The Art of Reasoning Lecture 1: Course Info. and Chapter 1

Instructor: M.A. Parks

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Syllabus:

https://docs.google.com/document/d/1TWpYLLw3aBNUApfQ93nnJlKgHAXGRsp4FXAx7azrflk/edit?usp=sharing

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Ch 1 Introduction

We are going to be studying thinking, and how to think properly.

Thinking is a cognitive process we use in the attempt to gain knowledge or to understand something, as distinct from our emotional responses to things.

There are certain rules and strategies of thinking, certain standards that tell us when we have achieved a clear understanding of some subject or succeeded in proving a case.

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Thinking Skills

The core of logic has always been the study of inference.

The purpose of logic is to answer questions such as what evidence is better than other kinds, whether appropriate use is being made of statistics, and whether opponents are making proper use of the evidence.

Logic will give you a method to follow in making that decision and backing it up. It will show you how to break an issue down into subissues, so that you can be sure to consider all of the relevant points. It will give you standards for deciding what sorts of evidence is appropriate for a particular issue, and standards for determining how much weight to give a piece of evidence.

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Logic can help us distinguish between similar but different issues, such as whether people are concerned with morality or legality when discussing whether abortion is permissible or not.

People often talk past each other when they use words with different meanings.

Thinking involves synthesis as well as analysis, integration as well as differentiation. To understand a line of reasoning, we need to break it down into its parts, but we also need to put it in its wider context.

An understanding of logic will help you spot such wider relationships, such as contradictory claims about the nature of money between economics class on the one hand and an ethics or religion class on the other hand.

Objectivity

The methods and standards associated with thinking have a purpose: to help us be objective.

Objectivity in this context means staying in touch with the facts, and guiding our thought processes by a concern for the truth.

To some extent, objectivity is a matter of choice: the choice not tto indulge in wishful thinking, not to let bias or prejudice distort our judgment, and so forth.

The essence of objectivity is the ability to step back from our train of thought and examine it critically. It also involves looking at things from another person's perspective, because it is rare that any single perspective reveals the whole truth.

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There are no exercises in the book for Ch. 1. Instead of engaging with exercises for this lecture, please take the time to introduce yourself on the discussion board on Canvas, and include the following information by Friday at 11:59pm:

Name

Preferred Pronouns

Major

One interesting thing about you

Reply to two classmates' posts by Sunday at 11:59pm (even if it's just to say, "Hi!")

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The Art of Reasoning
Lecture 2: Chapter 2

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Classification

Language is our basic tool of thought and speech. One of the major functions of language is to divide the world up into categories.

Except for proper names, most nouns stand for groups of things: dogs, chairs, exams, and so on. Organizing a set of things into groups is called classification, and a word that stands for such a group expresses a concept.

Concepts and Referents

Classification is one of our basic cognitive tools. Whenever we classify, we make use of concepts - ideas that represent classes of things we have grouped together and that function as mental file folders.

In classifying your courses, you used concepts such as ART, PHILOSOPHY, and INTRODUCTORY. (Words in all caps are used to indicate concepts.)

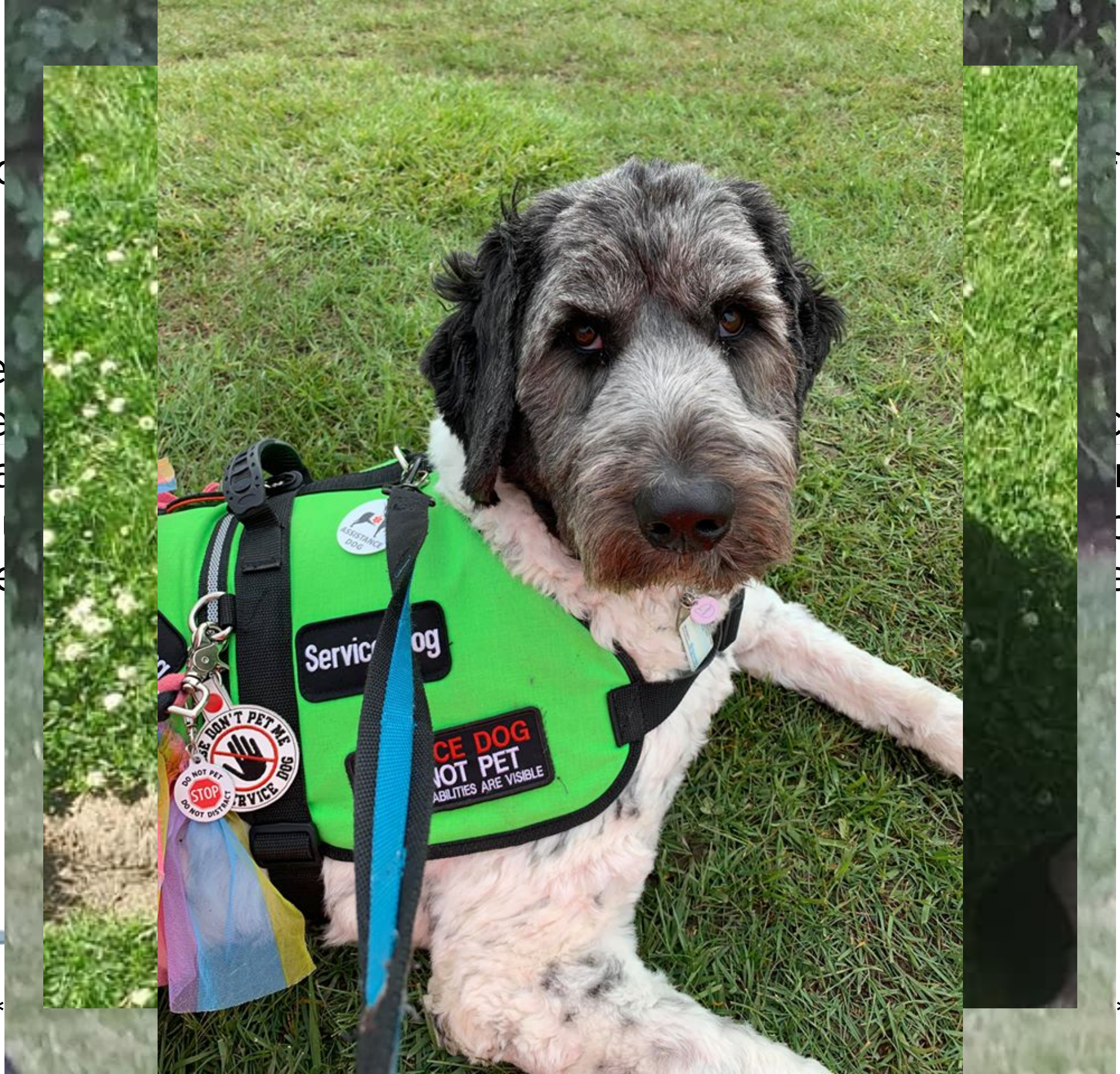
In order to learn the word ‘dog’, you had to acquire the concept DOG.

A scientist who discovers a new phenomenon forms a concept for that class of thing and expresses the concept in a new word (e.g., quark).

A concept is an idea, and a word is the linguistic vehicle we use to express an idea.

If a co folder

So the world,
the . A
diagra nd for
indivi bjects
are ed.



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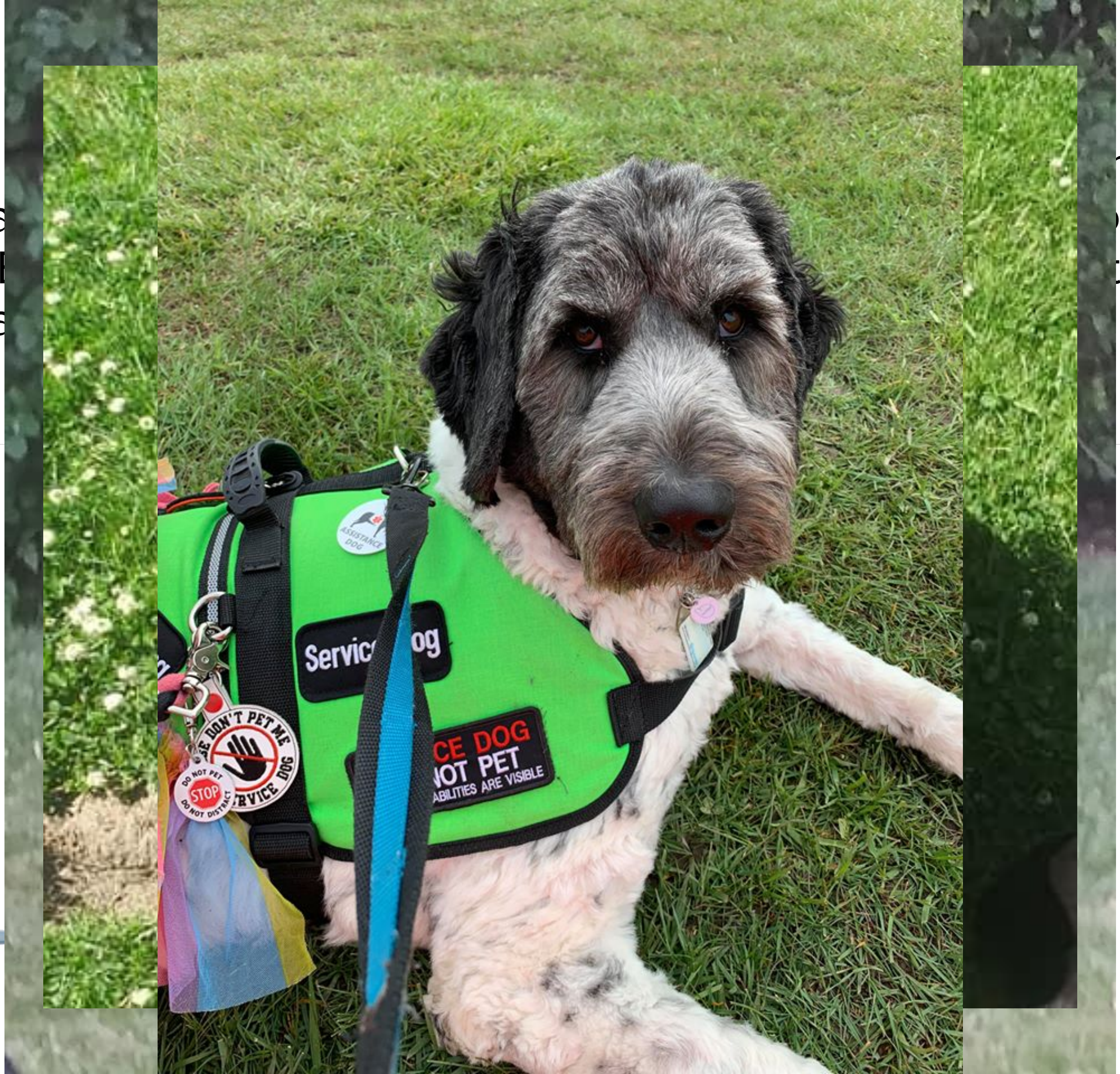
Now … n this
separa … wn for
DOG. … type of
anima … same



Notice all the referents included in DOG are also included in ANIMAL, but ANIMAL includes many other things as well, such as cats (as the diagram indicates), horses, cows, fish, birds, humans, and other types of animals. ANIMAL is a broader concept than DOG because it includes more than the narrower concept DOG.

Whenever we encounter this relationship, we use the term genus for the broader concept and the term species for the narrower concept.

Thus, both DOG and CAT are species of the genus ANIMAL. If a species is a file folder, a genus is a file drawer containing many folders.

Genus and species are relative terms, like ‘mother’ and ‘daughter’. Your mother is a mother relative to you, but a daughter relative to her parents. DOG is a species relative to ANIMAL, but a genus relative to ROTTWEILER.

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Note, genus and species have a more flexible meaning than in biology.

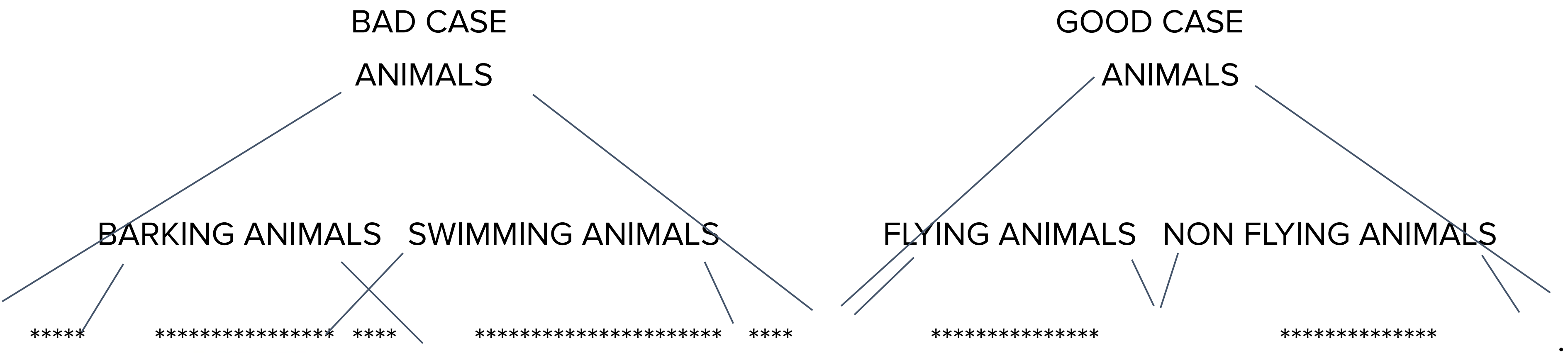
Abstract and Concrete

The referents of our concepts are concrete; each is a single, individual object. But a concept (such as DOG or ANIMAL) is abstract: each refers to a group of objects, not just a single thing, and it groups together things that differ from one another. There are many differences between different individual dogs, for example, but they are grouped together because they are similar.

Abstractness is a relative property; any concept is abstract to some degree, but a species is less abstract than a genus to which it belongs.

Rules of Classification

1. A single principle or set of principles should be used consistently so that the categories (species) are mutually exclusive (each species excludes members of other species) and jointly exhaustive (the species taken together must cover all the objects in the genus).



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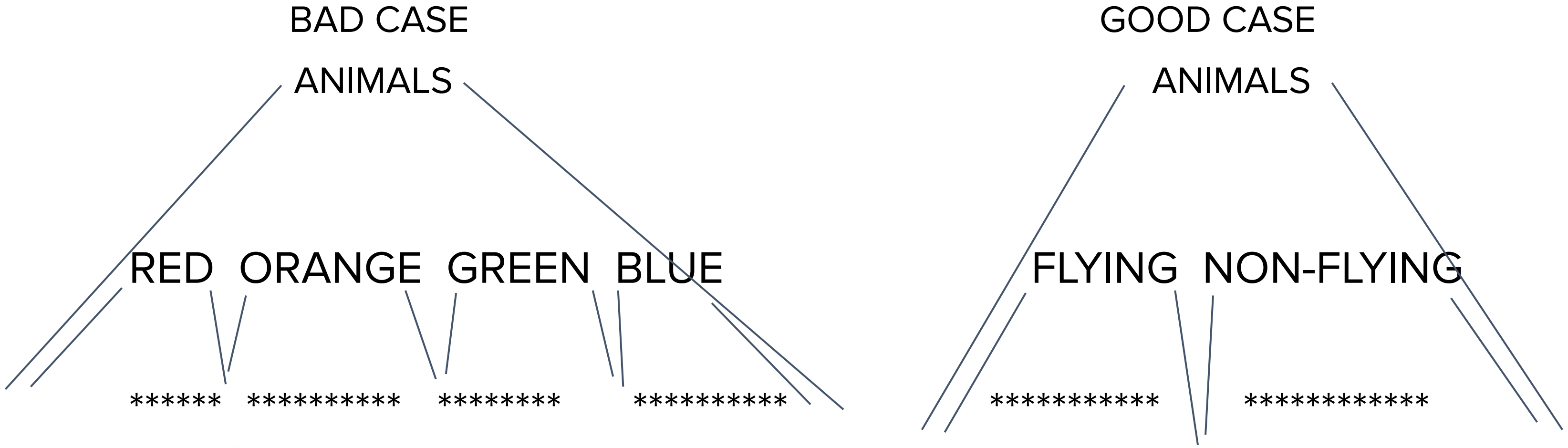
2. The objects should be grouped according to their essential attributes. Things that are fundamentally similar are grouped together and things that are fundamentally different are separated.



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Levels of Organization

We often deal with concepts that reflect preexisting classifications, and the task we face is to locate the concepts at the right level of a species-genus hierarchy.

Concepts on the same level of organization should have roughly the same degree of abstractness. When it is necessary to separate levels in order to achieve this, we must often add concepts that were not given to us originally. Finally, we might see that other concepts should be entered in order to provide a more complete picture of the relationships between different concepts.

To organize related concepts into a classification diagram:

1. Find the highest-level (most abstract) genus.
2. Identify concepts that are species of that genus; they should have the same degree of abstractness.
3. Identify the principle of division that applies to the concepts in Step 2; put the principle in brackets.
4. For each concept in steo 2, identify other concepts that are its species, and identify the principle of division (the single principle by which the concept has been divided into species).
5. Repeat step 4 for as many levels as necessary.

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For the problem sets for Ch. 2 (A, B, C, D, E, and F on p. 28-30), please pick one problem that takes you a bit of effort to answer. Post your answer on the discussion board by Friday at 11:59pm. Post replies to two classmates' posts by Sunday night at 11:59pm, perhaps agreeing or disagreeing with their suggestion.

The Art of Reasoning
Lecture 3: Chapter 3

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Definitions (and their Functions)

We saw in Ch 2 that concepts serve as mental file folders that help us organize our knowledge about classes of things. Definitions tell us what is in the folders. By telling us what concepts stand for, and how they relate to other concepts, definitions are an important tool of knowledge.

Functions of Definitions:

1. Tell us what is and what is not included in a concept, by giving us a test or rule for membership. This helps clarify the boundaries of a concept.
2. Clarify the relationship between concepts. In this way, we can acquire new concepts (connecting it to its referents) on the basis of old ones.
3. Provide a summary statement about the referents of our concepts. A good definition condenses the knowledge we have about the referents of a concept, giving us just the highlights, the key points, the essence.

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Rules for Definitions

A definition should:

1. Include a genus and a differentia
2. Not be too broad or too narrow
3. State the essential attributes of the concept's referents
4. Not be circular
5. Not use negative terms unnecessarily
6. Not use vague, obscure, or metaphorical language

A definition should include a genus and a differentia. For example, consider the following definition of humans: “Humans are rational animals”.

Animals names the wider class to which humans belong; it classifies us as a species of the genus ANIMAL.

The term ‘rational’ specifies an attribute that distinguishes us from other species of the same genus. This is the differentia- it differentiates humans from other animals.

A definition should not be too broad or too narrow.

For example, a definition for HUMANS would be too broad if it was that “Humans are two legged animals” because it would include a wider class of things than just humans, e.g., birds.

A definiton of HUMANS would be too narrow if it says “Humans are religious animals” because some humans are not religious animals, and thus would be excluded by the proposed definition.

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A definition should state the essential attributes of the concept's referents, fundamental attributes that cause or explain other attributes.

In the case of "Humans are rational animals," ANIMAL is a good genus because a person's animal nature is more fundamental and explains more about them than the fact that they can sometimes be religious, for example.

RATIONAL is a good differentia because the capacity to reason is fundamental to human nature, and it explains many other, less fundamental attributes.

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A definition should not be circular.

A definition is circular when a synonym is used, e.g., “Man is the human animal.”

Simmilarly, a pair of definitions can be circular if they use concepts to define each other, e.g., “A husband is a person who has a husband or wife” and “A wife is a person who has a husband or wife.”

Definitions should not use negative terms unnecessarily.

For example, consider the definition: “An automobile is a horseless carriage.” ‘Horseless’ tells us about a source of power not used by automobiles, but there are many other sources of power they don’t use. It would be better to use a definition that tells us what kind of power they do use.

A definition should not use vague, obscure, or metaphorical language.

Definitions which are vague fail to give us a precise criterion for membership in the concept.

An obscure definition uses abstract or technical language that is more difficult to understand than the concept itself.

A metaphorical definition doesn’t convey the literal meaning of the concept, but only an analogy that we have to interpret.

Constructing Definitions

To construct a definition for a concept C:

1. Find the genus of the concept- the broader concept that includes C and other, related concepts from which one needs to distinguish C.
2. Choose a differentia that distinguishes C from other concepts in the same genus. If there is more than one distinguishing attribute, choose the most essential one.
3. Check to make sure that the resulting definition is not circular, unnecessarily negative, or unclear.

For the problem sets for Ch. 3 (A, B, C, D, E, F, and G on p. 53-57), please pick one problem that takes you a bit of effort to answer. Post your answer on the discussion board by Friday at 11:59pm. Post replies to two classmates' posts by Sunday night at 11:59pm, perhaps agreeing or disagreeing with their suggestion.

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Lecture 4: Chapter 4

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Whereas previously we were concerned with concepts, from here on out we will be concerned primarily with propositions (although the concept material will still show up on the final exam!).

A proposition is something we can assert in the form of a true/false statement.

For example:

Stella is a dog.

Stella and Sophia are rottweilers.

All dogs are mammals.

The concept identifies a certain class of things; the propositions assert something about the members of that class. Concepts give us an indispensable tool for thought and speech by grouping together similar objects, actions, properties, and relationships. But a concept by itself is not a complete thought, and a word by itself doesn't say anything. Concepts provide a framework, but the units of thought and speech are propositions.

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One essential feature of a proposition is that it is either true or false (which involves a complete declarative sentence, with a subject and a predicate). Examples:

The universe is a computer simulation.

We have free will.

The meaning of life is to help and appreciate other life, as well as one’s own life.

Examples of phrases which aren’t true or false:

Cat

Computer simulation

The meaning of life

A sentence is the linguistic vehicle we use to express a proposition- just as an individual word is the linguistic vehicle we use to express a concept. Two different sentences may express the same proposition, just as two different words may express the same concept. And a single sentence may express more than one proposition. Our goal is not to study language for its own sake, but to understand how it can be used to formulate and convey our thoughts.

For example:

Je m'appelle Megan.

And

My name is Megan.

Assert the same proposition.

Moreover, if we have two sentences that differ only in one word, 'Stella is an X' and 'Stella is a Y,' and X and Y express the same concept, these two sentences assert the same proposition. It is sometimes tricky to determine if for such sentences, X and Y express identical concepts or not.

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For sentences such as ‘Stella is an X’ and ‘Stella is a Y’, sometimes sentences can contain an X and Y pair which are related, but distinct.

In some such cases, it can be hard to determine if the same concept is expressed in each.

The test for whether two words express the same concept is:

1) Do they pick out the same class of things?

2) Do they isolate those things on the basis of the same distinguishing properties?

To apply this test, we use the techniques of classification and definition.

Connotations

Sometimes two words/phrases express the same concept, for example:

Has a firm command of the subject matter

Has a good comprehension of the subject matter

While the phrases express the same concept, the first conveys the image of power and control over the material, whereas the second is more bland; it doesn't really convey any image at all. They have different connotations.

But that doesn't mean a pair of sentences "Mary has a firm command of the subject matter" and "Mary has a good comprehension of the subject matter" will express different propositions:

"Mary has a firm command of the subject matter" and "Mary has a good comprehension of the subject matter" have different connotations, but they assert the same proposition (because the predicates express the same concept).

When the concepts actually differ in meaning, not just connotation, different propositions are asserted.

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Metaphors

Literal interpretations must be provided for any metaphors in order to capture the logical relations between sentences.

To determine whether two sentences assert the same proposition:

1. USe techniques of classification and definition to identify the concepts the words express.
2. Ignore differences in connotation.
3. Find a literal interpretation of all metaphors.

Propositions and Grammar

Two different grammatical structures can be equivalent, just as two words can be synonymous. For example:

‘Ade did better than I did on the test’ and ‘I did worse than Ade on the test’

A single sentence can contain more than a single proposition. E.g.:

‘We live in a blue house with a chicken coop.’

A sentence doesn’t always assert every proposition it expresses. Consider the following:

The reelection of the president depends on whether the economy will improve by November.

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Conjunctions

The easiest way of combining propositions within a single sentence is to use a conjunction, which often rely on words such as ‘and’ to join multiple subjects, or multiple predicates, or even multiple sentences.

Example: Stella and Sophia are dogs, and they are mammals.

There are many different types of conjunctions, such as those that assert a relationship of dependence (because, since, so that) and others that assert a relationship of time or place (before, when, while, where). Others assert a relationship of contrast (but, although, even though).

All such conjunctions combine component propositions into a statement in which all components are being asserted as true.

This is not the case with ‘if’ and ‘or’, which merely assert that a certain relation exists between component propositions (rather than asserting the component propositions, too).

Relative Clauses

Rottweilers, who have their tails docked, were bred to pull carts.

The main clause in this sentence asserts the proposition that rottweilers were bred to pull cards.

The subordinate clause ‘have their tails docked’ modifies the subject in the main clause, ‘rottweilers’.

As a result, the statement also asserts the proposition that rottweilers have their tails docked.

This structure is known as a relative clause, because it relates one clause to a particular word in another clause.

When we are dealing with a relative clause, we must consider whether it is restricive or nonrestrictive in order to be clear about what proposition is being asserted and what class of things we are talking about.

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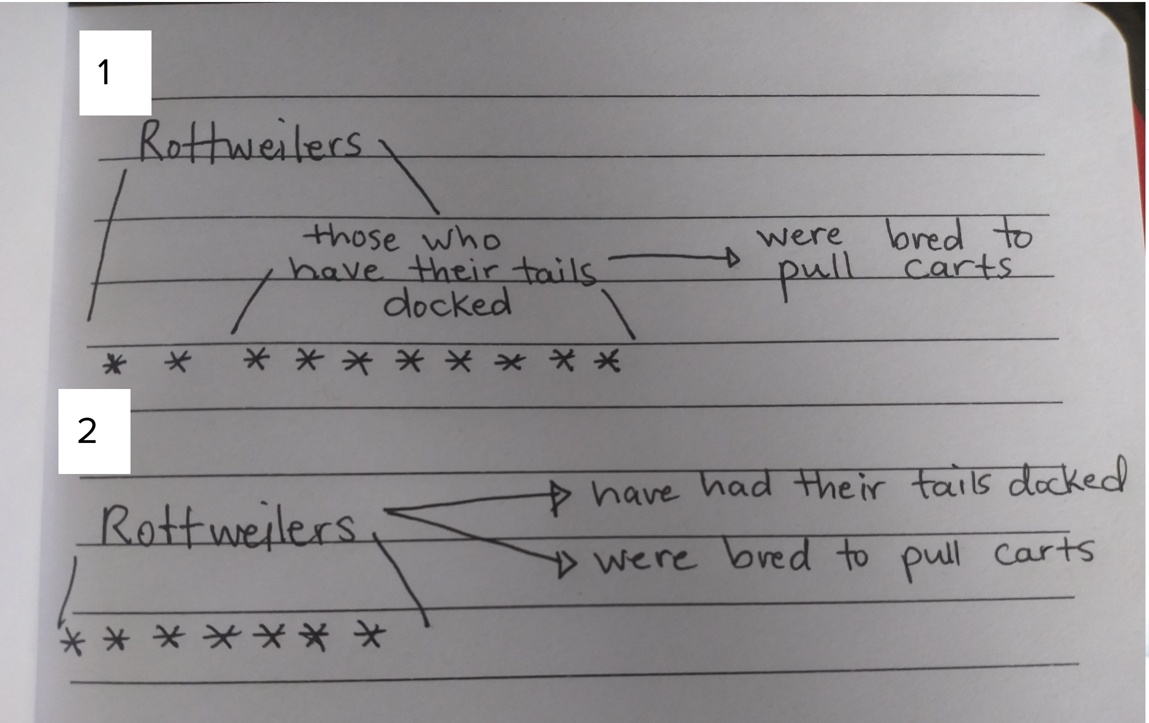
Restrictive and Nonrestrictive Clauses



1) Rottweilers who have had their tails docked were bred to pull carts.
2) Rottweilers, who have their tails docked, were bred to pull carts.

1 has a restrictive clause (it restricts the reference of the term it modifies)

2 has a nonrestrictive clause, because it doesn't restrict the reference of the relevant term

For the Chapter 4 Exercises (A, B, C, D, E, and F on pages 79-83), please pick one problem that takes you a bit of effort to answer. Post your answer on the discussion board by Friday at 11:59pm. Post replies to two classmates’ posts by Sunday night at 11:59pm, perhaps agreeing or disagreeing with their suggestion.

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The Art of Reasoning
Lecture 5: Chapter 5

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Elements of Reasoning:

Premise, conclusion, and argument

Consider the following:

Stella is a rottweiler, and all rottweilers are dogs. Moreover, all dogs are mammals. Therefore, Stella is a mammal.

In this case, we are concerned with evidence for the truth of a proposition: that Stella is a mammal. In logic, this proposition is called a conclusion.

And the evidence in support of the conclusion consists of other propositions that we take as given. These are called the premises. The premises are that Stella is a rottweiler, all rottweilers are dogs, and all dogs are mammals.

Considered by itself, a proposition is neither a premise nor a conclusion. A proposition is a premise or conclusion only in relation to other propositions.

A set of premises together with a conclusion is called an argument.

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Recognizing Arguments

What distinguishes arguments from other patterns is the effort to support a statement (the conclusion) logically.

For example, in an argument, we reason forward from premises to the conclusion, whereas with an explanation, we reason backwards from a fact to the cause or reason for that fact. We aren't using assumed premises to support or argue for a conclusion.

In giving an argument, the author doesn't just tell us something she takes to be true; she also presents reasons intended to convince us that it is true. This is usually signaled by certain verbal cues.

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Strategy Box 5.1

INDICATOR WORDS

To identify premises and conclusions, look for the following indicator words:

Premise indicators	*Conclusion indicators*
Since	Therefore
Because	Thus
As	So
For	Consequently
Given that	As a result
Assuming that	It follows that
Inasmuch as	Hence
The reason is that	Which means that
In view of the fact that	Which implies that

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The Diagramming Method

One symbol is an arrow pointing from premise to conclusion. This arrow represents a single step in reasoning- the relationship between a premise and the conclusion. Suppose you argued against gun control on the ground that it would violate the right of self-defense:

Restricting hand gun ownership would violate the right of self-defense.

⇓

The government should not restrict handgun ownership.

If there is more than one premise, we must figure out if they are dependent or independent in supporting the conclusion.

Dependent:

1.Politics depends on morality.

2 Morality depends on religion.

(Therefore) 3 Politics depends on religion.

In this case premises 1 and 2 must be combined to have an argument for 3. This is diagrammed as follows:

<u>1 + 2</u>

↓

3

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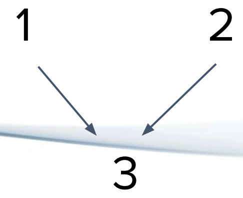
Independent Premises: the premises provide independent support for the conclusion (each taken by itself supports the conclusion)

Consider the following argument:

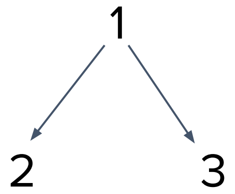
1. The people choose the legislature and the president.
2. The people serve as jurors to decide whether someone may be punished for a crime.

(Therefore) 3. The people control the actions of the government.



One premise, many conclusions

1. every particle attracts every other particle in the universe with a force that is directly proportional to the product of their masses and inversely proportional to the square of the distance between their centers.
2. Water flows downhill.
3. The roof of a building needs to be supported.



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One proposition serving as both a premise and a conclusion

We shouldn’t have gun control because it violates the right of self-defense, which people have because people have a right to life, and therefore have a right to defend themselves.

1. People have a right to life
2. People have a right to self-defense
3. Gun control violates the right of self-defense
4. We shouldnt have gun control

1

↓

2 + 3

↓

4

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1. An argument must have at least one premise and one conclusion; use an arrow to represent the link between them.
2. A single conclusion may be supported by more than one premise; use a plus sign and a single arrow for dependent premises, convergent arrows for independent ones.
3. A single premise may support more than one conclusion; draw divergent arrows.
4. An argument may have more than one step, so that a given proposition can be both a conclusion (of one step) and a premise (of another step); use separate arrows to represent each step, with the final conclusion on the bottom line.

Find an argument online or from the book (see pages 98-99), and diagram the argument. (Make sure to appropriately number the propositions involved!) Post your answer on the discussion board by Friday at 11:59pm. Post replies to two classmates' posts by Sunday night at 11:59pm, perhaps agreeing or disagreeing with their suggestion.

Also, take the time to work through some examples… this stuff will only get more complicated!

Optional extra video on diagramming:

https://www.youtube.com/watch?v=KiTP4w_Y9pA&t=14s

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Lecture 6: Chapter 5

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Applying the Method

We begin by identifying the conclusion and the premises, and giving them numbers. The numbers are merely a convenience, so that we don't have to keep writing out the propositions.

We have to assign numbers to all propositions that play a role, i.e., all the premises and conclusions. If the argument contains a complex sentence, we may have to break it down into its constituents.

Moreover, we assign numbers only to the propositions being asserted (for "If ____, then ____" sentences, only the whole sentences is asserted, not the components).

Once we've isolated and numbered the premises and conclusion, we can diagram the structure.

“It is an empirical claim, I think, [1] that all living organisms have living organisms as parents. The second empirical claim is [2] that there was a time on earth when there were no mammals. Now, if you allow me those two claims as empirical, then the claim [3] that mammals arose from non-mammals is simply a conclusion.”

3 is clearly labeled the conclusion, and 1 and 2 are identified as premises. If we only accept one premise but not the other, the argument collapses, so they are dependent:

<u>1 + 2</u>

↓

3

Logical Strength

To prove a conclusion, an argument must have 2 essential attributes:

1 its premises must be true

2 the premises must be logically related to the conclusion in such a way that if the premises are true, the conclusion is likely to be true as well.

This second attribute is the logical strength of the argument

If it is impossible for the conclusion to be false if the premises were all true, the argument is valid. (example: If Stella is a cat, then Stella is a mammal. Stella is a cat. Therefore, Stella is a mammal.) If the argument is valid and the premises are in fact true, the argument is sound.

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Logical strength is the degree of support that the premises confer on a conclusion- the degree to which the premises, if true, make it likely that the conclusion is true as well. The stronger the argument is, the tighter the relationship between its premises and conclusion; the weaker it is, the looser the relationship.

When we evaluate the argument as a whole in light of the components, there are two principles to follow. First, an argument with more than one step can be no stronger than its weakest step.

Second, when there are independent premises within a single step - that is, when two or more arrows converge on the same conclusion- the argument is at least as strong as its strongest component.

Implicit Premises

People rarely express in words all of the premises they are using. Most arguments contain some premises that are assumed but not stated, implicit rather than explicit. Consider:

[1] Sally has a broken leg. Therefore, [2] she can't come on the trip.

This argument clearly relies on the unstated assumption that [a] people with broken legs can't go hiking.

1 + a

↓

2

There are two basic rules we should follow when identifying implicit premises:

1. The premise we supply should close the logical gap between the stated premises and the conclusion
2. The premise we supply should not commit us to more than is necessary

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Find an argument online or from the book with unstated premises, and diagram the argument. (Make sure to appropriately number the propositions involved!) Post your answer on the discussion board by Friday at 11:59pm. Post replies to two classmates’ posts by Sunday night at 11:59pm, perhaps agreeing or disagreeing with their suggestion.

Also, take the time to work through some examples… this stuff will only get more complicated!

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The Art of Reasoning
Lecture 7: Chapter 6

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Fallacies

In the broadest sense of the term, a fallacy is any error in reasoning. But the term is normally restricted to certain patterns of errors that occur with some frequency, usually because the reasoning involved has a certain surface plausibility.

It is good to be aware of fallacious reasoning so you can avoid it in your own reasoning, and identify it when it is being used against you in debate.

Subjectivist Fallacies

The first and most straightfoward violation of objectivity is the fallacy of subjectivism, committed whenever we hold that something is true merely because we believe or want it to be true.

I believe/want p to be true

↓

P is true

In an argument of this sort, a subjective state- the mere fact that we have a belief or a desire- is being used as evidence for the truth of a proposition.

Appeal to Majority

The fallacy of appealing to the majority is committed whenever someone takes a proposition to be true merely because large numbers of people believe it (regardless of whether those people actually constitute a majority).

The majority (of people, nations, etc.) believe p

↓

p is true

The possibility that the majority are right is a possibility worth exploring. But we should look for objective evidence; mere popularity doesn't count.

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Appeal to Emotion

This fallacy is the attempt to persuade someone of a conclusion by an appeal to emotion instead of evidence. A person who commits this fallacy is hoping that her listeners will adopt a belief on the basis of a feeling she has instilled in them: outrage, hostility, fear, pity, guilt, or whatever.

This fallacy occurs only when rhetoric replaces logic, only when the intent is to make an audience act on emotion instead of rational judgment.

Governments once contracted with private interests to loot the ships of other nations

↓

New York State should not contract with private companies to collect garbage, maintain parks, and so forth.

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Appeal to Force

If I persuade you of something by means of threats, I have not given you a reason for thinking the proposition is true; I have simply scared you into thinking, or at least into saying, it is true. In this respect, the appeal to force might be regarded as a form of the appeal to emotion.

Fallacies involving Credibility

These fallacies misuse the standards of credibility for evaluating testimonial evidence.

Appeal to authority: using testimonial evidence for a proposition when the conditions for credibility are not satisfied or the use of such evidence is inappropriate.

Ad hominem: using a negative trait of a speaker as evidence tht his statement is false or his argument weak.

Fallacies of Context

These fallacies jump to a conclusion without considering a large enough context of evidence.

False alternative: excluding relevant possibilities without justification.

Post hoc: using the fact that one event preceded another as sufficient evidence for the conclusion that the first caused the second.

Hasty generalization: inferring a general proposition from an inadequate sample of particular cases.

Composition: inferring that a whole has a property merely because its parts have that property.

Division: inferring that a part has a property merely because the whole has that property

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Fallacies of Logical Structure

This kind of fallacy includes fallacies of logical structures, errors involving the relation between premises and conclusion.

Begging the question (circular argument): trying to support a proposition with an argument in which that proposition is a premise

Equivocation: using a word in two different meanings in the premises and/or conclusion

Appeal to ignorance: using the absence of a proof for a proposition as evidence for the truth of the opposing proposition.

Diversion: trying to support one proposition by arguing for another proposition.

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Now that you are aware of these fallacies…

Try not to ever use them again, and spot them when used by others!

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Find an argument online that commits a fallacy, and post it on the discussion board. Post your answer on the discussion board by Friday at 11:59pm. Post replies to two classmates' posts (answering what fallacy you think has been committed) by Sunday night at 11:59pm, perhaps agreeing or disagreeing with their suggestion.

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The Art of Reasoning
Lecture 8: Ch. 8

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Categorical Propositions

A categorical syllogism is a deductive argument with 2 premises, in which the premises and conclusion are categorical propositions.

A categorical proposition, in turn, is a statement that makes a straightforward assertion with no “ifs”, “ands”, or “buts.”

Categorical propositions are typically expressed by the simple type of sentence we discussed in Ch 4, containing a subject and a predicate, but no conjunctions or the other grammatical devices involved in more complex sentences.

Whales are not fish.

Stella is a dog.

Humans have free will.

Components of Categorical Propositions

A categorical proposition can be regarded as an assertion about the relations among classes. Consider:

Whales are mammals.

This proposition says that the first class, whales, is included in the second class, mammals.

Every categorical proposition says a certain relationship exists between two classes.

The parts of the proposition that refer to the classes are called th terms of the proposition, and there are 2 terms of the proposition, the subject (S) and the predicate (P).

In the above example, 'whales' is the subject and 'mammals' is the predicate. When necessary, we rewrite each proposition (without changing meaning) so that it has the form 'S is P' or 'Ss are Ps.'

In addition to a subject and predicate, each categorical proposition has a copula, indicated by the words ‘is’ and ‘are’. This is called the copula because it links subject and predicate.

The copula can be either affirmative or negative (this is its quality).

Whales are fish.

No whales are fish.

Copper is not a precious metal.

Gold is a precious metal.

Each categorical proposition also has a quantity. Some are universal (e.g., all whales are mammals), and some are particular (some whales live in the pacific ocean).

The quality and quantity determine the logical form of the categorical proposition; the subject and predicate determine its content.

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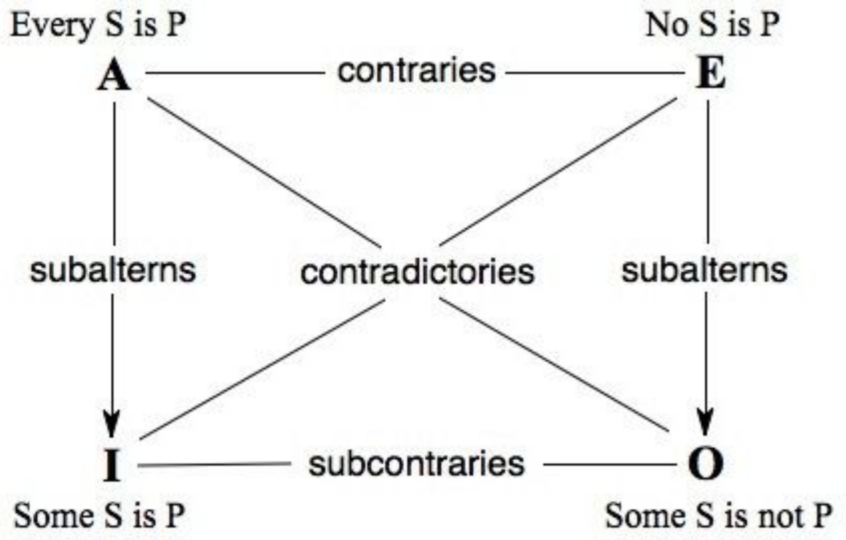
	Affirmative (affirm)	Negative (nego)
Universal	A: All S are P	E: No S are P
Particular	I: Some S are P	O: Some S are not P

The Square of Opposition



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https://www.youtube.com/watch?v=ZXfLJraWbaQ&t=30s

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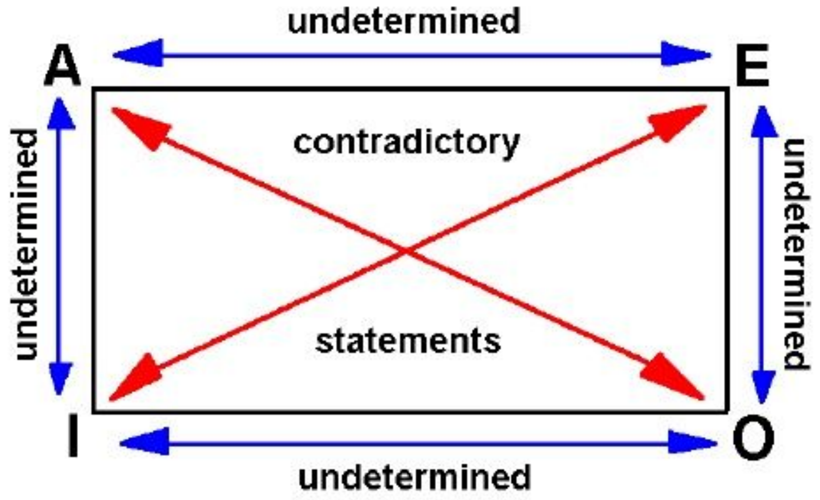
The Modern Square of Opposition

Modern Square of Opposition: have a contradictory relationship.



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Which version of the square of opposition should we adopt? (make sure to discuss existential import!) Post your answer on the discussion board by Friday at 11:59pm. Post replies to two classmates’ posts by Sunday night at 11:59pm, perhaps agreeing or disagreeing with their suggestion.

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Lecture 9: Chapter 8

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Summary Box 8.4

IMMEDIATE INFERENCES

	A	E	I	O
Proposition	All *S* are *P*	No *S* is *P*	Some *S* are *P*	Some *S* are not *P*
Converse	All *P* are *S* (not legitimate)	No *P* is *S*	Some *P* are *S*	Some *P* are not *S* (not legitimate)
Obverse	No *S* is non-*P*	All *S* are non-*P*	Some *S* are not non-*P*	Some *S* are non-*P*
Contra-positive	All non-*P* are non-*S*	No non-*P* is non-*S* (not legitimate)	Some non-*P* are non-*S* (not legitimate)	Some non-*P* are not non-*S*

You wont be graded on this, but:

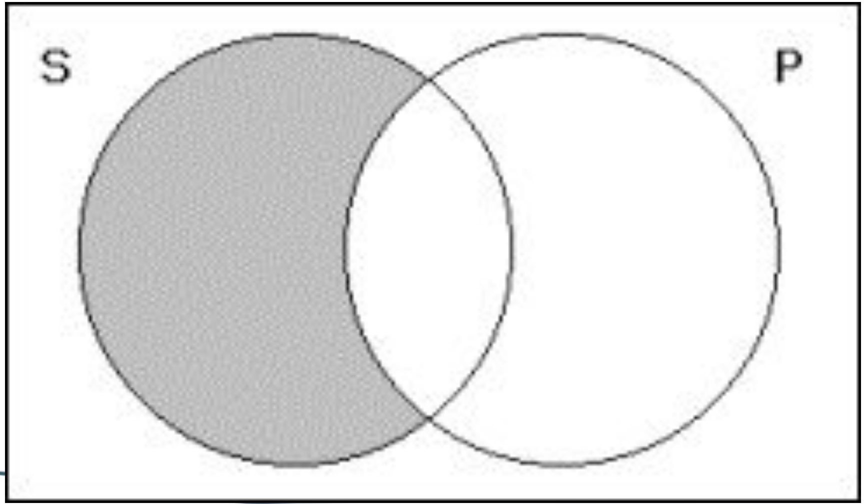
Obversion always results in an equivalent proposition.

Conversion is legitimate only for E and I propositions.
Contraposition is legitmate for A and O propositions.

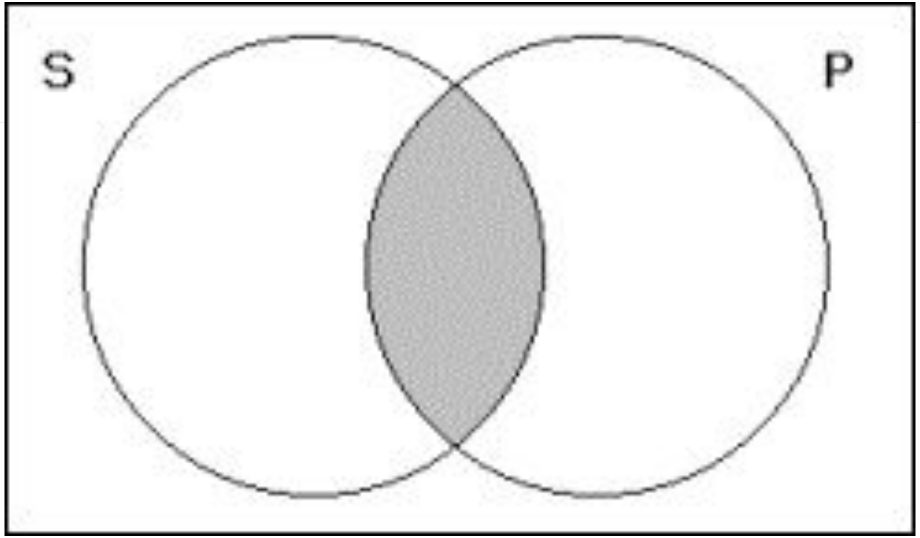
To construct a Venn diagram for a categorical proposition:

1. Draw two overlapping circles next to each other, representing the subject and predicate terms.
2. If the proposition is universal, shade out the area of the S circle which must be empty if the proposition is true.
3. If the proposition is particular, put an x in the area of the S circle where something must exist for the proposition to be true.
4. If the proposition contains a complementary term non-S or non-P, use shading (for universal propositions) or place an x (for particular propositions) in the area inside the box but outside the S or P circle.
5. Two propositions are equivalent if and only if the Venn diagrams for them are identical.

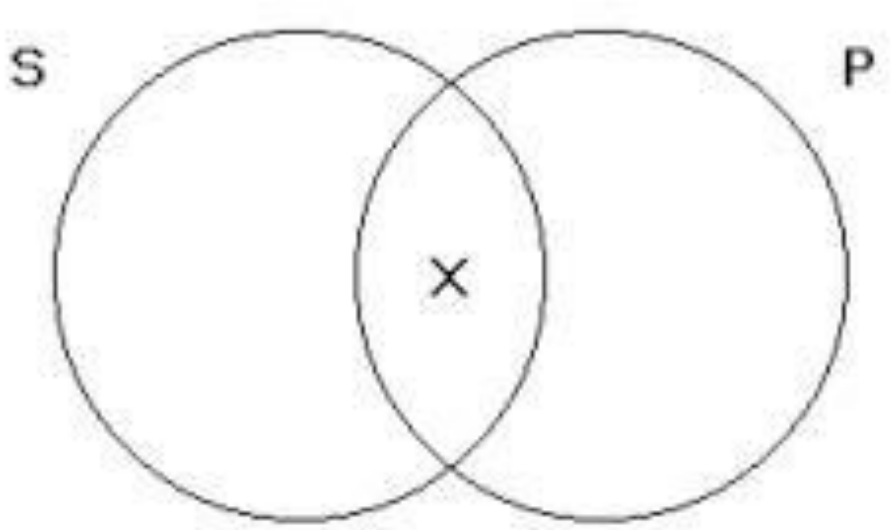
All S are P



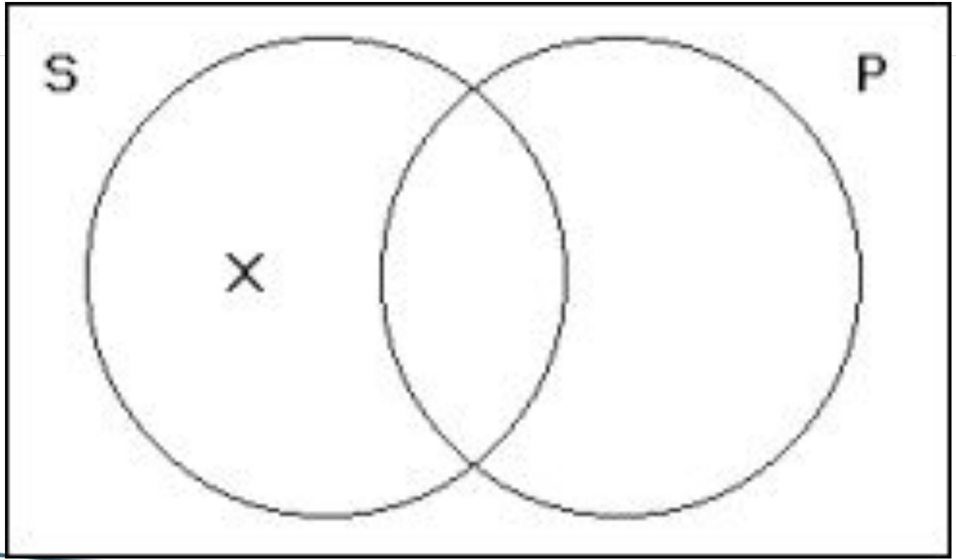
No S are P



Some S are P



Some S are not P



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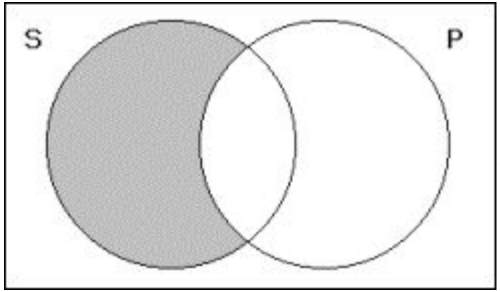
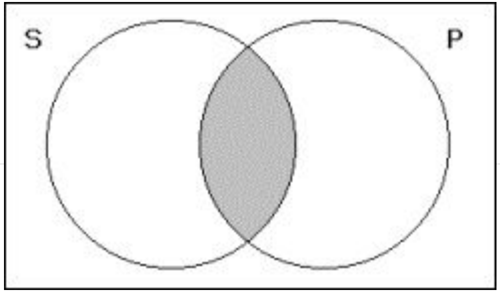
The Modern Square of Opposition Relations are Reflected:

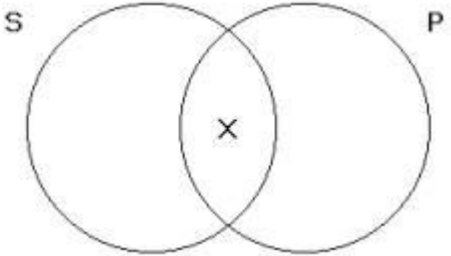
A



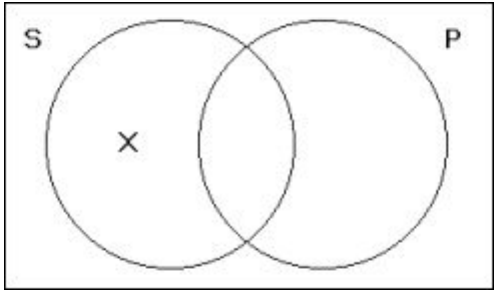
E



I



O



Fill in Ss and Ps for 2 of the exercises on page 226, and construct a Venn diagram for each. Post your answer on the discussion board by Friday at 11:59pm. Post replies to two classmates' posts by Sunday night at 11:59pm, perhaps agreeing or disagreeing with their suggestion.

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The Art of Reasoning
Lecture 10: Chapter 9

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Categorical Syllogisms

Categorical syllogisms are deductive arguments. In deductive arguments, the premises always work together to support the conclusion, so instead of diagramming the premises with a plus sign next to each other, the argument can be expressed in standard form:

1 Premise 1

<u>2 Premise 2</u>

3 Conclusion

Every syllogism has 3 propositions. Every proposition has two terms, and each syllogism contains 3 terms, each occurring twice. Each of the 3 terms has a distinct name.

The predicate of the conclusion is the major term (it also occurs in premise 1, the major premise). The subject of the conclusion is the minor term (which also occurs in premise 2, the minor premise). There is also a middle term that occurs once in each premise.

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P1) All M are P
Middle Major

P2) All S are M
Minor Middle

C) All S are P
Minor Major

Mood

The premises and conclusion of a categorical syllogism, in fact, can have any of the standard forms: A, E, I and O. A categorical syllogism is identified, in part, by reference to this fact.

We list the letters that identify the forms of the propositions in the syllogism in the following order: major premise, minor premise, conclusion.

This list is what is call the mood of the syllogism

Figure

The position of the middle term in the premises is called the figure of hte syllogism. Since there are two premises, and two possible positions in each premise, there are four figures. They are identified by number, as follows:

Figure 1	Figure 2	Figure 3	Figure 4
M–P	P–M	M–P	P–M
S–M	S–M	M–S	M–S
S–P	S–P	S–P	S–P

Example: IAI-4

Some P are M — Some crimes against property are frauds.

All M are S — All frauds are felonies .

Some S are P — Some felonies are crimes against property.

IAI because the Major premise is an I statement, as is the conclusion. The minor premise is an A statement.

It is figure 4, because, remember:

Figure 1	Figure 2	Figure 3	Figure 4
M–P	P–M	M–P	P–M
S–M	S–M	M–S	M–S
S–P	S–P	S–P	S–P

Validity

For deductive arguments, we use the term validity to designate logical strength, and validity is all or nothing.

A valid syllogism has no internal gap whatever; if the premises are true, the conclusion must be true; you cannot accept the premises and deny the conclusion without contradicting yourself. An invalid syllogism, on the other hand, has no strength; the premises confer no support on the conclusion.

The validity of a syllogism is determined by its form. If two syllogisms have the same form, they are either both valid or both invalid, even if one has true premises and the other has false ones.

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Rules for Testing Validity

Distribution

1. The middle term must be distributed in at least one premise.
2. If a term is distributed in the conclusion, it must be distributed in the premises in which it occurs.

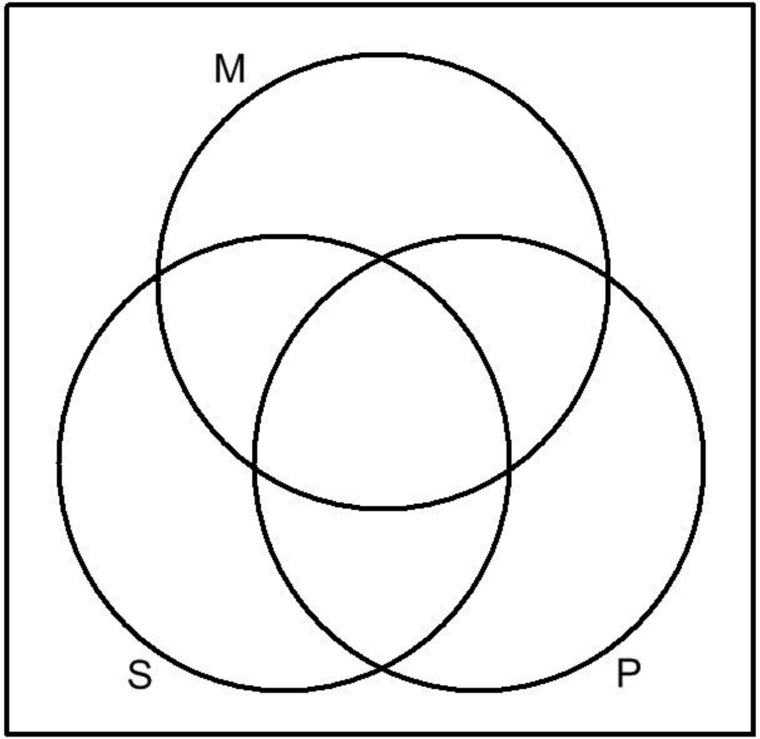
Negation

3. The premises cannot both be negative.
4. If one premise is negative, the conclusion must be negative, and if the conclusion is negative, one premise must be negative.

If we wish to incorporate the modern view of existential import, add:

5. If the conclusion is particular, one premise must be particular.

Venn Diagrams



The technique of Venn diagrams is based on the fact that in a valid syllogism, the conclusion asserts no more than what is already contained, implicitly, in the premises.

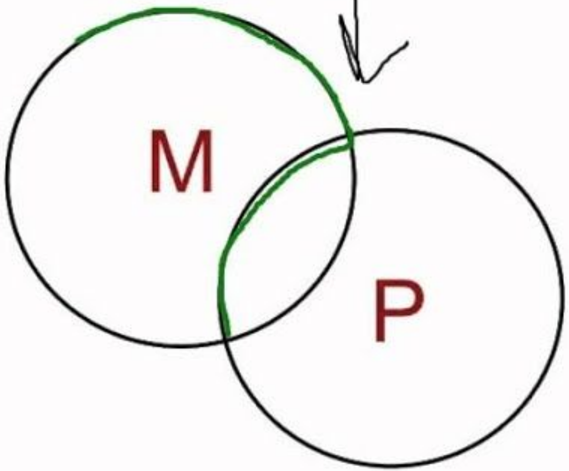
If the conclusion asserts more than that, it does not follow from the premises, and the syllogism is invalid.

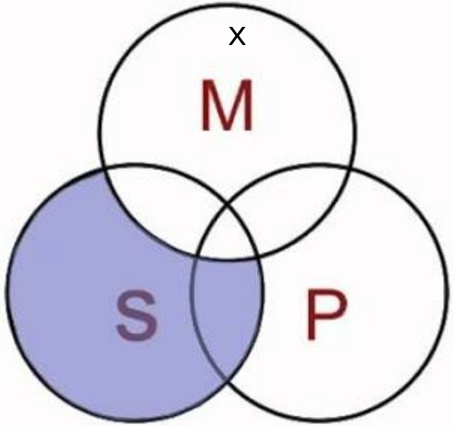
The technique is to diagram the premises, and then see whether anything would have to be added in order to diagram what the conclusion asserts. If so, the syllogism is invalid. If not, it's valid.

1. Draw three overlapping circles, representing the major, minor and middle terms.
2. Diagram each of the premises.
   a) Using just the two circles representing the terms in that premise, diagram the proposition as you would on a two-circle diagram.
   b) If one premise is universal and the other is particular, diagram the universal one first.
   c) In diagramming a particular premise, if there are two possible regions in which to put the x, put it on the line separating the regions.
3. Determine whether anything would have to be added to the diagram to represent the claim made by the conclusion. If anything would have to be added, the syllogism is invalid; if nothing would need to be added, it is valid.

Categorical Syllogisms

P_1: All S are M	A - claim
P_2: Some M are not P	O - claim
∴ Some S are not P	O - claim





We won’t cover the cancellation method or arithmetic notation.

Test a categorical syllogism for validity using the two methods covered in class. Did you get the same answer? Post your answer on the discussion board by Friday at 11:59pm. Post replies to two classmates' posts (by Sunday night at 11:59pm, perhaps agreeing or disagreeing with their suggestion.

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The Art of Reasoning
Lecture 11: Ch. 10

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1. Whales are mammals.
2. Either whales are mammals, or they are very large fish.
3. If whales are mammals, then they cannot breathe underwater.

1 is a categorical proposition.

2 has the structure p or q, which is a disjunctive proposition.

3 has the structure if p then q, which is a hypothetical proposition.

1 is contained or expressed in both 2 and 3, but neither 2 nor 3 asserts 1; they merely assert that some logical relationship exists between 1 and the other component sentence (‘they are very large fish’, and ‘they cannot breathe underwater’).

2 says that whales belong to the class of mammals or the class of fish, but it does not say which one.

3 says what the implication would be if whales were mammals- without asserting that they actually are.

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The components of a disjunctive proposition- p and q- are called disjuncts. Such a statement does not actually assert that p is true, or that q is true, but it says that at least one of them is true.

Structure of disjunctive syllogism:

p or q	Either Stella is a cat or Stella is a dog.
not -p	Stella isn’t a cat.
q	Stella is a dog.

If it is asserted that either p or q is true, and it’s also asserted that p is false, then it follows that q is true (since at least one of p and q are true, and p isn’t, q must be true).

If it is asserted that either p or q is true, and it’s also asserted that q is false, then it follows that p is true (since at least one of p and q are true, and q isn’t, p must be true).

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To be consistent with future logic classes you students may take, I will not cover disjunctive syllogisms which use ‘or’ in the exclusive sense, but I will say a bit about this issue.

Exclusive ‘or’: Whales are either firsh or they are mammals, but they are not both.

Inclusive ‘or’: I will have cake or icecream at the party (and possibly both).

Inferences of the following form are only valid if exclusive or is assumed:

Either p or q

<u>p</u>

Not q

For logical purposes, we assume or is used inclusively, so that affirming a disjunct is fallacious. You’ll see the difference in the logical forms when we get to propositional/sentential logic.

Hypothetical Propositions

A hypothetical proposition has the form “If p then q”, where p and q once again are the component propositions. But in this case they are not called disjuncts. The ‘if’ component is the antecedent, and the ‘then’ component is the consequent.

In a hypothetical proposition, we are not actually asserting the truth of p or q; we are saying that the truth of p would be sufficient to guarantee the truth of q.

Note:

If p then q.

is equivalent to:

If not q then p.

q unless not p.

q if p.

p only if q.

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Hypothetical Syllogisms

We can make a variety of inferences with hypothetical propositions.

Pure hypothetical syllogism (valid):

If p, then q.

<u>If q, then r.</u>

If p, then r.

If King is a rottweiler, then King is a dog.

<u>If King is a dog, then King is a mammal.</u>

If King is a rottweiler, then King is a mammal.

Mixed hypothetical Syllogisms (4, only 2 valid)

Modus ponens (valid)

If p then q

p

q

If Alex is a mother, then Alex is a parent.

Alex is a mother.

Alex is a parent.

Modus tollens (valid)

If p then q

<u>Not q</u>

Not p

If Alex is a mother, then Alex is a parent.

<u>Alex is not a parent.</u>

Alex is not a mother.

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Affirming the consequent (invalid)

If p then q

<u>q</u>

p

If Alex is a mother, then Alex is a parent.

<u>Alex is a parent.</u>

Alex is a mother.

WHAT IF ALEX IS A FATHER, NOT A MOTHER?
COUNTEREXAMPLE

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Denying the Antecedent (invalid)

If p then q

<u>Not p</u>

Not q

If Alex is a mother, then alex is a parent.

<u>Alex is not a mother.</u>

Alex is not a parent.

WHAT IF ALEX IS A FATHER, NOT A MOTHER?
COUNTEREXAMPLE

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Explain the difference between the four kinds of mixed hypothetical syllogisms. Post your answer on the discussion board by Friday at 11:59pm. Post replies to two classmates’ posts by Sunday night at 11:59pm, perhaps agreeing or disagreeing with their suggestion.

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The Art of Reasoning
Lecture 12: Chapter 11

This will be one of the shortest lectures of the course!

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In order to analyze deductive arguments as they occur in ordinary language, we need to identify the kind of syllogism involved: categorical, hypothetical, or disjunctive.

We rely partly on linguistic criteria of various kinds, such as the presence or absence of explicit quantifiers.

We also rely on substantive criteria: disjunctive syllogisms typically deal with alternative possibilities, hypothetical syllogisms with relationships of dependence, categorical syllogisms with relationships among classes.

Moreover, deductive arguments in everyday thought and speech are normally extended; to analyze and evaluate them, we need to break the arguments down into component steps, identifying our implicit premises and intermediate conclusions.

Our study of the classical approach to deductive reasoning is now complete. Even though the essential feature of deduction is that the conclusion is already contained in the premises, it should be clear that such reasoning is enormously valuable:

It is indispensable for clarifying our thoughts, enlarging our understanding of the issues, bringing order to complex material.

It is used pervasively in politics, law, ethics, and the sciences, as well as in everyday thinking.

It allows us to apply the knowledge embodied in our concepts for classes of things; to draw conclusions about cause and effect, means and ends; to find out way among the alternatives set by a given situation.

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However, the classical approach did not offer a complete account of deduction; there were certain problems it was unable to solve. In the next section, we will see how modern deductive logic addresses those problems.

In the end, moreover, deductive reasoning is only as good as the premises on which it relies, and those premises ultimately depend, in one way or another, on inductive reasoning, which we will examine in the last section.

Complete one of the exercises on page 325. Post your answer on the discussion board by Friday at 11:59pm. Post replies to two classmates' posts by Sunday night at 11:59pm, perhaps agreeing or disagreeing with their suggestion.

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The Art of Reasoning
Lecture 13: Chapter 12

Modern Deductive Logic! Finally! :)

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The forms of inference studied by classical deductive logic represent the simpler and more common sorts of inference we make in everyday thought and speech.

The goal of modern deductive logic has been to develop a more comprehensive system that will allow us to analyze and evaluate more complex arguments.

The characteristic features of modern theories are their use of symbols to represent the elements of logical form and their use of a small set of rules to generate and test arguments of any complexity.

We will first focus on propositional logic (which takes propositions as basic units) and then move on to the other branch of modern deductive logic, predicate logic (which deals with arguments that depend on the internal structure of categorical propositions).

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Propositional logic is one main branch of what is known as symbolic logic.

In earlier chapters, we used symbols such as p and q for propositions, S and P for terms. We symbolized the content of the propositions.

But we did not symbolize the logical form of propositions and arguments; we used words like all, some, if,then, and or. Modern symbolic logic replaces all of these with symbols.

In this respect it is like mathematics, which not only uses variables to represent numbers but also uses special symbols for operations like addition or multiplication that we can perform on numbers.

Connective symbols	Word	Technical term	Example
•	AND	Conjunction	p • q
v	OR	Disjunction	p v q
⊃	Implies	Implication	p ⊃ q
⇔	If and only if	Biconditional	A⇔ B
~	Not	Negation	~p

Conjunction Truth Table: The conjunction is only true when both p and q are true, on the first line of the truth table:

p	q	p • q
T	T	T
T	F	F
F	T	F
F	F	F

Negation Truth Table

The negation is only true when the component p is false, on the second row of the truth table.

p	~p
T	F
F	T

Disjunction Truth Table

The disjunction is true when at least one of the components p and q are true (or when both are true). It is only false on the last row of the truth table.

p	q	p v q
T	T	T
T	F	T
F	T	T
F	F	F

Conditional truth table

Conditionals say that IF the antecedent is true, then the consequent has to be true as well. The only time this is false is on the second row of the truth table, when the antecedent p is true and the consequent q is false. Either the antecedent is false, or the consequent is true, any time the conditional is true.

(This is the least intuitive truth table)

p	q	p ⊃ q
T	T	T
T	F	F
F	T	T
F	F	T

Note: The truth of a conditional is consistent with those combinations of truth values on rows 1, 3, and 4, but most conditional say something more than that, something not captured by the truth table.

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The biconditional truth table

The biconditional is true only when the components p and q have the same truth values, that is, when both are true (top row) or when both are false (bottom row).

p	q	p ≡ q
T	T	T
T	F	F
F	T	F
F	F	T

Answer two of the problems in practice quiz 12.2 (page 341-342) by Friday at 11.59pm. Post replies to two classmates’ posts by Sunday night at 11:59pm, perhaps agreeing or disagreeing with their suggestion.

The Art of Reasoning
Lecture 14: Ch. 12 & 13

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We have described each of the connectives in terms of a truth table.

Compound statements involving these connectives are therefore truth-functional.

That is, the truth or falsity of the compound statement is a function solely of the truth values of its components and does not depend on any other connection between components, e.g., the ‘something more’ in most conditional statements.

So far we have dealt with compound statements containing a single connective and one or two components. We can also put together much more complex statements, involving any number of connectives and components. To do so however, we need some rules of punctuation in order to avoid ambiguities.

Consider the following two statements:

1) Either I'll go home and watch TV, or I'll think about the election
2) I'll go home, and I'll either watch TV or think about the election.

These sentences contain the same component propositions: I'll go home, I'll watch TV; I'll think about the election. We can abbreviate them with H, T, and E, respectively.

They have the same connectives, either/or as well as and.

But they say different things. We mark this difference with parentheses.

1) Either I'll go home and watch TV, or I'll think about the election
2) I'll go home, and I'll either watch TV or think about the election.

1) (H • T) v E
2) H • (T v E)

The basic rule is to use parentheses so that the connectives •, v, and ⊃ join two components, where one or both components may themselves be compound statements marked off by parentheses. The main connective stands outside all parentheses.

A negation sign in front of a component statement is a denial of that component only, while a negation sign in front of a compound statement marked off by parentheses is a denial of the compound statement as a whole.

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To construct a truth table for a statement with more than one connective:

1. Make a column for each component statement, with enough rows for each possible combination of truth values among the components. (2 to the Nth power, where N is the number of atomic components or sentence letters)
2. Identify the connectives that apply directly to component statements. On each row, determine the truth value of the statement involving just that connective, and enter that truth value in a column under the connective.
3. Repeat step (2) until you reach the main connective (The one outside all parentheses). The truth values in its column are the truth values of the statement as a whole.

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A	B	C	$\sim A$	$\bullet$	$(B \vee C)$
T	T	T			
T	T	F			
T	F	T			
T	F	F			
F	T	T			
F	T	F			
F	F	T			
F	F	F			

Truth table test for argument validity (chapter 13)

To determine whether a propositional argument is valid:

1. Make a column for each component statement, with enough rows for each possible combination of truth values among the components (2 to the Nth power, where N is the number of atomic components or sentence letters).
2. Make a column for each premise, and for the conclusion, and compute their truth values for each row- i.e., for each combination of truth values of the components.
3. Identify each row in which the conclusion is false, and determine whether any of the premises are false in that row.
4. If there is at least one false premise in every row in which the conclusion is false, it is a valid argument. Otherwise it is invalid.

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Find an argument in English, symbolize it in propositional logic, and construct a truth table which contains all of the premises. Post your answer on the discussion board by Friday at 11:59pm. Post replies to two classmates' posts by Sunday night at 11:59pm, perhaps agreeing or disagreeing with their suggestion.

The Art of Reasoning
Lecture 15: Chapter 13

Proofs

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A proof is a series of small steps, each of which is itself a valid inference. If we can get from premises to conclusion by valid steps, then the argument as a whole is valid.

Constructing a proof often takes some ingenuity, so the fact that you haven't found a proof in a given case doesn't establish the argument is invalid (so unlike the truth table method, the method of proof won't establish that an argument is invalid).

Summary Box 13.1

Nine Basic Inference Forms

Simplification (Simp)

$$\frac{p \bullet q}{p} \qquad \frac{p \bullet q}{q}$$

Conjunction (Conj)

$$\begin{array}{l} p \\ \underline{q} \\ p \bullet q \end{array}$$

Addition (Add)

$$\frac{p}{p \vee q} \qquad \frac{q}{p \vee q}$$

Disjunctive syllogism (DS)

$$\begin{array}{l} p \vee q \\ \underline{\sim p} \\ q \end{array} \qquad \begin{array}{l} p \vee q \\ \underline{\sim q} \\ p \end{array}$$

Hypothetical syllogism (HS)

$$\begin{array}{l} p \supset q \\ \underline{q \supset r} \\ p \supset r \end{array}$$

Modus ponens (MP)

$$\begin{array}{l} p \supset q \\ \underline{p} \\ q \end{array}$$

Modus tollens (MT)

$$\begin{array}{l} p \supset q \\ \underline{\sim q} \\ \sim p \end{array}$$

Constructive dilemma (CD)

$$\begin{array}{l} (p \supset q) \bullet (r \supset s) \\ \underline{p \vee r} \\ q \vee s \end{array}$$

Destructive dilemma (DD)

$$\begin{array}{l} (p \supset q) \bullet (r \supset s) \\ \underline{\sim q \vee \sim s} \\ \sim p \vee \sim r \end{array}$$

Strategies for constructing proofs:

1. Working forward from the premises:

a) Look for pairs of premises to which the rules of modus ponens, modus tollens, disjunctive syllogism, hypothetical syllogism, or constructive or destructive dilemma can be applied.
b) Then see whether the result can be combined with a further premise in a way that takes you closer to the conclusion.

2. Working backward from the conclusion:

a. If the conclusion is a component statement, identify the premise(s) in which that statement occurs and look for ways to get from that premise(s) to the conclusion.
b. If the conclusion is a compound statement, identify the main connective and the elements it connects.
c. If the main connective is a conditional, look for a way to derive it by hypothetical syllogism.
d. If the main connective is conjunction, look for ways to derive each conjunct separately.
e. If the main connective is disjunction, look for a way to derive one of the disjuncts and then use the rule of addition (or look for a way to derive it with CD or DD)

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1. $A \supset B$	Premise
2. $C \bullet \sim B$	Premise
3. $(C \vee D) \supset E$	Premise
4. $E \supset F$ / $\sim A \bullet F$	Premise/Conclusion
5. $(C \vee D) \supset F$	3, 4 HS
6. C	2 Simp
7. $C \vee D$	6 Add
8. F	5, 7 MP
9. $\sim B$	2 Simp
10. $\sim A$	1, 9 MT
11. $\sim A \bullet F$	8, 10 Conj

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https://www.youtube.com/watch?v=8wsfrtAX_nE&list=PLS8vfA_ckeuZ9UjAHhA1q-ROZGuE_h21V&index=27&t=0s

Answer one of the problems from Practice Quiz 13.4 A (p 379). Post your answer on the discussion board by Friday at 11:59pm. Post replies to two classmates’ posts by Sunday night at 11:59pm, perhaps agreeing or disagreeing with their suggestion.

The Art of Reasoning
Lecture 16: Chapter 14

Predicate Logic

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Instead of me covering the basics of predicate logic, I’m going to link to the following video:

https://www.youtube.com/watch?v=sJuIfjFYyf8&t=159s

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Symbolize an argument in predicate logic. Post your answer on the discussion board by Friday at 11:59pm. Post replies to two classmates' posts by Sunday night at 11:59pm, perhaps agreeing or disagreeing with their suggestion.

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The Art of Reasoning
Lecture 17: Chapter 15-17

Inductive Reasoning

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While deductive reasoning draws out implications of knowledge we already possess, inductive reasoning expands our knowledge. (so we dont talk about validity in inductive reasoning, we talk about logical strength.)

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Generalization is a form of inductive inference in which we conclude that something is universally true of a class on the basis of evidence regarding a sample. To avoid the fallacy of hasty generalization, we should follow three basic rules in generalizing:

1. Use a sample that is sufficiently numerous and various
2. Look for disconfirming evidence
3. Consider whether the conclusion is plausible in light of other knowledge we possess

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Causal generalizations are claims that a certain type of fator is necessary and/or sufficient for a certain type of effect. To establish that factor a is causally related to effect E, we may use Mill’s four methods: agreement, difference, concomitant variations, and residues.

Mill’s methods can also be used negatively to argue against a causal claim. To evaluate an argument that mploys one or more of these methods, we should consider whether all the relevant factors have been varied appropriately.

Analogies can be used to argue for a conclusion as well as to describe or explain. When it is used in an argument, an analogy purports to show that B has the property P because A has that property and because B is similar to A.

To analyze such an argument, we must identify the respect in which A and B are similar- the property S that they share. To evaluate the argument, we must use inductive methods to determine whether there is a link between S and P.

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Analyzing arguments by analogy

1. Identify the 2 things being compared (A and B) and the property P attributed to B in the conclusion.
2. Identify the property S that is supposed to make A and B similar. If this is not stated explicitly, construct a similarity table and choose the most plausible candidate.
3. Analyze the argument into its inductive and deductive elements. The deductive step will be a syllogism with the major premise “All/No S is P”
4. Evaluate that premise as a generalization, looking for counter-analogies.

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Statistics

https://www.youtube.com/watch?v=L8gn86TaugY

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Find an example of an inductive argument online, and share it on the discussion board, along with your assessment of its logical strength. Post your answer on the discussion board by Friday at 11:59pm. Post replies to two classmates' posts by Sunday night at 11:59pm, perhaps agreeing or disagreeing with their suggestion.

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Lecture 18: Self-Guided Review

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For this class, feel free to go to the start of lecture slides and review all the material presented.