

Pinning Down Argument Structure

Introduction

Most of the examples of arguments used so far were relatively short and worded in a straightforward way; the reasoning was easy to follow and it was not difficult to find conclusions and the premises that support them. However, things are not always quite so clear. We sometimes have to investigate more closely to see the *architecture* of an argument. In this module, we look at the challenge of identifying various argument components and examine the multiplicity of ways in which attempts to persuade are structured.

Topics

These notes are divided into two topics:

1. *A Strategy for Standardizing and Diagramming Arguments (ASSDA).*
2. *Faithfulness and Charity in Argument Interpretation.*

Learning Outcomes

When you have completed this module, you should be able to meet the following learning outcomes:

- Find the main premise(s) and the main conclusion of an argument.
- Determine whether or not an argument contains subarguments and, if it does, find its sub-premise(s) and sub-conclusion(s).
- Identify various patterns of support.
- Understand the scope and degree of commitment in premises and conclusion.
- Identify and supply unstated elements in an argument (if any).
- Explain the importance of faithfulness and charity in argument interpretation.

Resources

All resources you need to complete this module will be provided to you. Aside from this document, the following are also required.

Reading 4.1	“Introducing <i>ASSDA</i> ” in M. M. Guirguis’s <i>Rational Persuasion: An Introduction to Informal Logic</i> , pp. 51-78.
Reading 4.2	“Tips for Argument Analysis” in G. Seay and S. Nuccetelli’s <i>How to Think Logically</i> , pp. 94-97.

1. A Strategy for Standardizing and Diagramming Arguments (ASSDA)

Unless we know how an attempt to persuade is structured—what its *main conclusion* is, which claims constitute its *main premises*, whether or not it is an *extended* argument that contains *subarguments*, and what *patterns of support* it contains—we will not be able to evaluate it in any effective way. The first reading assigned in this module provides a process of analyzing argument structure and a detailed strategy for standardizing and diagramming arguments. We shall call this strategy *ASSDA*.

Reading 4.1: “Introducing ASSDA”

A thorough, example-based introduction to argument standardization and diagramming is given by Mazen M. Guirguis (your course developer). Go and read this selection now, leaving out the exercises at the end. (We will return to the exercises later.) Be sure to *highlight* and *take notes* as you proceed, and pay special attention to the following prompts:

- the three features and thirteen steps of *ASSDA*;
- unstated premises and conclusions;
- linked, convergent, and linear patterns of support;
- extended arguments and their components; and
- qualifying expressions and expressed degrees of commitment.

2. Faithfulness and Charity in Argument Interpretation

A person who is presenting an argument has a duty to be as clear as possible. Unfortunately, clarity in expression is a skill that people have in various degrees, and this simple fact creates a counter-obligation on the part of the evaluator (namely, *you*). In interpreting an argument, you should make every effort to be fair and unbiased. This means *not* weakening the argument by adding material that would make it less credible or deleting material that would otherwise make it more credible. The idea is to achieve *faithfulness* in argument interpretation.

But there are those who would go further, insisting that *charity* in argument interpretation is the proper attitude to have. What exactly is the relationship between these two principles? The following reading assignment will help you answer this question.

Reading 4.2: “Tips for Argument Analysis”

The roles of faithfulness and the principle of charity in argument interpretation are discussed in a short reading by Seay and Nuccetelli. Go and read this excerpt now, *highlighting* and *taking notes* as you proceed.

Summary

In this module, you have had the opportunity to learn how to standardize and diagram arguments using the *ASSDA* method. You worked on the following Learning Outcomes:

- Find the main premise(s) and the main conclusion of an argument.
- Determine whether or not an argument contains subarguments and, if it does, find its sub-premise(s) and sub-conclusion(s).
- Identify various patterns of support.
- Understand the scope and degree of commitment in premises and conclusion.
- Identify and supply unstated elements in an argument (if any).
- Explain the importance of faithfulness and charity in argument interpretation.

The next module introduces the requirements for argument cogency.

Exercise Set

An exercise set related to the application of *ASSDA* is provided in the Guirguis reading. Go now and complete this exercise set. Examine each given passage slowly and carefully, applying what you have learned rather than just guessing, and work through each of the steps of *ASSDA* methodically. Avoid the temptation to skip steps even if they seem simple or obvious. Check your answer to each question with the one provided before going on to the next argument.

Study Questions

The following *study questions* are intended to test your knowledge of the material covered in this module. The answers to these questions are not provided, but they are all readily available in the activities and readings assigned. Finding these answers is not difficult, but it is up to you to do so.

Answering the study questions at the end of each module is the best way to prepare for the tests and the final exam. Even though these questions *will not be graded*, you should not think of them as optional, but as part of a deliberate strategy to perform well in this course.

1. What are the three *features* and thirteen *steps* of *ASSDA*?
2. Explain why background information, editorial remarks, and personal opinions are omitted when standardizing an argument.
3. What is an *extended* argument?
4. Describe the difference between *linked*, *convergent*, *linear*, and *mixed* support, and state why deductive arguments are associated with a linked support pattern.
5. State and describe the criteria used in justifying the addition of an unstated component in an argument.
6. Explain why an unstated premise will *link* to one or more stated premise(s) in an argument, and why an unstated subconclusion will follow *validly* from the subpremise(s) that support it.
7. Distinguish and give some examples of *qualifying expressions* and expressions that indicate *degrees of commitment*.
8. Are there logical meanings associated with the various qualifications and degrees of commitment? Why is it important to preserve such expressions in the standardization of an argument?
9. In what respects do the principles of *faithfulness* and *charity* differ, and why are they important in argument analysis?
10. What should a critical thinker do in a case where *faithfulness* and *charity* come apart?

References

Guirguis, M. M. (n.d.). Introducing *ASSDA*. In *Rational Persuasion: An Introduction to Informal Logic* (pp. 51-78). Unpublished Manuscript.

Seay, G., & Nuccetelli, S. (2008). Tips for Argument Analysis. In *How to Think Logically* (pp. 94-97). Toronto, ON: Pearson Education.

Types of Persuasive Arguments

Introduction

Sometimes arguments provide good support for their conclusions and sometimes they don't. That's why there are such things as *cogent* arguments and *non-cogent* arguments. By the time you finish this course, you should be able to extract an argument from a piece of prose and evaluate its strengths and weaknesses. This process involves four basic steps:

1. Recognizing whether or not a piece of prose contains an argument.
2. Determining the type of argument presented.
3. Standardizing and diagramming the argument to reveal its architecture.
4. Deciding whether or not the argument is cogent by applying the appropriate evaluative procedure.

Spotting the presence of an argument is the first step in the process. If there is an attempt to persuade, we proceed to the second step: determining what *kind* of argument we are dealing with. This is important because different types of arguments have different structures and require different methods of assessment. Hence, the second step is crucial for correctly carrying out the steps that follow.

We have already completed step one by learning to distinguish arguments from opinions, descriptions, and explanations. This module is concerned with step two: *determining the type of argument presented*.

Topics

These notes are divided into three topics:

1. *A Tree Chart of Argument Types.*
2. *Deductive Arguments.*
3. *Non-Deductive Arguments.*

Learning Outcomes

When you have completed this module, you should be able to meet the following learning outcomes:

- Identify the various types and subtypes of arguments, and distinguish deductive from non-deductive arguments.
- Explain why a valid argument can never have true premises and a false conclusion.

- Understand the relationship between validity, soundness, and truth, and give examples of valid arguments that have various truth/falsity combinations.
- Compare and contrast inductive, abductive, and conductive arguments.

Resources

All resources you need to complete this module will be provided to you. Aside from this document, the following are also required.

Video 3.1	“Critical Thinking—Fundamentals: Validity” Produced by Wireless Philosophy.
Video 3.2	“Critical Thinking—Fundamentals: Soundness” Produced by Wireless Philosophy.
Video 3.3	“Critical Thinking—Fundamentals: Truth and Validity” Produced by Wireless Philosophy.
Video 3.4	“Crash Course Philosophy (Episode 3): How to Argue—Induction & Abduction” Produced by PBS Digital Studios.

1. A Tree Chart of Argument Types

As you can see from Figure 3.1 below, there are several kinds of arguments which fall broadly into two families—*deductive* and *non-deductive*. Within the deductive family we find *valid* arguments, of which some may be *sound*. Within the non-deductive family we have three types of arguments—*inductive*, *abductive* (or *IBE*, “*i*nference to the *b*est *e*xplanation”), and *conductive* (or *LOR*, “*l*ist of *r*easons”). Inductive arguments divide further into four subtypes: *inductive* (or *statistical*) *generalizations*, *statistical syllogisms* (or *statistical applications*), *causal inductive*, and *analogical arguments* (or *arguments from analogy*) ... The rest of this document is essentially an introduction to the members listed on this argument family tree.

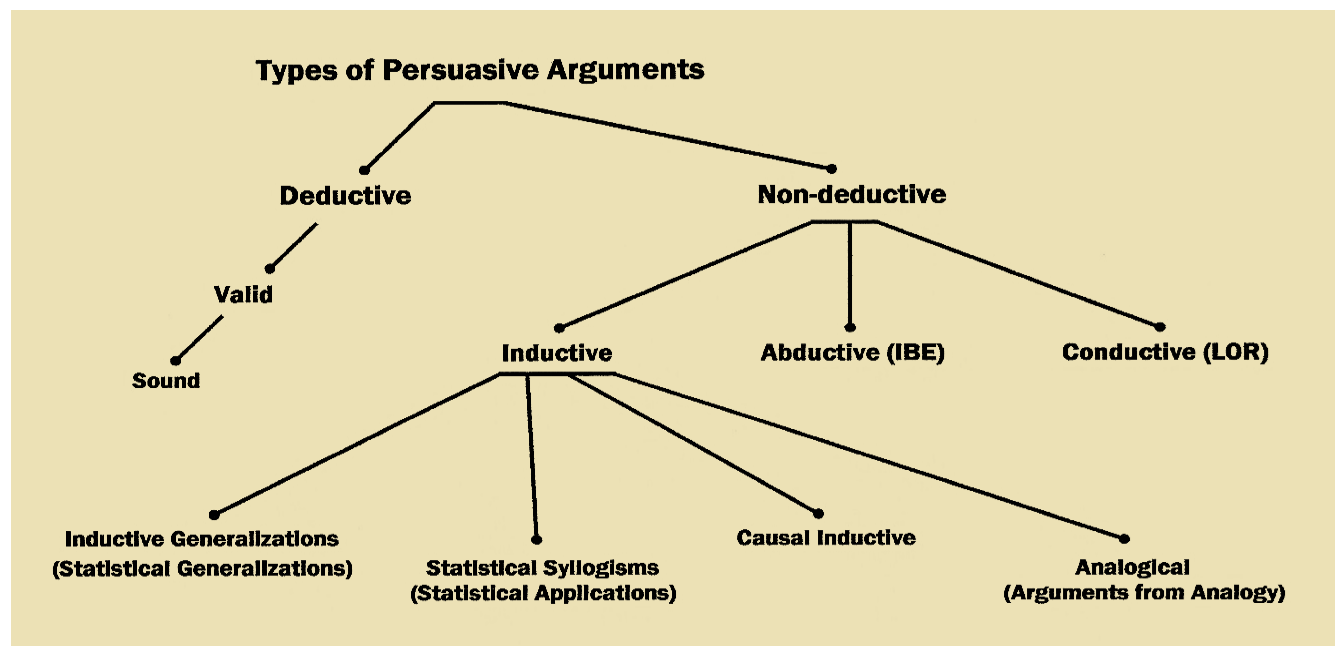


Figure 3.1

The Argument Family Tree (Guirguis, n.d.)

2. Deductive Arguments

What, then, is a *deductive* argument? It is typical to define deduction with reference to the arguer's *intentions*. Hence, we can define a *deductive argument* as an argument that is *intended by the arguer* to be a proof, that is, to provide a guarantee of the truth of the conclusion given that the argument's premises are true. In other words, in a deductive argument, the premises are *intended to provide* such strong support for the conclusion such that, if the premises are true, then it would be impossible for the conclusion to be false. An argument which meets this standard is called a *deductively valid* (or simple *valid*) argument. If a valid argument also happens to have factually true premises, then this argument is said to be *sound*.

2.1 Validity and Soundness

The basic unit of analysis in logic is the *proposition*. Propositions are English sentences that have *truth-value*, and there are exactly two truth-values a proposition may have: *true* (*T*) or *false* (*F*). Hence, a proposition is a statement that makes a claim of which we can assert truth or falsity. The following are all examples of propositions. (*Which ones are true and which are false?*)

- Leonardo da Vinci was born in 1452.
- 9 is a prime number.
- The moon has a solid iron-rich core.
- Horses are marsupials.
- A proposition is a statement that makes a claim of which we can assert truth or falsity.

Of course, not *all* English sentences are propositions. The following are examples of *non-propositions*. (*Can you explain why?*)

- What is your name?
- Please close the door.
- Damn!
- Hello.
- Stick it up your ear.

As you might have already noticed, arguments in standard form consist entirely of propositions. In a valid argument, the truth of the premises provide just about the strongest kind of support that can be had for the truth of the conclusion; and the strongest kind of support that can be had for a conclusion is nothing short of a *guarantee*. For example, one would be putting forth a valid argument if one were to present any of the following:

Example 1:

- [1] All cancerous tumours show signs of uncontrolled cell-growth.
 - [2] Not all tumours show signs of uncontrolled cell-growth.
-
- [3] Not all tumours are cancerous.

Example 2:

- [1] All Greeks are men.
 - [2] Aristotle was Greek.
-
- [3] Aristotle was a man.

There are a number of ways of defining *validity*, including the following:

- An argument is valid if and only if it can *never* take you from true premises to a false conclusion.
- An argument is valid if and only if its premises are so related to its conclusion such that, *if* the premises are true, then conclusion *must* be true as well.
- An argument is valid if and only if *assuming* the truth of its premises *guarantees* the truth of its conclusion.
- An argument is valid if and only if it is *impossible* (*inconceivable*, *unimaginable*) for all its premises to be true and its conclusion false.

All of these definitions are equivalent. They all say that in a valid argument there is no possible situation, real or imagined, in which the premises can be true and the conclusion false. So to determine whether or not an argument is valid, you need to figure out whether there *may be* a set of circumstances, any way the world *could possibly be*, in which all the premises are true and the conclusion false. If there is, the argument is *invalid*; if not, the argument is valid.

Examples 1 and 2 above are both valid arguments because they adhere to the definition of validity: in both cases, the premises, if true, guarantee the truth of the conclusion. Interestingly, the argument in example 2 is valid even though its first premise is false. That's because validity is a *structural* property of arguments; it has to do only with the relationship between the premises and the conclusion, not with the truth of any specific statement. Thus a valid argument may have *false premises*, or a *false conclusion*, or even *both*. The only assignment of truth-values that is *impossible* for a valid argument to have is for all its premises to be true and its conclusion false. (*Can you explain why?*)

Example 3:

- [1] All Prime Ministers of Canada speak Arabic.
 - [2] All those who speak Arabic also speak French.
 - [3] Jean Chretien is the current Prime Minister of Canada.
-
- [4] Jean Chretien speaks French.

All of the premises in this argument are false but its conclusion is true. This, however, is irrelevant to the question of validity. What is important is whether the premises, *if true*, guarantee the truth of the conclusion. Accordingly, we must take the premises of the argument as they are, *assume* they are true regardless of the facts, and then ask ourselves if the conclusion *necessarily* follows from them. Doing this will reveal the kind of *relationship* a given set of premises has to the conclusion of an argument, and it is *that* relationship which determines validity. Following this procedure for example 3, we note that if it is a fact that all Prime Ministers of Canada speak Arabic *and* all those who speak Arabic also speak French *and* Jean Chretien is the current Prime Minister of Canada, then Jean Chretien *must* speak French. There is just no way for all three premises to be true and the conclusion false, and this is *exactly* what it means for an argument to be valid.

Example 4:

- [1] The capital of Fiji is Tbilisi.
 - [2] Tbilisi is a city in South Dakota.
 - [3] South Dakota has only one city.
-
- [4] All cities in South Dakota are the capital of Fiji.

Here again is a rather odd argument, where *every* statement made (premises and conclusion) is false. Is it valid? As in the previous example, we are not concerned with the truth or falsity of particular propositions, but with the relationship the premises have to the conclusion. If we *assume* all three premises to be true, we will have no choice but to accept the conclusion. This means that the truth of the premises *guarantees* the truth of the conclusion, so the argument is valid.

By now, it should be clear that the meaning of the word *valid* as it is used in logic is very different from the meaning used in everyday language. Speaking with one other, we often use the word *valid* synonymously with *strong*, *persuasive*, or *convincing*. But as we can see from the last two examples, a valid argument need not be strong or persuasive. In fact, some valid arguments are downright ridiculous:

Example 5:

- [1] Pigs understand calculus.
 - [2] Anything that understands calculus can fly.
-
- [3] Pigs can fly.

It would be a mistake, then, to claim that an argument is strong or persuasive simply because it happens to be valid. *The opposite side of that coin is also true.* Just because an argument happens to be *invalid* does not mean that it is weak or faulty. All non-deductive arguments, for instance, aim to present *circumstantial* evidence leading to a particular conclusion, but no absolute guarantee that the conclusion is true. Nevertheless, the evidence presented in such arguments, although not beyond the shadow of a doubt, may still be very powerful. As it happens, *non-deductive* arguments are much more prevalent than deductive ones, and many non-deductive arguments are quite compelling, even though they are all invalid by definition (more about that in Topic 3).

If you understand what a valid argument is, you should readily understand what a *sound* argument is. This is because a sound argument just is a particular kind of a valid argument: it's a *valid argument that has all true premises*. Hence, an argument is sound if and only if,

- *it is valid, and*
- *all of its premises are true.*

Example 6:

- [1] All mammals have lungs.
 - [2] Some sea creatures are mammals.
-
- [3] Some sea creatures have lungs.

Both premises of the above argument are true and the truth of the conclusion follows directly from them. Hence, the argument is both valid and sound.

Video 3.1: “Critical Thinking—Fundamentals: Validity”

You will be watching a number of videos produced by *Wireless Philosophy*. The first—narrated by Paul Henne of Duke University—deals with validity. It summarizes and reinforces many of the ideas discussed above. Go and watch the video now and be sure to do so *actively*, which means paying attention and taking detailed notes. You may view the video as often as you like.

At the end of the video, you are given an argument and asked whether it is valid or invalid. Write down your answer with an explanation on a piece of paper. We will return to this argument in question 17 of the exercise set.

Video 3.2: “Critical Thinking—Fundamentals: Soundness”

The second video you are encouraged to view deals with soundness; it is narrated by Arron Ancell of Duke University. Go now and *actively* watch the video as many times as you like.

2.2 Validity, Soundness, and Truth Conditions

As previously defined, an argument is *valid* if and only if:

- it can *never* take you from true premises to a false conclusion;
- its premises are so related to its conclusion such that, *if* the premises are true, the conclusion *must* also be true;
- *assuming* the truth of its premises *guarantees* the truth of its conclusion;
- it is *impossible* (*inconceivable*, *unimaginable*) for all its premises to be true and its conclusion false.

It is worth emphasizing that the definition of validity *does not require* either the premises or the conclusion of a valid argument to be true. It merely states that *if* the premises are true, the conclusion is *guaranteed* to be true. Essentially, the definition tells us *what happens* to the conclusion *if* the premises are (or assumed to be) true, but it does not demand that either the premises or the conclusion actually *be* true. It should be possible, then, to have valid arguments with a variety of truth/falsity combinations of premises and conclusion.

In fact, it *is* possible. Example 5 is an instance of a valid argument with all false premises and a false conclusion. *But what other combinations of truth or falsity of premises and truth or falsity of the conclusion can a valid argument have?* To answer that question, we must first determine the total number of unique truth/falsity combinations possible for *any* argument.

We know that an argument consists of two parts: *premise(s)* and *conclusion*. Taking the premises first, we find three truth-value possibilities. Specifically, the premises may be:

- (i) All TRUE
- (ii) All FALSE
- (iii) MIXED (at least *one* true premise and at least *one* false premise)

The conclusion of an argument may be:

- (a) TRUE
- (b) FALSE

Combining the premises side with the conclusion side gives us *six* combinations in total. Hence, all arguments, regardless of type, *must* fall into one of the following categories:

- (i a) The premises are TRUE and the conclusion is TRUE
- (i b) The premises are TRUE and the conclusion is FALSE
- (ii a) The premises are FALSE and the conclusion is TRUE
- (ii b) The premises are FALSE and the conclusion is FALSE
- (iii a) The premises are MIXED and the conclusion is TRUE
- (iii b) The premises are MIXED and the conclusion is FALSE

As it happens, the definition of validity eliminates only *one* of these combination, (i b), which is to say that a valid argument can *never* have all true premises and a false conclusion. But valid arguments can (and often do) have any one of the other five combinations. To illustrate:

Example 7:

Combination (i a)—the premises are TRUE and the conclusion is TRUE.

- [1] To be a novelist one must have written at least one novel. (T)
- [2] J. K. Rowling is a novelist. (T)

- [3] J. K. Rowling has written at least one novel. (T)

Example 8:

Combination (i b)—the premises are TRUE and the conclusion is FALSE.

It is impossible for any argument with this combination to be valid.

Example 9:

Combination (ii a)—the premises are FALSE and the conclusion is TRUE.

- [1] Wolfgang Amadeus Mozart walked on the surface of the moon. (F)
- [2] All those who walked on the surface of the moon died before the age of 45. (F)

- [3] Wolfgang Amadeus Mozart died before the age of 45. (T)

Example 10:

Combination (*ii b*)—the premises are FALSE and the conclusion is FALSE.

- [1] Vladimir Putin was born in Cleveland Ohio. (F)
 - [2] All those born in Cleveland Ohio are allergic to peanuts. (F)
 - [3] All those allergic to peanuts are madly in love with Hillary Clinton. (F)
-
- [4] Vladimir Putin is madly in love with Hillary Clinton. (F)

Example 11:

Combination (*iii a*)—the premises are MIXED and the conclusion is TRUE.

- [1] Paris is a city in France. (T)
 - [2] All cities in France have the Eiffel Tower. (F)
-
- [3] Paris has the Eiffel Tower. (T)

Example 12:

Combination (*iii b*)—the premises are MIXED and the conclusion is FALSE.

- [1] If the sky is sometimes blue, then Justin Bieber has a Ph.D. in climatology. (F)
 - [2] The sky is sometimes blue. (T)
-
- [3] Justin Bieber has a Ph.D. in climatology. (F)

Note that while it is perfectly correct to say, “All humans are creatures that have lungs,” the converse of this proposition, “All creatures that have lungs are human” is clearly incorrect. Similarly, while it is correct to say that valid arguments can fall into any of the above five categories, we must be careful to remember that *not all arguments that fall into these categories are automatically valid*. In order for an argument to be valid, it must meet the definition of validity; that is, it must be such that, *if* its premises are true, its conclusion is *guaranteed* to be true. For example, the following is an argument with mixed premises and a true conclusion—*combination (iii a)*—but is *not* valid:

Example 13:

- [1] There are ancient pyramidal structures outside of Egypt. (T)
 - [2] Sir Winston Churchill was a three-time Wimbledon tennis champion. (F)
-
- [3] *Fear and Trembling* is a philosophical work written by Søren Kierkegaard. (T)

An argument is *sound* if and only if it meets two conditions: *first*, it must be valid; *second*, all of its premises must be true. Now, in how many of the six truth-value combinations can a sound argument fall? Let us take them one by one.

Combination (i a)—all premises are *TRUE* and the conclusion is *TRUE*.

Yes. *This combination is possible for a sound argument, which will always have true premises and a true conclusion.*

Combination (i b)—all premises are *TRUE* and the conclusion is *FALSE*.

No. *Arguments with this combination cannot be sound because they cannot be valid.*

Combination (ii a)—all premises are *FALSE* and the conclusion is *TRUE*.

No. *While arguments with this combination may be valid, they cannot be sound because they do not have all true premises.*

Combination (ii b)—all premises are *FALSE* and the conclusion is *FALSE*.

No. *While arguments with this combination may be valid, they cannot be sound because they do not have all true premises.*

Combination (iii a)—the premises are *MIXED* and the conclusion is *TRUE*.

No. *While arguments with this combination may be valid, they cannot be sound because they do not have all true premises.*

Combination (iii b)—the premises are *MIXED* and the conclusion is *FALSE*.

No. *While arguments with this combination may be valid, they cannot be sound because they do not have all true premises.*

So a sound argument can only have all true premises and a true conclusion. But again we must be careful here: *not all arguments that have true premises and a true conclusion are automatically sound*, as the following example demonstrates.

Example 14:

- [1] There are 12 months in a year. (T)
- [2] There are 24 hours in a day. (T)

- [3] Albert Einstein had three children. (T)

Although all propositions in this argument are true, it is *invalid*. Since soundness requires validity, the argument is *non-sound* as well.

Video 3.3: “Critical Thinking—Fundamentals: Truth and Validity”

The third video you are required to view deals with truth, validity and soundness; it is narrated by Julianne Chung of Yale University. Go and *actively* watch the video now. As you do, answer the following questions:

- What are the four possibilities of truth/falsity and validity/invalidity identified in the video? Draw a diagram of your own to represent these possibilities.
- Explain why a valid argument with a false conclusion *must* have at least one false premise.

2.3 Entailment

To say that a sentence A entails another sentence B is to say that if A is true, B must be true as well. In other words, A entails B if and only if the truth of A guarantees the truth of B , in which case there will be no way for A to be true and B false. Here are some examples:

1. A : Larry killed a mockingbird.
 B : Larry killed a bird.
2. A : It is 9:00 am in Vancouver right now.
 B : It is not midnight in Vancouver right now.
3. A : Mary is taller than Paul.
 B : Paul is shorter than Mary.

In each of the three pairs above, sentence A entails sentence B : if it is true that Larry killed a mockingbird, then it must also be true that Larry killed a bird (since a mockingbird *is* a bird); if it is true that it is now 9:00 am in Vancouver, then it must also be true that it is not midnight now in Vancouver; and if it is true that Mary is taller than Paul, then it must also be true that Paul is shorter than Mary.

There are a few things to keep in mind about entailment. First, this property does not require the sentences involved to actually be true. Larry, we may suppose, is a very peaceful, nature-loving man who has never killed anything in his life, much less something as beautiful as a mockingbird. In this case, both $1A$ and $1B$ would be false. Nevertheless, $1A$ still entails $1B$, since the truth of $1A$ (irrespective of the actual fact of the matter) *guarantees* the truth of $1B$ (irrespective of the actual fact of the matter).

Second, entailment is often a *one-way* relationship. Just because A entails B , we cannot (and should not) automatically assume that B entails A . For instance, by killing a mockingbird we can be assured that Larry has killed a bird ($1A$ entails $1B$), but killing a bird does not assure us that Larry has killed a mockingbird, since he may have killed an owl or a penguin ($1B$ does not entail $1A$). Similarly, $2A$ entails $2B$, but $2B$ does not entail $2A$. (*Can you explain why?*) The third pair, however, does have a *two-way* entailment relationship: if Mary is taller than Paul, Paul must be shorter than Mary ($3A$ entails $3B$); and if Paul is shorter than Mary, Mary must be taller than Paul ($3B$ entails $3A$) ... To sum, the existence of a one-way entailment relationship between a pair of sentences does not imply the existence of a two-way entailment relationship. Bi-directional entailment must be investigated, not assumed.

Finally, the relationship of entailment does not exist only between pairs of sentences; it can also exist between a *set* of sentences and a *single* sentence. A set of sentences \mathfrak{S} entails a single sentence A if and only if *the truth of all members of \mathfrak{S} guarantees the truth of A* . For instance, the set of sentences $\{“A \text{ is identical to } B,” “B \text{ is identical to } C,” “C \text{ is identical to } D”\}$ entails the sentence “ A is identical to D .” This means that if *all* the sentences in this set are true, the sentence “ A is identical to D ” must also be true. Here are some further examples:

- $\{“To \text{ be a novelist one must have written at least one novel},” “J. K. Rowling \text{ is a novelist}”\}$ entails “ $J. K. Rowling \text{ has written at least one novel}.”$
- $\{“Wolfgang Amadeus Mozart \text{ walked on the surface of the moon},” “All those who \text{ walked on the surface of the moon died before the age of } 45”\}$ entails “ $Wolfgang Amadeus Mozart \text{ died before the age of } 45.”$

- {“Vladimir Putin was born in Cleveland Ohio,” “All those born in Cleveland Ohio are allergic to peanuts,” “All those allergic to peanuts are madly in love with Hillary Clinton”} entails “Vladimir Putin is madly in love with Hillary Clinton.”
- {“Paris is a city in France,” “All cities in France have the Eiffel Tower”} entails “Paris has the Eiffel Tower.”
- {“If the sky is sometimes blue, then Justin Bieber has a Ph.D. in climatology,” “The sky is sometimes blue”} entails “Justin Bieber has a Ph.D. in climatology.”

Just as in the case of entailment between two single sentences, entailment between a set of sentences and a single sentence does not require that any of the propositions involved be true. All that matters is *what happens if all the sentences in the set are true*: if the truth of all members of \mathfrak{S} guarantees the truth of A , then \mathfrak{S} entails A . It’s that simple!

We have defined a valid argument as one where, *if* all its premises are true, then its conclusion *must* be true as well. In a valid argument, the truth of the premises *guarantees* the truth of the conclusion, regardless of the facts of the matter. Do you notice a connection between this definition of *validity* and the one used to define *entailment*?

If you suspect that they are similar, you are absolutely correct. In fact, what we have called *entailment* is the name of that relationship between premises and conclusion that makes an argument valid; it is that bond between premises and conclusion whereby, if the former are all the true, the truth of the latter is guaranteed. Hence, we have a new way of defining validity to add to our previous list:

Various Definitions of Validity

- An argument is valid if and only if it can *never* take you from true premises to a false conclusion.
- An argument is valid if and only if its premises are so related to its conclusion such that, *if* the premises are true, the conclusion *must* be true as well.
- An argument is valid if and only if *assuming* the truth of its premises *guarantees* the truth of its conclusion.
- An argument is valid if and only if it is *impossible* (*inconceivable*, *unimaginable*) for all its premises to be true and its conclusion false.
- **An argument is valid if and only if the set comprising its premises *entails* its conclusion.**

Since sound arguments are valid, the set comprising the premises of a sound argument will also entail its conclusion.

3. Non-Deductive Arguments

It would be illogical to accept the premises of a valid deductive argument and yet deny its conclusion. But *non-deductive* arguments are different. In a non-deductive argument, the premises give support, but not *conclusive* support, to the conclusion. This means that it is *always* possible to accept the premises of a non-deductive argument and yet reject its conclusion, because the conclusion of a non-deductive argument always goes beyond what the premises convey. As such, *all non-deductive arguments are invalid*.

Most of the reasoning we do every day is non-deductive in nature. Virtually all scientific reasoning is also non-deductive. (Hence, strictly speaking, it is incorrect to say that a scientific theory has been *proven*!) Non-deductive reasoning is *probabilistic* rather than *absolute*. Anytime you conclude that an event is *probably* going to happen, or is *unlikely* to occur, you are reasoning non-deductively.

Figure 3.1 above shows various types of non-deductive arguments. We will have occasion to discuss some of these later in the course. For now, a brief description of these arguments will suffice.

3.1 Inductive Arguments

Inductive arguments are those in which the premises and the conclusion are *empirical*—having to do with regularities observed or experienced—and in which the inference to the conclusion is based on an assumption that the observed regularities will continue. There are four kinds of inductive arguments:

- **Inductive (or Statistical) Generalizations**

These are arguments in which the premises describe a property shared by a number of cases and a generalization is made in the conclusion stating that all (or most) further cases will also have that same property. Inductive generalizations usually follow the pattern of making a claim about a *target population* based on testing that claim on a *sample*. If the generalization is to be considered legitimate, the sample must be *representative* of the target population. Examples of this type of argument include evaluating the efficacy of a new drug in a human trial and taking a poll before an election to find out which political faction is likely to win.

- **Statistical Syllogisms (or Statistical Applications)**

In these arguments we reason from characteristics generally present (or absent) within a certain *reference class* to characteristics likely (or unlikely) to belong to proper subsets (including single individuals) within that class. These arguments come in one of the following two forms:

[1] Most <i>As</i> have feature <i>C</i> .	
[2] <i>q</i> is an <i>A</i> .	
<hr/>	
[3] <i>q</i> probably has feature <i>C</i> .	

[1] Few <i>As</i> have feature <i>C</i> .	
[2] <i>q</i> is an <i>A</i> .	
<hr/>	
[3] <i>q</i> probably does not have feature <i>C</i> .	

- **Causal Inductive Arguments**

According to Trudy Govier (2010, p. 286):

A causal inductive argument is an inductive argument in which the conclusion is a claim that one thing causes another. Examples of causal claims are “Clogged arteries cause heart attacks,” “A rough surface produces friction, which lessens speed,” and “Exercise during heat causes sweating.” In such arguments, people offer evidence about two phenomena, or two sorts of phenomena, in an attempt to explain an effect by stating its cause. When we know causal relationships we are in a position to explain and predict certain phenomena. Knowing what causes thunderstorms, for instance, allows us to understand the physical interactions they involve. Causal understanding also permits us to predict such storms, which, in turn, provides a measure of control over the effects they have on human activities.

Determining the cause of an event is not always easy. In fact, causal inductive arguments are often conducted through a process of elimination. Hence, if a *correlation* is found between *A* and *B*, one of the following will be true:

- 🎯 *A* is the cause of *B*.
- 🎯 *B* is the cause of *A*.

- ✚ The correlation between A and B is a coincidence.
- ✚ A third factor, C , causes both A and B , but A and B are not themselves causally connected.

In order to establish that *any* of these four options is the case—for example, that A is the cause of B —we must eliminate the other three possibilities. That is the *only* way in which a strong causal inductive argument can be made.

- **Analogical Arguments (or Arguments from Analogy)**

An argument from analogy begins by using one case (usually agreed on and relatively easy to understand) to illuminate or clarify another case (usually less clear), then seeks to justify a conclusion about the second case on the basis of considerations about the first. The basis of drawing the conclusion is the *relevant similarities* between the two cases, which are regarded as showing a commonality of structure between them. An example of an analogical argument might be one friend advising another, “*Take Advil if you have a headache. I use it all the time and it works like a charm for me. It’ll work for you, too.*”

3.2 Abductive (IBE) Arguments

Abductive arguments are those in which a hypothesis, H , is inferred from a set of data, D , on the grounds that it offers the *best available explanation* of that data. All such arguments have the following form:

- [1] D exists.
 - [2] H_1, H_2, H_3, \dots would all explain D .
 - [3] H_n offers the best explanation of D .
-
- [4] H_n is probably true.

In order for a hypothesis to be included among those listed in premise [2] it must fulfill two fundamental conditions. First, H_n must be *plausible*, which means that the hypothesis must be consistent with what we already know about how the world works. Second, H_n must be *falsifiable* (which is not the same as *false*). To be falsifiable means that we are able to ascertain the conditions which would make H_n fail. This is important because, unless these conditions are well defined, we would not be able to effectively test H_n ; and in the realm of science an untestable hypothesis is essentially useless.

But an abductive argument is more than just a list of plausible hypotheses; it is an inference to the *best* explanation. Accordingly, premise [3] must be defended in a secondary argument (otherwise known as a *subargument*)—i.e., one must provide convincing reasons that H_n is the best hypothesis of the bunch. This is typically done by showing that the candidate hypothesis has the following additional three characteristics:

- H_n must be the *most plausible* of those available, which means that it shows the greatest consistency with what we already know.
- H_n has the *most explanatory power*—i.e., the hypothesis not only explains the greatest amount of data from the set collected, but also makes the clearest predictions.
- Finally, H_n must be the *simplest to use* of those available. The “simplest to use” condition is referred to as *Occam’s Razor*, which is a logical principle attributed to the mediaeval philosopher William of Occam (or Ockham). The principle states that when there are two competing theories that make exactly the same

predictions, the simpler one is always better. Occam's Razor also goes by the name of the *principle of parsimony*. It directs us to choose from a set of otherwise equivalent models the one that admits no more causes of things than are sufficient to explain the phenomenon under consideration, and never to make assumptions unnecessarily.

3.3 Conductive (LOR) Arguments

Conductive (or *list of reasons*) arguments are ones in which the pattern of support is *convergent*. The premises in convergent structures are put forward as being *separately relevant* to the conclusion. None of these premises by itself is meant to be sufficient to accept the conclusion, but when considered in aggregate they are intended to provide a strong case. Conductive arguments are quite common and we meet them often. Here is an example:

There are three good reasons why everyone ought to oppose the easy availability of abortion. First, such easy availability turns a medical procedure into a commercial enterprise, with make-profit abortion clinics springing-up everywhere. Second, such easy availability is part of a dehumanizing ideology, which treats human life as expendable. Finally, such easy availability promotes loose sexual morals.

You might be inclined to disagree with the arguer's views, but the *type* of argument offered is unmistakable: it is a conductive argument in which three distinct reasons are meant to collectively support the conclusion.

Video 3.4: “Crash Course Philosophy (Episode 3): How to Argue—Induction & Abduction”

The last video assigned is the third episode of *Crash Course Philosophy*, which deals with induction and abduction. Go and watch the video now and be sure to do so *actively*. Answer the following questions as you proceed.

- Explain in your own words Nelson Goodman's *Grue* thought-experiment and its significance to induction.
- How are *abduction*, *interlocutors*, *counterargument*, and the *Socratic Method* defined in the video?

You will eventually learn how to assess arguments and see for yourself that the *cogency* of a defended position is independent of whether that defense is deductive or non-deductive. In the meantime, let us emphasize once again that in logic the word *valid* refers only to a *relationship of direct inference* between the premises of an argument (which may or may not actually be true) and the conclusion of the argument (which may or may not actually be true). Thus to say that an argument is *valid* does not in any way imply that it is strong or convincing. Furthermore, to say that an argument is *invalid* does not suggest that it is weak or easily refuted. In fact, invalid arguments can be very strong, much more so than some deductive ones:

Example 15:

- [1] All Czech citizens are eight feet tall.
 - [2] All things eight feet tall drink Pilsner beer.
-
- [3] All Czech citizens drink Pilsner beer.

Example 16:

[1] The odds of winning the Lotto 649 are about 1 in 13½ million.

[2] The next time *you* play the Lotto 649 you will not win.

One of the above arguments is deductively valid, the other is non-deductive and invalid. Which of the two do you find more persuasive?

Summary

In this module, you have had the opportunity to learn about the two main families of arguments and to recognise their members. You worked on the following Learning Outcomes:

- Identify the various types and subtypes of arguments, and distinguish deductive from non-deductive arguments.
- Explain why a valid argument can never have true premises and a false conclusion.
- Understand the relationship between validity, soundness, and truth, and give examples of valid arguments that have various truth/falsity combinations.
- Compare and contrast inductive, abductive, and conductive arguments.

In the next module, you will be learning how to diagram argument structures.

Exercise Set

Determine whether each of the following arguments is deductive or non-deductive. Before you look at the answer make sure you first think through the passages slowly and thoughtfully. Make sure to apply what you are learning rather than taking a guess.

1. This pasture can support three sheep per acre and we have 500 acres. So there's room enough for our 800 sheep.
2. Our neighbour's lights are on, so he must be at home.
3. We are fully entitled to assert that this law is constitutional. The reasons are plain. Surely, our foremost constitutional experts are not all wrong. It is clear, however, that either this law is validated by our constitution or Section 21 has been radically misinterpreted by the lower court. As you know, if that section is so misinterpreted, our foremost constitutional experts are indeed all mistaken.
4. Whether or not God exists is one of the things we will never know in this life. After all, the question of the existence of God has been considered by some of the best minds since time immemorial. Neither a satisfactory proof of God's existence nor a convincing proof that God does not exist has been produced in spite of the great skill of those who have put life's labour to the task.
5. I bet you value your mind more than your legs. Here's why: if you had no legs, you could still have a good time. If your mind was totally gone, you could not have a good time. People usually value the things they need to have a good time more than they value the things they can do without and still have a good time.
6. Marijuana should not be legalized. That's because sustained use of marijuana worsens a person's memory, and nothing that adversely affects one's mental abilities should be legalized.
7. Young women who eat foods rich in animal fat may be increasing their risk of breast cancer, a new study has found. Researchers have long suspected a link between fatty diets and breast cancer, but previous studies couldn't establish one. This new study, a large one involving more than 90,000 nurses, found no link between breast cancer and fats from plants, such as olive oil. But it did find that women who ate more red meat and high-fat dairy products showed a significantly increased risk of getting the disease.
8. She never takes her eyes off him in a crowd, and she is continually restless when he is out of town. At any opportunity, she will introduce his name in a conversation. And no other man has ever occupied her attention for so long. You can tell she is in love with him.
9. Either the university budget will increase or the quality of its library holdings will be undermined. If the university budget increases, the opportunities for students will be better. If the quality of the university library holdings is undermined, then great care will be needed to protect its reputation. So either the opportunities for students will be better or great care will be needed to protect the university's reputation.
10. I think Bill is annoyed, because he tenses up whenever he sees me and never invites me for coffee the way he used to. Although he still says *hello* and we work fairly effectively together, he just seems annoyed.

Determine whether each of the following arguments is valid or invalid.

11. Medical school does not seem to be in Jamie's future, for one needs an 80% average in science courses to be accepted into one, which is something Jamie hasn't got.
12. The gas in the chamber did not expand. From this we can infer that the temperature was not increased, for we know that, if the temperature of any gas is increased while the pressure is kept constant, it will expand.
13. Ski resorts will not make large profits this winter. For while they will make a fortune if it snows heavily, the long-range weather forecast predicts a dry season.
14. You will do well at golf, for if you can concentrate under pressure, as you can, you have got the game beat.
15. The theory of creation must be true. For scientists have found that there are inaccuracies in carbon dating, and that is just what we would expect if the theory of creation were true.
16. The whale is sometimes described as a big fish. But this could not be right, for we know that all whales are mammals and fish are not.
17. All fruit is a chair. Square is a chair. Therefore, square is a fruit.
18. Either Russia will take Crimea or it won't. If it does, Putin will be humiliated by the sanctions that the West will impose on his country. If Crimea is not taken, Putin will be humiliated in front of his own people by appearing weak and indecisive. So Putin will definitely be humiliated.
19. A computer cannot cheat in a game, because cheating requires deliberately breaking rules in order to win. A computer cannot deliberately break rules, because it has no freedom of action.
20. Ever since history has been recorded, the sun has risen every day. Therefore, the sun will rise tomorrow.

Determine in each of the following sentence-pairs whether or not A entails B and whether or not B entails A .

21. A Harry is a wizard and Ron is a Muggle.
 B Ron is a Muggle and Harry is a wizard.
22. A Harry is a wizard and Ron is a Muggle.
 B Ron is a Muggle.
23. A Ottawa is the capital city of Canada.
 B Canada is in North America.
24. A Bears are dangerous animals.
 B Bears are dangerous animals or Robins are dangerous birds.
25. A Some lawyers are rich.
 B Some female lawyers are rich.

Determine in each of the following whether or not set \mathcal{S} entails sentence A .

26. \mathcal{S} {“If the sun rises tomorrow, then Vancouver is a small city,” “If Vancouver is a small city, then China is a big country,” “If China is a big country, then Jill works at SFU”}
 A If the sun rises tomorrow, then Jill works at SFU.
27. \mathcal{S} {“Some lawyers are rich people,” “Some rich people are women”}
 A Some lawyers are women.
28. \mathcal{S} {“Bertrand Russell has red hair,” “All mathematicians have red hair”}
 A Bertrand Russell is a mathematician.
29. \mathcal{S} {“If it rains tomorrow, we will not go on the picnic,” “We will go on the picnic”}
 A It will not rain tomorrow.
30. \mathcal{S} {“Either Tom likes tennis or Tom likes mountain biking,” “If Tom likes tennis, then he owns a tennis racket,” “If Tom likes mountain biking, then he owns a mountain bike,” “Tom does not own a tennis racket”}
 A Tom owns a mountain bike.

Identify what kind of non-deductive argument is given in each of the following.

31. When I put bread in the toaster it does not work. In case there is a selected side for one slice, I check and move the bread from the one side to the other, and the toaster still does not work. So the problem can't be that I put the bread in on the wrong side. When I check to make sure the toaster is plugged in, I find that it is. What can be the cause of this failure? It may be that the outlet I am using is controlled by a switch in the wall. I change the switch and the toaster works. So probably the reason that it did not work before is that the switch controls the outlet.
32. In a patch of rainforest in Brazil, approximately 1 square kilometer in size, it has been calculated that for each tree that is removed by selective logging, 27 other trees that are 10 centimeters or more in diameter are severely injured, and 40 meters of road need to be created. Experts have estimated on the basis of this sample that it will take 70 years for selectively logged forests to again resemble the state they were in when the selective logging was done. Therefore if 400 square kilometers of rainforest were to be logged in this way, approximately 10,800 trees of more than 10 centimeters in diameter would be severely injured. Furthermore, 16,000 meters of road would need to be created. And the rainforest would not recover for some 28,000 years.
33. In seeking protection from ABC's creditors in bankruptcy court, Sabbo Reef (chairman of ABC Company) is like the young man who killed his parents and then begged the judge for mercy because he was an orphan. During the last three years, Reef has stripped ABC of its most valuable assets and then pleaded poverty because the shrunken structure was losing money.
34. We keep using oil in abundant quantities. We know we cannot keep doing that given that oil is going to run out. We know that using oil as we do makes us vulnerable to foreign powers and increases the national debt.

We know that we have to develop alternative technologies and lifestyles. You can see for these reasons that we know that we need to change. Yet we are unable to act on that knowledge. All this supports my claim that our consumption of oil amounts to an addiction.

35. According to reports in July 2003, some 10 percent of the students accepted for university residence space at McMaster University and Wilfrid Laurier University for the fall of 2003 would not be able to take their place in residence. John is a student about to attend Wilfrid Laurier University, and he was accepted for residence. He has nothing to worry about, because the risk of his not finding that space is low.
36. During the earthquake in China in the spring of 2008, some 6,000 schools were destroyed. By contrast, government buildings in the earthquake area survived intact. What was responsible for the comparative vulnerability of the schools? The matter is clear: corruption of local officials, who permitted shoddy workmanship. Thousands of children died as a result.
37. Usually the Santa lie, befitting Christmas, is a white one. For starters, the lie is only temporary. You tell kids about Santa now, but you'll straighten them out later. The deception isn't forever. And the deception is a mild one. You don't take a falsehood and call it truth; you take a fiction and call it truth—a smaller distortion. This means the loss of the illusion is gentler. When kids are older they don't lose Santa entirely, they just think of him in a different way. Finally, the deception is good for kids. Believing in Santa adds magic and excitement to Christmas; the anticipation is keener, the delight sharper. Parental love is fine and even profound, but a gift from the North Pole is far more exotic.
38. Using low-calorie food products actually makes people gain weight. Why? They don't have the satisfaction that comes from consuming sugars and fats and, in addition, they eat more because they believe these foods will not be fattening.
39. Barney's fingerprints were on the gun found by Fred's body, a shirt in Barney's size, said by his wife to belong to Barney, was found at the scene of the crime, and DNA testing showed that Barney's DNA matched that found on blood stains on the sleeve of the shirt. Therefore, Barney probably murdered Fred.
40. You can get a large audience together for a strip-tease act—that is, to watch a girl undress on the stage. Now suppose you came to a country where you could fill a theatre simply by bringing a covered plate onto the stage and then slowly lifting the cover so as to let everyone see, just before the lights went out, that it contained a mutton chop or a bit of bacon, would you not think that in that country something had gone wrong with the appetite for food? (Lewis, 1952, p. 75)

Answers to Exercise Set

1. This argument is *deductive*.
2. This argument is *non-deductive*.
3. This argument is *deductive*.
4. This argument is *non-deductive*.
5. This argument is *non-deductive*. The key word here is ‘*usually*’ in the last sentence. If it were to be replaced with ‘*always*,’ that would make the argument deductive.
6. This argument is *deductive*.
7. This argument is *non-deductive*.
8. This argument is *non-deductive*.
9. This argument is *deductive*.
10. This argument is *non-deductive*.
11. This argument is *valid*.
12. This argument is *invalid*. The temperature of the gas may have been increased, but perhaps the pressure was not kept constant. Since the premises may be true and the conclusion false, the argument cannot be valid.
13. This argument is *invalid*. This argument is invalid, because (i) the possibility of making huge profits without snow is still open, and (ii) long-range weather forecasts may be wrong.
14. This argument is *valid*.
15. This argument is *invalid*. The first premise does not rule out the possibility that inaccuracies in carbon dating are consistent with other theories of the origin of life besides the theory of creation. Thus it does not follow from the fact that carbon dating is inaccurate that the theory of creation is true.
16. This argument is *valid*.
17. This argument is *invalid*. It is quite possible for square to share with fruit the property of being a chair without being a fruit itself. Consider the following parallel argument, “All brilliant philosophers have lungs. Donald Trump has lungs. Therefore, Donald Trump is a brilliant philosopher.” The utter invalidity of this argument should be clear to everyone!
18. This argument is *valid*.
19. This argument is *valid*.
20. This argument is *invalid*. This is a non-deductive argument, so it is invalid by definition.
21. A entails B , B entails A .
22. A entails B , B does not entail A .
23. A does not entail B , B does not entail A .
24. A entails B , B does not entail A . The key is in the word ‘or.’ Any “or” claim always has two parts (e.g., “ X or Y ”) and in order for that claim to be true, *at least one* of its two parts must be true (so X must be true or Y must be true.) This means that if we know for sure that X is true, we also know for sure that “ X or Y ” is true. Hence, “Bears are dangerous animals” entails “Bears are dangerous animals or Robins are dangerous birds.” On the other hand, knowing that “ X or Y ” is true only tells us that at least one of the two parts of the claim is true, but it does not tell us which one. This means we can’t infer X from “ X or Y ,” and we can’t infer Y from “ X or Y .”

Hence, “Bears are dangerous animals or Robins are dangerous birds” does not entail “Bears are dangerous animals.”

25. A does not entail B , B entails A .
26. \mathfrak{I} entails A .
27. \mathfrak{I} does not entail A . The truth of “Some lawyers are rich people” and “Some rich people are women” does not guarantee the truth of “Some lawyers are women.” Imagine a world where all lawyers are male and some of these male lawyers are rich. In that same world there also happens to be a number of rich women doctors. This is a case where “Some lawyers are rich people” would be true, “Some rich people are women” would be true, but “Some lawyers are women” would be false. Since it is *possible* for the members of \mathfrak{I} to be true and A false, \mathfrak{I} does not entail A .
28. \mathfrak{I} does not entail A . Just because Bertrand Russell shares the property of having red hair with all mathematicians does not mean that he is a mathematician himself. Review again the answer to question 17.
29. \mathfrak{I} entails A .
30. \mathfrak{I} entails A .
31. Abductive (IBE).
32. Inductive Generalization.
33. Inductive Analogy.
34. Conductive (LOR).
35. Statistical Inductive.
36. Causal Inductive.
37. Conductive (LOR).
38. Causal Inductive.
39. Abductive (IBE).
40. Inductive Analogy.

Study Questions

The following *study questions* are intended to test your knowledge of the material covered in this module. The answers to these questions are not provided, but they are all readily available in the activities and readings assigned. Finding these answers is not difficult, but it is up to you to do so.

Answering the study questions at the end of each module is the best way to prepare for the tests and the final exam. Even though these questions *will not be graded*, you should not think of them as optional, but as part of a deliberate strategy to perform well in this course.

1. Define *deductive* and *non-deductive* arguments. Which type of argument is stronger and why?
2. Using original examples, define every member of the non-deductive family of arguments.
3. Explain *validity* and *soundness*.
4. What are the four possibilities of truth-falsity and validity-invalidity identified in the “Critical Thinking—Fundamentals: Truth and Validity” video? Draw a diagram of your own to represent these possibilities.
5. Explain why a valid argument with a false conclusion *must* have at least one false premise.
6. Are invalid arguments weak? Explain your answer.
7. Define the property of *entailment* and explain its relationship to *validity* and *soundness*. What does it mean for set \mathfrak{S} to *entail* sentence A ?
8. Give original examples of valid arguments that have:
 - (i) all true premises and a true conclusion;
 - (ii) all false premises and a true conclusion;
 - (iii) all false premises and a false conclusion;
 - (iv) mixed premises and a true conclusion; and
 - (v) mixed premises and a false conclusion.
9. Explain in your own words Nelson Goodman’s *Grue* thought-experiment and its significance to induction, as presented in the “Crash Course Philosophy (Episode 3): How to Argue—Induction & Abduction” video.
10. How are *abduction*, *interlocutors*, *counterargument*, and the *Socratic Method* defined in the “Crash Course Philosophy (Episode 3): How to Argue—Induction & Abduction” video?

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Arguments and Non-Arguments

Introduction

Arguments are found where there is some controversy or disagreement about a subject and people try to resolve that disagreement rationally. When one puts forward an argument, one offers reasons to try to persuade others that his or her beliefs are correct. The objective of this course is to give you the tools required for a fair and accurate evaluation of such *attempts to persuade*. Since human communication is not made up exclusively of arguments, a necessary first step is to learn to distinguish arguments from non-arguments. This is what this module is about.

Topics

These notes are divided into three topics:

1. *Arguments and Opinions.*
2. *Premise and Conclusion Indicators.*
3. *Descriptions and Explanations.*

Learning Outcomes

When you have completed this module, you should be able to meet the following learning outcomes:

- Distinguish arguments from non-arguments and, in particular, from opinions, descriptions, and explanations.
- Identify argument premise(s) and conclusion.
- Recognize and give examples of premise and conclusion indicators.
- Distinguish different types of explanation, including explanations of causes, purpose, and meaning.

Resources

All resources you need to complete this module will be provided to you. Aside from this document, the following is also required.

Reading 2.1	“Making Room for Argument” in L. A. Groarke and C. W. Tindale’s <i>Good Reasoning Matters! A Constructive Approach to Critical Thinking</i> , 5 th ed., pp. 1-12, 14-20, 22-25.
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1. Arguments and Opinions

Philosophers are *conceptual analysts* who assess arguments that touch upon many different issues. Thinking critically is not just about finding fault with these arguments (even though finding weaknesses in expressed views is part of what good critical thinkers do); rather, it is about the *development of good reasons* for the positions we hold. Principles of good reasoning form the technical foundation of all branches of philosophy, and argument analysis forms the technical foundation of all good reasoning.

What, then, is an argument? An *argument* is an attempt to persuade, composed of one or more claims (called *premises*) intended to support, or provide evidence for, a further claim (called the *conclusion*). Thus, to take Aristotle's favourite example, if one were to say:

- [1] All men are mortal.
- [2] Socrates is a man.

- [3] Socrates is mortal.

one would be giving an argument. Sentences [1] and [2] are the premises of that argument, and [3] is the conclusion.

Arguments come in different types, but all arguments, regardless of type, must have at least *one* premise; there is no upper limit on the number of premises an argument may have. If there are no premises at all, no *reasons* given in support of a position, then there is *literally* no attempt to persuade. Similarly, all arguments must have a conclusion. If there is no expressed conclusion, no implicit or explicit claim that is defended, then there is *literally* no attempt to persuade. So every argument must have at least one premise and a conclusion.

Sometimes we encounter arguments that seem to have more than one conclusion, as in the following example:

- [1] Justice is the fundamental feature of the human species.

- [2] Those who are deliberately unjust reject the essence of what they are.
- [3] Those who are just affirm their humanity.

This argument has a single premise that supports two conclusions. While this is not technically wrong, it does make the job of evaluating the argument more cumbersome. For this reason, there is a convention in logic of having exactly *one* conclusion per argument, no more and no less. We deal with an argument that has more than one conclusion by separating it into different arguments, each with a single conclusion supported by the same set of premises, and then considering these arguments independently. Doing so for the example above yields:

- [1] Justice is the fundamental feature of the human species.

- [2] Those who are deliberately unjust reject the essence of what they are.

and ...

- [1] Justice is the fundamental feature of the human species.

- [2] Those who are just affirm their humanity.

Not all human speech is made up of arguments. We all make claims about matters of which we do not have full knowledge. An *opinion* is a belief, often (but not always) held with a low degree of confidence. When we express mere opinions, we are usually aware that we cannot fully defend them by citing reasons or providing evidence. Of course, arguments too contain opinions, but the difference between arguments and mere opinions is that claims made in arguments are *defended*, while claims that form mere opinions are not. As such, mere opinions are not attempts to persuade.

Sometimes people are unwilling or unable to defend their views. Having beliefs that we cannot fully justify is not necessarily problematic, as long as we are *aware* of their limitations and are willing to reassess our commitment to them when more information becomes available. What is irrational, however, is not being able to differentiate opinions that are well grounded from opinions that lack adequate evidence. Here, it is apt to reiterate what was said in the previous module notes:

Opinions are not hard to come by ... and almost everyone who has an opinion will, if prompted, attempt to defend it by saying why it is a correct one ... It's all about *defending* one's opinion. Simply having a point of view is no great achievement. The achievement, rather, is in having a point of view that can be defended with *robust reasoning*. That is the short definition of a *good argument* ...

2. Premise and Conclusion Indicators

The examples of arguments given so far have been rather neat, but arguments do not usually come prepackaged in such a tidy way. More often, they are embedded in a piece of prose from which they must be *extracted*. To properly assess arguments it is useful (with complex arguments, essential) to put them in the premise-conclusion form exemplified above. Doing so is called *standardizing* the argument. To *standardize* an argument, we separate and number the premises, each one on a different line; the conclusion is also numbered and stated following a horizontal line (read as '*therefore*') that separates it from the premises.

We can be aided in standardizing an argument by some verbal cues. Certain *indicator words* typically suggest that what follows is a premise (e.g., *because*), while others typically introduce conclusions (e.g., *therefore*). The following is a list of common premise indicators:

- *because*
- *since*
- *follows from*
- *as shown by*
- *given that*
- *on the grounds that*
- *for the reason that*
- *as indicated by*
- *may be inferred from*
- *may be derived from ...*

Examples of common conclusion indicators include:

- *therefore*
- *thus*

- *so*
- *hence*
- *it follows that*
- *in conclusion*
- *accordingly*
- *proves that*
- *indicates that*
- *demonstrates that*
- *consequently ...*

Indicator words are only rough guides, however. Sometimes an argument is presented without them and sometimes these words function in a way that does not introduce either a premise or a conclusion. Moreover, not every piece of discourse is an argument. As noted, some passages may be mere opinions; others may be *descriptions* or *explanations*. Special attention must be given to distinguish arguments from explanations, since indicator words may also appear in the latter. In short, the presence of indicator words does *not* guarantee the presence of an argument; indicator words are helpful only *after* a passage has been deemed to be an argument.

3. Descriptions and Explanations

A *description* is a report that tells us the state of something. Descriptions may be given of the physical characteristics of objects and locations; of events, circumstances, and the mental states of individuals. In contrast to arguments, descriptions are not attempts to persuade, since they do not defend any point of view; they have neither premises nor a conclusion. Consider the following two passages:

Terry Fox was a great Canadian. To be a great Canadian one must accomplish a great thing for society, and Terry Fox did exactly that. One way to accomplish a great thing for society is to help in finding a cure for a terrible disease. Terry fox bravely undertook this challenge by running across Canada to support cancer research. All this leads me to say that Terry Fox was a great Canadian.

Sometimes we see a cloud that's dragonish; A vapour sometime like a bear or lion, A tower'd citadel, a pendant rock, A forked mountain, or blue promontory, With trees upon't, that nod unto the world, And mock our eyes with air.
(Shakespeare, 1623, Act IV, Scene XIV)

The first passage is clearly an attempt to defend a particular point of view (can you identify the main conclusion?) by providing specific reasons (can you identify the premises?), so it is an argument. In the second passage, on the other hand, no position is expressed, no reasons given or evidence offered; it is just a description of the fanciful objects we sometimes see.

Another important distinction to make is between arguments and *explanations*.

As we have seen, in an argument, premises are put forward as grounds to justify a conclusion as true. In an explanation ... claims are put forward in an attempt to render a further claim understandable—to offer an account as to why it is true. Explanations are offered on the assumption that the fact, situation, or event being explained exists, and the question is why or how it came into existence. A fundamental difference between arguments and explanations is that in arguments, premises are intended to provide reasons to *justify* a conclusion whereas, by contrast, in explanations claims are put forward to show how a phenomenon came to be. In an explanation, someone tries to *[clarify]* why some claim is true, whereas in an argument a person tries to *demonstrate that* it should be accepted. (Govier, 2010, pp. 13-14)

Because explanations also use indicator words, distinguishing them from arguments may in some cases be challenging. But recognizing different *types* of explanations should make the task easier. *Explanations by purpose* offer an account of why something makes sense by relating it to human motives. For example, we might give an account of why a mother with three sons is having another baby by saying that she *wants* a daughter. This identifies her motives for having a fourth child. Another type of explanation is involved when we give the meanings of words, which we typically do by referring to their synonyms. These are *explanations of meaning* or *semantic explanations*. For example, we can identify what the word *sibling* means by saying that a sibling is a brother or a sister.

Finally we have *causal explanations*, which are accounts showing, or attempting to show, how an object, fact or event came to be the way it is. Whereas arguments defend a position using evidence, causal explanations delineate cause-effect relationships. Here is an example:

Three of the chair's four legs were badly damaged and missing screws. So the chair collapsed under the weight of its occupant.

In this example, the word *so* introduces a statement describing what is explained: the chair's collapse. It is *already assumed* that the chair collapsed, and what is said offers an explanation of *how* this unfortunate event came to be. The passage does not contain an argument: there is no attempt to provide evidence to establish the chair's collapse as a fact. The word *so* in this instance does not link a conclusion to a premise. Rather, it connects a *statement of cause* (three eroded legs with missing screws) to a *statement of effect* (the collapse of the chair).

Of the three types of explanations we are considering, *explanations by purpose* and *explanations of meaning* are easily distinguished from arguments, since they carry very distinctive information. *Causal explanations* are more likely to be confused with arguments. In order to avoid this potential confusion, it is important to keep in mind the different *functions* arguments and explanations have: arguments are put forward to *defend a position with evidence*; explanations are given to *clarify a situation by providing information*. Simply ask yourself:

- *What is the point of what the writer (or speaker) is saying?*
- *Is he or she attempting to defend a position by providing evidence or to clarify a cause-effect relationship?*

What is required here is something that we already do successfully every day. We normally have little trouble understanding the intentions of those with whom we communicate. Adopting the same common-sense approach to the question of arguments versus explanations is the best approach to take.

Once we have identified a passage as an argument, finding the *main conclusion* is usually a straightforward matter. The main conclusion is the ultimate claim the arguer is endorsing, the *centre of gravity* around which everything else in the passage revolves. To find it, ask yourself some basic questions:

- *What is the central point that the arguer is trying to make?*
- *What is the underlying purpose behind what he or she is saying?*
- *If one had to distill the entire passage into a single fundamental assertion, what would that be?*

Finding the *main premises* of an argument is also usually a straightforward matter. The questions to ask here are:

- *What reasons or evidence does the arguer give to back up the main conclusion?*
- *Do these reasons support the conclusion separately, or are they intended to work in conjunction with other pieces of information?*

Note that the task before you is not to decide whether or not you *agree* with the arguer's reasons, but only to identify what the arguer *intends* those reasons to be. If you are ever in doubt about whether or not a claim is meant as a premise, the following trick may be useful:

- *read the main conclusion out loud,*
- *say BECAUSE,*
- *then read the potential premise out loud.*

Doing this should give you some indication of whether or not the potential premise *makes sense* as a reason for the conclusion.

Speeches and texts that do not contain arguments can be categorized as *non-arguments*. We've already noted that *mere opinions*, *descriptions*, and *explanations* are not attempts to persuade. Further examples of non-arguments include *exclamations*, *questions*, and *jokes*. A single *conditional statement*—i.e., a statement of the form, “If ... , then ... ”—is also not an argument, but it may be *part* of an argument as a premise or a conclusion.

Reading 2.1: “Making Room for Argument”

Arguments are the bread and butter of philosophy. In the opening chapter of *Good Reasoning Matters*, Leo A. Groarke and Christopher W. Tindale introduce the basic elements of arguments and situate them within the context in which they occur. Go and read this chapter now, *highlighting* and *taking notes* as you proceed.

As you go through the reading, answer the following questions:

- What is the *overconfidence effect* and how is it related to the *confirmation bias*?
- How do Groarke and Tindale define ‘argument’?
- Summarise the influence belief systems have on arguments.
- What, according to Groarke and Tindale, is the difference between a *specific audience* and a *universal audience*, and what impact does a particular target audience have on the presentation of an argument?
- Explain the process of *dialectic* and the roles played by opponents and proponents in this process.

Imagine a math student who attends class, reads the appropriate textbook sections, but does not bother to do any of the assigned exercises. Such a student is unlikely to perform well in the course, because, as we all know, math takes practice to be mastered. What is equally true (though perhaps less known) is that mastery of logic also takes practice. For this reason, we shall have an exercise set at the end of every module, starting with this one. You are advised to complete these exercise sets *faithfully*; a good deal of your success in this course will depend upon it. Answers to the exercises are provided in order for you to gauge your progress.

Summary

In this module, you have had the opportunity to learn about various non-arguments and how to distinguish them from arguments. You worked on the following Learning Outcomes:

- Distinguish arguments from non-arguments and, in particular, from opinions, descriptions, and explanations.
- Identify argument premise(s) and conclusion.

- Recognize and give examples of premise and conclusion indicators.
- Distinguish different types of explanation, including explanations of causes, purpose, and meaning.

In the next module, we will be discussing the *deductive* and *non-deductive* families of arguments.

Exercise Set

For each of the following passages, determine whether it does or does not contain an argument, and give reasons for your judgment. If the passage contains an argument, specify its main conclusion. If the passage does not contain an argument, identify what type of non-argument it is.

1. The sun was setting on the hillside when he left. The air had a peculiar smoky aroma, the leaves were beginning to fall, and he sensed all around him the faintly melancholy atmosphere that comes when summer romances are about to end.
2. To know any claim with certainty, you have to know you are awake. To know you are awake, you have to prove you are awake. Nobody can prove that he is awake. Therefore, no one can know any claim with certainty.
3. If a diet does not work, then that is a problem. But if a diet does work, there is still a problem, because the diet will have altered the dieter's metabolism. An altered metabolism as a result of dieting means a person will need less food. Needing less food, the person will gain weight more easily. Therefore, dieting to lose weight is futile.
4. Jane is a better tennis player than Peter.
5. "Lastly, those are not at all to be tolerated who deny the being of a God. Promises, covenants, and oaths, which are the bonds of human society, can have no hold upon an atheist. The taking away of God, though but even in thought, dissolves all." (Locke, 1689, p. 36)
6. Because she was an only child, she did not develop the independence necessary to care for herself. Even at the age of 7, she was unable to put on her own skates.
7. If a person knows in advance that his actions risk death, then when he voluntarily takes those actions, he accepts a risk of death. These conditions surely apply to mountain climbers. Therefore, people who climb mountains have accepted a risk of death.
8. Mathematics is not the queen of the sciences, because it is not a science at all.
9. Every morning we wake up, how do we do it? What is happening when awareness dawns? Why do we need to be conscious? Where are we when we sleep or when we die?
10. If it rains tomorrow, then we will not go on the picnic.

Each of the following passages presents an argument. In each case, identify the premise(s) and the conclusion.

11. Feral cats are a major problem for urban centres. They carry disease, they fight, they are noisy, and they destroy wildlife.

12. Good health depends on good nutrition. Good nutrition requires a budget adequate to buy some fresh fruits and vegetables. Therefore, good health requires a budget adequate to buy some fresh fruits and vegetables.
13. It is well known that dolphins, whales, and elephants communicate with each other. In fact, even bees communicate with each other. So you can see that human beings are not the only animals that communicate.
14. “The peculiar evil of silencing the expression of an opinion is that it is robbing the human race; posterity as well as the existing generation; those who dissent from the opinion still more than those who hold it. If the opinion is right, they are deprived of the opportunity of exchanging error for truth. If wrong, they lose, what is almost as great a benefit, the clearer perception and livelier impression of truth, produced by its collision with error.” (Mill, 1859, Ch. II, para. 1)
15. “One immediate retort to the idea that a market society without governing institutions is a decent society is that a market society includes economic organizations, particularly monopolies and cartels, which are in fact governing institutions. The coercive power of monopolies is no less than that of political institutions. Thus the idea that a market society is free of institutions that have the power to humiliate people is a fairy tale.” (Margalit, 1996, p. 21)

Answers to Exercise Set

1. This passage does *not* contain an argument. It is a description.
2. This passage contains an argument. The conclusion is: *no one can know any claim with certainty*.
3. This passage contains an argument. The conclusion is: *dieting to lose weight is futile*.
4. This passage does *not* contain an argument. It is a mere opinion.
5. This passage contains an argument. The conclusion is: *those are not to be tolerated who deny the being of a God*.
6. This passage does *not* contain an argument. It is a causal explanation.
7. This passage contains an argument. The conclusion is: *people who climb mountains have accepted a risk of death*.
8. This passage contains an argument. The conclusion is: *mathematics is not the queen of sciences*.
9. This passage does *not* contain an argument. It is a series of questions.
10. This passage does *not* contain an argument. It is a single conditional statement.
11. **Conclusion:** *Feral cats are a major problem for urban centres.*
Premise(s): *Feral cats carry disease.*
Feral cats fight.
Feral cats are noisy.
Feral cats destroy wildlife.
12. **Conclusion:** *Good health requires a budget adequate to buy some fresh fruits and vegetables.*
Premise(s): *Good health depends on good nutrition.*
Good nutrition requires a budget adequate to buy some fresh fruits and vegetables.
13. **Conclusion:** *Human beings are not the only animals that communicate.*
Premise(s): *Dolphins communicate with each other.*
Whales communicate with each other.
Elephants communicate with each other.
Bees communicate with each other.
14. **Conclusion:** *Silencing the expression of an opinion is robbing the human race.*
Premise(s): *If the opinion is right, posterity is deprived of the opportunity of exchanging error for truth.*
If the opinion is wrong, posterity loses the clearer perception and livelier impression of truth, produced by its collision with error.
15. **Conclusion:** *It is not the case that a market society without governing institutions is a decent society.*
Premise(s): *A market society includes economic organizations, particularly monopolies and cartels, which are in fact governing institutions.*
The coercive power of monopolies is no less than that of political institutions.
The idea that a market society is free of institutions that have the power to humiliate people is a fairy tale.

Study Questions

The following *study questions* are intended to test your knowledge of the material covered in this module. The answers to these questions are not provided, but they are all readily available in the activities and readings assigned. Finding these answers is not difficult, but it is up to you to do so.

Answering the study questions at the end of each module is the best way to prepare for the tests and the final exam. Even though these questions *will not be graded*, you should not think of them as optional, but as part of a deliberate strategy to perform well in this course.

1. What is the difference between *arguments*, *opinions*, and *descriptions*?
2. What is the difference between arguments and *explanations*, and what is the primary purpose of each?
3. Define the three types of explanations discussed in the reading.
4. Give at least five *premise indicators* and five *conclusion indicators*.
5. Is the presence of indicator words in a passage a sure sign of the presence of an argument? Explain.
6. What is the *overconfidence effect* and how is it related to the *confirmation bias*?
7. How do Groarke and Tindale define ‘argument’?
8. Summarise the influence belief systems have on arguments.
9. What, according to Groarke and Tindale, is the difference between a *specific audience* and a *universal audience*, and what impact does a particular target audience have on the presentation of an argument?
10. Explain the process of *dialectic* and the roles played by opponents and proponents in this process.

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Philosophy and Critical Thinking

Introduction

Welcome to LIBS 7008, an introductory course in *logic* and *critical thinking* meant to help you develop and utilize good reasoning skills. Critical thinking is all about argument analysis, which requires an examination of the meaning of logical terms and an investigation of their contribution to the arguments in which they occur. At the heart of every argument is an *attempt to persuade*, so considerable attention will be given to representing the structure of arguments and assessing their effectiveness.

Before starting to study a subject, however, it is reasonable to want to know something about the broader area of which it is a part. Since critical thinking is a subfield of philosophy, the question “*What is philosophy?*” arises immediately and naturally. The aim of this first module is to provide you with a general understanding of philosophy as a field of study and with critical thinking as a process.

Topics

These notes are divided into three topics:

1. *Philosophy as Conceptual Analysis.*
2. *The Branches and Sub-branches of Philosophy.*
3. *Critical Thinking in Focus.*

Learning Outcomes

When you have completed this module, you should be able to meet the following learning outcomes:

- Describe the origins of the word *philosophy* and recognize some of the basic questions in the field.
- Explain *conceptual analysis* as the basic method of philosophical activity.
- Compare the main branches of philosophy and provide examples of the issues explored in each.
- Identify the difference between *thinking* and *critical thinking*.

Resources

All resources you need to complete this module will be provided to you. Aside from this document, the following are also required.

Reading 1.1	“What Is Critical Thinking,” in G. M. Nosich’s <i>Learning to Think Things Through: A Guide to Critical Thinking Across the Curriculum</i> , 3 rd ed., pp. 1-18, 223.
Video 1.1	“Crash Course Philosophy (Episode 1): What Is Philosophy?” Produced by PBS Digital Studios.

1. Philosophy as Conceptual Analysis

Unlike the questions, “What do engineers do? What do doctors do? What do teachers do?” the question “What do philosophers do?” is a difficult one to answer. This is not because philosophers have given no thought to the matter, nor is it because answers have been lacking. Rather, the difficulty has to do with the *history of philosophy* itself, which at one time encompassed all disciplines.

For a beginner, the best way to approach the question “What is philosophy?” is to do some philosophy and then come to an understanding about the nature of that activity. But even if this is the correct strategy, you may still want at least a rough idea of just what it is that philosophers do.

In a nutshell, a philosopher is a *conceptual analyst*, someone trained to conduct conceptual analyses. To analyze a concept is to *expose, examine and clarify the ideas of which it is composed*. More elaborate definitions exist; unfortunately, many of them tend to be less than clear:

Formal concept analysis is a principled way of deriving a concept hierarchy or formal ontology from a collection of objects and their properties. Each concept in the hierarchy represents the set of objects sharing the same values for a certain set of properties; and each sub-concept in the hierarchy contains a subset of the objects in the concepts above it. (“Formal concept analysis,” 2017, para. 1)

Here is a better offering:

Conceptual analysis consists primarily in breaking down ... concepts into their constituent parts in order to gain knowledge or a better understanding of a particular philosophical issue in which the concept is involved. For example, the problem of free will in philosophy involves various key concepts, including the concepts of freedom, moral responsibility, determinism, ability, etc. The method of conceptual analysis tends to approach such a problem by taking apart the key concepts pertaining to the problem and seeing how they interact. (“Philosophical analysis,” 2016, “Method of analysis,” para. 2)

Perhaps an analogy will help.

Consider a *cartographer* whose job is to construct maps. Modern technology now enables us to pinpoint national boundaries and other regional divisions to an accuracy of centimeters. Clearly, this is very important; a map that is not accurate is of little use. An ideal map gives us a way of determining for *any given object on the planet* whether or not that object belongs within the boundaries of a particular region or area. Conversely, it gives us a way of determining for *any given region or area on the planet* whether or not it contains a particular physical object within its boundaries. A cartographer’s job, then, is essentially one of representing physical divisions with as much precision as possible.

Philosophers do something similar—not within *physical* space, but within *conceptual* space. They want to understand how concepts are formed, what they mean and entail, the role they play in organizing and expressing thoughts, and the manner in which they contribute to our understanding of the world in which we live. In short, a philosopher’s job is to chart out the *boundaries* of concepts, to define their scope and extent, where they diverge and overlap. When

this job is done well, we can determine the kind of things a given concept includes and the kind of things it excludes; we would then know to what things in the world the concept applies and to what things it does not apply.

But conceptual analysis is not exclusive to philosophy. An interesting case from the world of science once involved an ambiguity about the identity of Giant Pandas. For a long time, scientists could not decide whether these animals belonged to the Bear family or to the Raccoon family. The trouble was that many physical and behavioural characteristics of Pandas were consistent with both species—which is to say that these characteristics seemed to fall equally well within the scientific concept **BEAR** and the scientific concept **RACCOON**—so an exact match proved difficult. It was not until genetic testing became available that Pandas were finally classified as bears.

This case is a good illustration of conceptual analysis at work. At one time, the scientific concept **BEAR** was not *fine-grained* enough to classify all bears as bears and to keep *non*-bears from being so classified. Later that concept became much more precise when genetic testing revealed information that enabled more discriminations to be made.

The concepts which philosophers analyze tend to be somewhat more abstract than those contemplated in science. For instance, consider the philosophical problem of the *morality of abortion*. Many people believe that an act of abortion is an act of *murder*. Are they right? Everyone agrees that abortion involves *killing* something that is alive, but is killing the same as murdering? If not, what is the difference and how is it relevant to the abortion question?

The status of the fetus is also an important issue in the debate. Is the fetus a human being? To find out, it seems we must first define what we mean by *human being* and then ascertain whether or not a fetus answers to this definition. But even if a fetus is judged to be fully human (as opposed to something that just has human DNA), we must still determine what rights, if any, it has (since not all human beings have exactly the same rights).

So far we have not even mentioned the rights of the mother (whose status as fully human is not in dispute); should we *force* her to carry an unborn baby to term, if that is not what she wants? What would this mean for her autonomy as a person, her right to control what happens to her body, to choose the course of her life, to determine her own ambitions and to follow her personal value system? ...

As you can see, these are complicated problems, and they all call for conceptual analysis: *clarifying ideas, sharpening definitions, honing classifications, determining contexts, evaluating circumstances*, etc.

Philosophy is not one of the natural sciences. (The word ‘philosophy’ must mean something whose place is above or below the natural sciences, not beside them.) Philosophy aims at the logical clarification of thoughts. Philosophy is not a body of doctrine but an activity ... Without philosophy thoughts are, as it were, cloudy and indistinct: its task is to make them clear and to give them sharp boundaries. (Wittgenstein, 1921, §4.111/112)

Despite best efforts, however, disagreement is still common in philosophy, and we may expect a variety of different opinions on any controversial topic. So what do we do when we are faced with different and often competing points of view? How do we evaluate the various positions?

The fact is, opinions are not hard to come by; everyone has one. Ask any number of people “What is a human being?” and you will receive replies from multiple perspectives—biological, religious, socio-cultural, psychological—and almost everyone who has an opinion will, if prompted, attempt to defend it by saying why it is a correct one. Herein, then, lies the key. It’s all about *defending* one’s opinion. Simply having a point of view is no great achievement. The achievement, rather, is in having a point of view that can be defended with *robust reasoning*. That is the short definition of a *good argument*, something which figures prominently in this course.

2. The Branches and Sub-branches of Philosophy

Philosophy is the contemplation of questions that emerge from our reflection on ourselves and our place in the natural world. Most of those who study philosophy do so for its inherent appeal. They want to take part in a 2500-year-old conversation involving questions about virtually every aspect of human existence. These questions, both vital and sweeping, have been fiercely debated for millennia, and the proposed solutions are as fascinating as they are diverse. The study of philosophy is an invitation and an opportunity—an *invitation* to explore what some of the most profound thinkers have said about some of the most fundamental questions of all, and an *opportunity* for you to cultivate your own answers to these questions.

Philosophy is to be studied, not for the sake of any definite answers to its questions ... but rather for the sake of the questions themselves; because these questions enlarge our conception of what is possible, enrich our intellectual imagination and diminish the dogmatic assurance which closes the mind against speculation; but above all because, through the greatness of the universe which philosophy contemplates, the mind also is rendered great, and becomes capable of that union with the universe which constitutes its highest good. (Russell, 1912, Ch. XV, para. 13)

The term *philosophy* is a compound word composed of two parts: the Greek words *philos* (love) and *sophia* (wisdom). Hence, philosophy literally means *love of wisdom*. It must be noted, however, that *sophia* meant much more than the English translation *wisdom*. For the ancient Greeks, *sophia* wasn't simply a matter of acquiring an understanding of the world, but also included *any* exercise of intelligence or curiosity. Thus, all activities intended to increase one's knowledge or skill involved philosophy: art, literature and music were philosophy, as were medicine, mathematics, politics, architecture, engineering, and so on. Eventually, these disciplines became more and more specialized and broke away from the philosophy canopy. But the fact that philosophy is the parent of all disciplines is still recognized today in the designation of a Ph.D. (*Doctor of Philosophy*).

Even the modern discipline of philosophy has broken into a number of specialties, and it is common for philosophers to be experts in some areas but not in others. Most philosophy departments divide the field into *five* main branches:

2.1 History of Philosophy

This branch looks at philosophical questions, movements, and schools of thought from a historical perspective—situating these elements in environmental and sociopolitical contexts that are appropriate for their times and locations. It also considers the contributions of key individual philosophers from different eras. The history of philosophy is usually divided into four periods:

- | | |
|-----------------------|-------------------|
| • <i>Ancient</i> | 585 BCE - 300 CE |
| • <i>Medieval</i> | 300 CE - 1400 CE |
| • <i>Early-Modern</i> | 1400 CE - 1850 CE |
| • <i>Contemporary</i> | 1850 CE - present |

2.2 Value Theory

This branch looks at practical and theoretical questions involved in *moral*, *political* and *aesthetic* judgements connected to human values. It includes:

- **Aesthetics (Philosophy of Art)**

What counts as art? In what does true beauty consist? How do pictures represent? What is the relationship between the moral and aesthetic values of art?

- **Political Philosophy**

Is there a political order in a state of nature? How should property be divided? Who should rule? What is the place of personal liberty in a governed society?

- **Ethics (Moral Philosophy)**

How do we know what is right and wrong? Is morality universal or relative? What is the relationship between ethics and religious belief? How does morality contribute to happiness? What are the rules of justice?

2.3 Epistemology and Metaphysics

Some philosophers argue that there is no single fundamental branch or area of philosophy, but there are those who would point to *epistemology* (the nature of knowledge) and *metaphysics* (the nature of reality) as those branches. The main questions someone working in the area of epistemology confronts are:

- *What is knowledge and how is it acquired?*
- *What is the relationship between knowledge and perception?*
- *How does knowing something differ from believing, conjecturing, guessing, or supposing that something is the case?*
- *What standards must an item of information meet if it is to count as an item of knowledge?*
- *What is the relationship between belief, evidence, and truth?*

There is no crisp line dividing epistemology and metaphysics. But some classic questions in the latter area are:

- *What exists in the universe?*
- *If we try to compile a catalogue of the kinds of things there are, what would appear in that catalogue?*
- *How is reality structured?*
- *What are mental events?*
- *How is consciousness generated by a physical brain?*
- *What sense can we make of personal identity, freedom of the will, and immortality?*
- *What is the nature of good and evil?*
- *Is there a God and, if so, on what basis can we assign attributes to this God?*

Wondering about the *nature of reality*, what there is and what will be, often leads to deeper personal questions—about ourselves, about the nature of mind and thought, about freedom and autonomy, and about the state of our knowledge and the reasons that guide our beliefs. These are just a few of the numerous stands epistemologists and metaphysicians explore.

2.4 Logic

This branch of philosophy deals with the rules of reasoning and rationality. It is divided into two sub-branches:

- **Formal (or Symbolic) Logic**
- **Critical Thinking (or Informal Logic)**

Both *formal* (or *symbolic*) *logic* and *critical thinking* (or *informal logic*) deal with the analysis and evaluation of arguments, but they do so in different ways. Formal logic takes an argument expressed in a *natural language*—i.e., the spoken language one learns as an infant, like English, Urdu, Swahili, etc.—and translates it into a *symbolic* language that has specific rules and assessment procedures; it then evaluates the argument in accordance with these rules and procedures. Critical thinking, however, evaluates arguments in natural languages *directly*, without first translating them into symbolic form. As such, informal logic is much more versatile and practical, but this comes at a price: the evaluative rules and procedures of critical thinking tend to be less precise than those of formal logic.

2.5 Discipline-Specific Philosophies

The final branch of philosophy comprises a wide range of issues that have arisen in relation to specific non-philosophical fields. Some examples follow.

- **Philosophy of Education**

What are the nature and aims of education? With whom does educational authority lie? To what extent are governments responsible for educating citizens? How should curriculum be developed to maximize outcomes for different kinds of learners?

- **Philosophy of Language**

How do words acquire their meaning? What is the relationship between meaning, interpretation, and truth? Is there a specific logical structure that governs all languages? Can there be thought without a natural language?

- **Philosophy of Psychology**

What counts as psychology? What is the relationship between the personal and the sub-personal levels of psychological explanation? Is there a distinction between perception and cognition? What is the scope and limitations of common sense (or folk) psychology?

- **Philosophy of History**

Is history a science? Are there rules of historical reasoning? Are historical investigations based more on objective evidence or subjective interpretation? Does language distort truth in historical accounts?

- **Philosophy of Law**

Is there natural law? What is the relationship between law, rights, and justice? How should law serve society and the individual? Is there a connection between rules, order, and morality?

The above are some of the problems with which philosophers concern themselves, and the divisions or branches of philosophy to which the problems belong. These are not the only problems that fall under the branches mentioned, nor are those branches the only ones. But you should now have some idea of what the main divisions of philosophy are and the sort of issues that arise in them.

Video 1.1: “Crash Course Philosophy (Episode 1): What Is Philosophy?”

Now that you know something about philosophy and what philosophers do, go and watch episode 1 of *Crash Course Philosophy*. This short video reinforces some of the ideas discussed above and introduces new ones in a fun and playful way.

You are expected to watch this video *actively*, which means paying attention and taking detailed notes. You may, of course, view it as often as you like.

3. Critical Thinking in Focus

Critical thinking is different from *thinking*. The latter is habitual, but the former, being a more complex and deliberate activity, is less common. While thinking focuses on information (data, facts, examples), critical thinking focuses on ideas (assumptions, biases, flaws in reasoning, points of view, contexts, implications); and while thinking involves organizing and making connections between pieces of information, critical thinking involves deeply and broadly questioning ways in which ideas are formed and how people interpret and examine these ideas. The goal of thinking is to form an opinion about what one has been contemplating; the goal of critical thinking is to evaluate the *contemplation process* itself.

But simply knowing what critical thinking involves is not enough to effectively engage in it. It is also essential for us to change the manner in which we receive information, to identify and overcome bad habits, and to keep an “inner eye” on the way we judge and reason in order to avoid common pitfalls. Doing so is not always easy; it is a learning process that requires patience and finesse. But the rewards that come with being a true critical thinker—*intellectual versatility, increased awareness, deeper perspective, personal confidence*—are worth tenfold the effort.

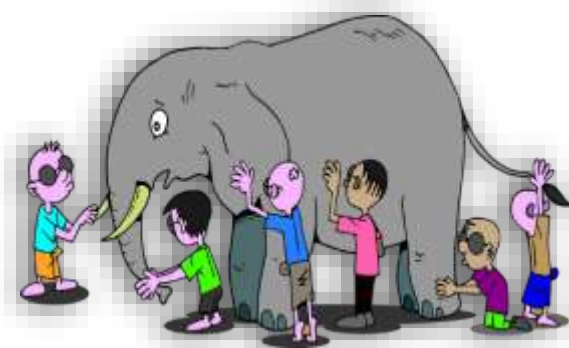


Figure 1.1
Six Blind Men and the Elephant

Reading 1.1: “What Is Critical Thinking?”

Gerald M. Nosich provides an excellent answer to the question “*What is critical thinking?*” in a piece by the same name. Go and read the excerpt now, *highlighting* and *taking notes* as you proceed. Try to focus on the following questions:

- How does Nosich define *critical thinking*, and what are some of its prominent features?
- State and explain the three parts of critical thinking, as described by Nosich.
- What are some of the misconceptions about critical thinking?

Summary

In this first module, you have had the opportunity to learn about philosophy as a field of study and about the process of critical thinking. You worked on the following Learning Outcomes:

- Describe the origins of the word *philosophy* and recognize some of the basic questions in the field.
- Explain conceptual analysis as the basic method of philosophical activity.
- Compare the main branches of philosophy and provide examples of the issues explored in each.
- Identify the difference between *thinking* and *critical thinking*.

In the next module, we will be discussing *arguments* and distinguishing them from non-arguments.

Study Questions

The following *study questions* are intended to test your knowledge of the material covered in this module. The answers to these questions are not provided, but they are all readily available in the activities and readings assigned. Finding these answers is not difficult, but it is up to you to do so.

Answering the study questions at the end of each module is the best way to prepare for the tests and the final exam. Even though these questions *will not be graded*, you should not think of them as optional, but as part of a deliberate strategy to perform well in this course.

1. Explain the origin of the word *philosophy* and describe the branches and sub-branches of the discipline.
2. What is *conceptual analysis* and how does it work?
3. How does Nosich define *critical thinking*, and what are some of its prominent features?
4. State and explain the three parts of critical thinking, as described by Nosich.
5. What are some of the misconceptions about critical thinking?

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