material covered in this chapter

- 9.1 Premises based on common knowledge of the target audience.
- 9.2 Premises based on experience
- 9.3 Premises based on epistemic authority

We have seen one line of support for premises. In serial arguments a subconclusion works as a premise for a further conclusion, while the subconclusion itself has a subpremise set offered in support of it. It is clear that this cannot be a general model for accepting all premises. For if every premise itself requires a further premise in support, then either this process will go on forever, e.g., P1 requires P2 for support, and P2 requires P3 for support, and so on; or we will end up repeating ourselves (arguing in a circle). A good argument must have at least one "bottom level" premise—a premise that is not supported by further premises. Bottom level premises can be either main premises that are not supported by further premises, or subpremises that are not supported by further premises. Our question then is: When should we accept bottom level premises? We will examine three instances: common knowledge, experience and appeals to experts.

### 9.1 Premises Based on Common Knowledge of the Target Audience

For the most part, we have been thinking about evaluating the arguments of others. In thinking about when premises are acceptable it will help to turn the exercise around: let us think about constructing good arguments with acceptable bottom level premises. Consider these examples:

#### Examples 9.1-9.7: Candidate premises based on common knowledge.

- 9.1 The earth is moving thousands of miles per hour.
- 9.2 The earth is billions of years old.
- 9.3 Government officials should not steal public money.

9.4 A fetus deserves the same moral consideration as an adult person.

9.5 Marijuana should be legal.

9.6 The earth is the center of the universe.

9.7 There is a new pizza place in town.

Imagine the target audience is a typical university undergraduate class and you are asked to debate some topic. Premises 9.1-9.3 would be appropriate bottom level premises that would be accepted on the basis of common knowledge. Premises that are common knowledge do not require any additional support.

On the other hand, premises 9.4-9.7 will require some other form of support. There is significant disagreement about the moral status of the fetus, that is, its moral status is not a matter of common knowledge in the typical undergraduate class. The same is true of 9.5. Example 9.6 is an extraordinary claim that would take some very extraordinary evidence to convince people: you are not likely to find a single person in a university class who thinks 9.6 is true. Finally, 9.7 is probably not a matter of common knowledge: the fact that the restaurant is new probably means the existence of the pizza joint is not a matter of common knowledge.

The qualification that common knowledge is based on the target audience should not be overlooked. In societies with little contact with science and advanced technology, 9.1 and 9.2 may require additional support, that is, they could not be assumed to be common knowledge. On the other hand, these same cultures may accept 9.6. In a meeting of the amoralist club, 9.3 may not be common knowledge and require further support. Similarly, if you were giving an argument to the marijuana legalization club, you could safely assume that 9.5 was common knowledge. It would probably be safe to assume that 9.4 is common knowledge if you were presenting an argument at a Catholic Bishop's convention.

It should be emphasized that just because some of these premises would not be accepted as common knowledge, does not mean that they could not be premises in an argument, and even a bottom level premise. 9.7, as we shall see, might be an acceptable bottom level premise if based on experience. A controversial premise like 9.4 or 9.5 will probably require additional arguments to be acceptable, so they are not likely to be accepted as bottom level premises in many contexts.

## 9.2 Premises Based on Experience

Evidence obtained from our sense organs can be the evidential support for a bottom level premise. The fact that someone has seen, heard, tasted, felt, or smelt X is often good evidence that X is true. Consider this argument: "Juan and Juanita said they saw a new pizza place in town. You know John loves pizza, we should take him there for lunch." The acceptability of the premise, there is a new pizza place in town, is based on the experience of Juan and Juanita: they *saw* a new pizza place in town. Although it is not explicitly mentioned, it seems plausible that the premise, John loves pizza, is something you gained from experience: you have seen him enjoy pizza.

Of course not every premise that is said to be justified by experience is acceptable. Consider a similar issue: the question of creditability of eye-witness testimony often arises in courts of law. In both cases, the acceptability of what the experienter reports will depend on a number of factors including:

- the general reliability of the witness
- the witness' ability to experience what is being reported
- how many witnesses there are
- whether their reports are independent
- the plausibility of the claim

The ‘general reliability of the witness’ refers to things like whether the witness is known to be honest and sober. As for the ‘ability to experience what is being reported’, the question here is whether the experiencer might plausibly be thought to have had the opportunity to experience what is reported. We should probably doubt someone’s experiential report that they identified (with unaided vision) a person five miles away in a large crowd. Similarly, someone who claims to have eaten the best pizza in the world has probably overstepped the bounds of what they can experience: it is pretty hard to try all the pizza in the world. In general, the more witnesses who see something, the more confidence we should have that the premise is acceptable. In the example above, the fact that both Juan and Juanita saw the same thing should give us more confidence that it is true, than if we only had the testimony of one or the other. Independent reports are ones where those experiencing something do so separately, and where the witnesses do not confer with one another about what they saw. If Juan and Juanita drove in different vehicles at different times and both report to you the existence of a new pizza place, you can be more confident that it is true than if they saw the place while driving together.

Another general constraint on accepting premises based on experience is the plausibility of the claim being made. The more extraordinary a claim, the more extraordinary the evidence must be to support the claim. A new pizza restaurant in town is not something that unusual. Martians landing in the city square is unusual (to say the least). Juan’s testimony to the effect that he saw the new restaurant is sufficient in the former case; in the latter case it would probably be wise to hold off accepting Juan’s testimony about Martians until further evidence can be obtained.

### 9.3 Premises Based on Epistemic Authority

An epistemic authority is someone who has specialized knowledge about a particular area. (‘Epistemic’ means of, or related to, knowledge). Many students are familiar with this concept from writing academic papers. If you are writing for your anthropology class, and you claim that humans have occupied North America for more than 40,000 years, you might cite an epistemic authority to support this claim. In practice, this usually would be a reference to a paper published in a reputable academic journal. Appeals to epistemic authorities do not happen only in academic settings. An argument made to your spouse that your house needs new wiring might be based on a premise that the existing wiring is a fire hazard. This premise, let us suppose, is based on a report from an electrician. Most of us are not competent to make such judgments. Electricians, with years of training and practical experience, are in a position to make such judgments: they are epistemic authorities on the matter.

We identified some of the conditions for appealing to an epistemic authority in Chapter 6 in the fallacy of improper appeal to an epistemic authority above. Here are the conditions again:

- The authority must be identified.
- The authority must be respected in her field.
- The matter must be one in which there is a reasonable consensus amongst the relevant experts.
- The authority must be speaking about a matter in her field of expertise.

A premise that is accepted based on epistemic authority is only as good as the authority, hence the need to identify the authority. Identifying the authority makes it possible for your audience to check the authority’s credentials. Consider cases where the authority is not identified. You may rightly wonder whether you should believe the premise, since it is possible that the author simply made up the claim. Don’t take my word for it; there is good evidence to back up this claim. A recent study by a noted sociologist shows that 78.43% of all undergraduate essays simply make up epistemic authorities. You should not believe the appeal to an epistemic authority in the previous sentence because no authority has been identified. And in fact, I just made this statistic up out of thin air. If I had said, Professor Smith showed this in a study published in 2010 in the *Journal of Better Sociology Statistics*, then you could have checked my appeal to an epistemic authority. You would quickly find there is no such journal, and so have very good reason to doubt my appeal to an epistemic authority.

The condition that the authority must be respected in her field is perhaps obvious. If someone is not respected in their field it does not mean what they say is wrong. It does, however, point to the fact that we cannot accept a knowledge claim simply because they are in the field. It is possible, after all, for someone to get professional accreditation, to get a PhD or to become a licensed electrician, for example, and then lose his or her mind. On the other hand, the fact that someone is respected in their field shows that they have demonstrated their epistemic reliability to their colleagues.

The reason that there must be a reasonable consensus amongst the experts can be seen from the following example. You want to make an argument that appeals to the premise that abortion is immoral. You can find a number of experts that have claimed it immoral, but also a large number who deny that it is immoral. Choosing one expert over another is arbitrary in this instance. Rarely is there complete consensus in any field. You may find a few professors of biology that doubt that humans are descended from apelike ancestors, but the overwhelming majority of university biologists believe that we are descended from apes. There are a few climate scientists who deny that the earth is warming, or think that humans are not responsible for some of the global warming pattern. But the overwhelming majority of climate scientists believe that the earth is warming, and that humans are a major contributor to this pattern. (The popular press gives the few dissenters far more attention than the scientific community does).

A couple more comments about appeal to epistemic authority are warranted. The first is a matter of quantity: more is better (within reason, of course). Citing one author who concludes that humans are causing global warming is not as strong as citing three. At least as important is the quality of the citation: a statement made in a peer reviewed journal is more trustworthy, other things being equal, than popular press accounts of scientific research, or something overheard at a cocktail party. The peer review process ensures a greater likelihood that errors have been eliminated. Print books and journals tend also to be more reliable than most web-based material, since the former tend more often to be peer-reviewed than the latter. For example, there are many fine print books on critical thinking, and other things being equal, they would be more reliable than a website on critical thinking which is not peer reviewed. (Ahem).

## Chapter 10: Advanced Standardizing

### Material covered in this chapter

- 10.1 Identifying arguments
- 10.2 Individuating propositions
- 10.3 Counter considerations and counter arguments

### 10.1 Identifying Arguments

Thus far, we have primarily looked at arguments, but of course we use language to do more than argue. We use language to describe, to command, explain, tell jokes, to promise, and so on. This presents a problem, since people rarely explicitly announce their intention to argue. So one of the first tasks we face in applying our critical thinking skills to some piece of text or speech is to determine whether something is an argument or not.

We know that arguments are attempts to persuade us to accept a conclusion on the basis of reasons. This tells us that if we think some passage or speech is an argument we should be able to identify at least one premise and one conclusion. If we can't, then we should revise our estimation that we are dealing with an argument. But this is not sufficient for identifying an argument. We must also be sure that the author's intention is to argue.

Consider this passage: “Mark said that all humans are immortal, so Socrates is not human”. The author of this passage is not making an argument, but *describing* an argument made by Mark.

Arguments are easily confused with explanations. To help us understand explanations, it will be helpful to have a little bit of vocabulary. Like arguments, explanations can be divided into two components. The *explicandum* is the thing being explained, and the *explanans* is the thing that does the explaining. So, in the passage, “The tide goes in and out because of the gravitational pull of the moon”, the explicandum is “the tide goes in and out” and the explanans is “the gravitational pull of the moon.” The pull of the moon explains why the tide goes in and out.

The primary difference between arguments and explanations is the speaker’s intentions. In arguments the intention is to persuade. With explanations, the intention is to make understandable why something is the case. We can exploit this difference to help us think about tricky cases where a passage might be interpreted as either an argument or an explanation. Consider this example: “Car engines get hot because there is exploding gas inside.” Understood as an explanation, the explicandum is “Car engines get hot”. The explanans is “There is exploding gas inside”. Understood as an argument, the premise “There is exploding gas inside” is offered in support of the conclusion, “Car engines get hot.” Imagine a child asking why car engines get hot. If we think of the parent saying the above in response, then we should understand the passage as an explanation. The parent is not attempting to persuade that car engines are hot, but trying to make understandable why they are. Suppose a parent was trying to convince a child that things other than the stove get hot. The parent asserts the premise, “There is exploding gas inside” to support the conclusion, “Car engines get hot”.

Often a passage will contain several different uses of language, e.g., a single paragraph might contain a description, an explanation and an argument. I’m afraid that there is no easy decision-rule for deciding on any particular passage how it is best identified. In general, we should try to be as charitable as possible: we should look for a reconstruction that makes the most sense. As noted, this will involve correctly interpreting the author’s intentions—and this is not easy. We have all had the experience of misunderstanding someone’s joke as a serious statement.

## 10.2 Individuating Propositions

Standardizing requires identifying individual premises and conclusions. In this subsection we learn how to individuate, how to “chop up”, a passage into individual premises and conclusions. Many of the examples above provided the individuation of premises and conclusions, e.g., sometimes numbers were assigned to individual premises and conclusions in a passage. Obviously, rarely will authors number or otherwise “chop up” the premises and conclusions for you. Hence, this is an important skill to learn.

Each premise and conclusion we may think of as a ‘proposition’: the smallest unit of argumentation suitable for logical reconstruction. It will help to clarify propositions by contrasting them with sentences.

Some propositions are not presented as declarative sentences. For example, a rhetorical question is a declarative statement in disguise. Thus in the example “We should go to the concert tonight. Who wouldn’t want to see the greatest rock and roll band ever?” the second sentence has the surface appearance of being a question, but clearly the author intends to communicate the idea that everyone wants to see the greatest rock and roll band ever. So, for the purposes of standardization, we would rewrite the argument thus:

P1: Everyone wants to see the greatest rock and roll band ever.

C: We should go to the concert tonight.

Sometimes sentences and propositions are one and the same thing. Consider this argument once again: “All humans are mortal. Socrates is human. Socrates is mortal.” This argument contains three sentences, and each is a proposition.

Sometimes a single sentence contains two or more propositions. There are two cases we should consider. The first is where a sentence contains both a premise and a conclusion. Thus, the single sentence, “You should go to

class today since there is a quiz today”, contains two propositions, “You should go to class today”, and “There is a quiz today.” The second serves as a premise for the first. The second case where a sentence contains more than one proposition is when there are two premises in a single sentence. Consider this example: “It is likely that Karl Marx did not own a factory. He was poor, and a communist.” The sentence “He was poor and a communist can be broken down into two separate premises and standardized thus:

P1: Karl Marx was a communist.

P2: Karl Marx was poor.

C: It is unlikely that he owned a factory.

The reason the sentence can be broken down in this way is that in saying “P and Q” we are committed to the truth of both P and Q.

The same cannot be said for conditional sentences or disjunctive sentences (sentences with an ‘or’). If I say, “If it is rainy, then it is cloudy”, this cannot be broken down into two propositions “It is rainy” and “It is cloudy”. This would have the absurd consequence that every time I assert the conditional “If it is rainy, then it is cloudy” I am committed to it being rainy and cloudy. This is clearly false. Imagine a beautiful sunny summer day. When I say, “If it is rainy, then it is cloudy”, I am saying something true even though it is perfectly sunny outside. As we saw in Chapter 3, a conditional merely asserts that the antecedent is sufficient for the consequent, and the consequent necessary for the antecedent; not that the antecedent and the consequent are true.

Similar remarks apply to sentences with an ‘or’. If I say, “He is flying to London on Friday or Saturday”, this cannot be broken down into, “He is flying to London on Friday”, and “He is flying to London on Saturday.” For our purposes, conditional and disjunctive propositions cannot be broken down further.

### 10.3 Counter Considerations and Counter Arguments

Counter considerations are claims provided by an author that provide reasons *not* to believe the argument. Here is an example.

#### **Example 10.1 Example with counter considerations**

Although Senator Smith got caught having affairs, and despite the fact that he is drunk half the time, you should still vote for him. He is a member of the Labor Party, and this country needs every Labor senator it can get.

The author is attempting to persuade us that we should vote for Smith. The author begins with two counter considerations (CC): claims that work against this conclusion:

CC1: Senator Smith got caught having affairs.

CC2: Senator Smith is drunk half the time.

The words ‘although’ and ‘despite’ indicate that these claims are acknowledged by the author to count against the argument. It is a good idea to put the counter considerations at the beginning to keep track of their role in the argument. A complete standardization of the above passage is as follows:

CC1: Senator Smith got caught having affairs.

CC2: Senator Smith is drunk half the time.

MP1: The counter considerations do not outweigh the main argument.

P2: Senator Smith is a member of the Labor Party.

P3: This country needs every Labor senator it can get.

C: You should vote for Senator Smith.

It is clear a charitable understanding of the argument says that the author does not believe that the counter considerations outweigh the strength of the main argument, hence the missing premise (MP1). Any argument that puts forward counter considerations will have a premise (either stated or missing) to the effect that the counter considerations do not outweigh the main argument.

A counter argument is an argument that concludes that some other argument is defective.

### **Example 10.2: An example of a counter argument**

I can't believe you think we should vote for Senator Smith. The man is a moral degenerate: you admit he is a drunk and a philanderer. We should not have moral degenerates in parliament.

This argument challenges the previous argument. Specifically, it questions the missing premise: it argues that drunkenness and philandering are sufficient reason not to vote for the candidate.

It can be confusing when an author states both the argument and the counterargument in a single place. For example:

### **Example 10.3: Argument and Counter argument in a single passage**

Some say that we should not vote for Smith because he is a moral degenerate. I agree that he is a moral degenerate, but parliament members are supposed to represent all types of people: men, women, tall, short, able-bodied, disabled, all skin colors and moral degenerates. So, drunks and philanders also need a voice in Parliament, and Smith is just the representative for them.

In standardizing this we must be careful to separate out the argument and the counterargument.

#### **Argument:**

P1: Smith is a moral degenerate.

C: We should not vote for Smith.

#### **Counterargument:**

P1: All types of people should have representatives in parliament.

P2: Being a philanderer and a drunk is to be a type of person.

P3: Smith is a philanderer and a drunk.

C: We should vote for Smith.

