

Plato's Allegory of the Cave

The First Word of the Day is ...

Troglodyte

From the Greek word for ‘cave’ (*trōglē*).

The **Troglodytae** (Τρωγλοδοῦται) or **Troglodyti** (literally “cave goers”) are those who live in caves.

The Second Word of the Day is ...

Allegory

From the Greek *allēgoria* — from *allos* (other) + *agoria* (speaking).

An allegory is a story, poem, or picture that can be interpreted to reveal a hidden meaning behind the literal meaning.

The Cave

The Fire

The Roadway

Diffused Daylight

Ascent to Sunlight



Logic

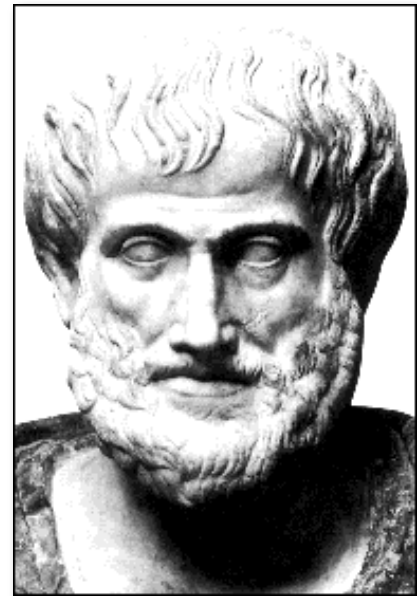
Overview

- (1) Sentences and Statements and Propositions
- (2) Simple and Complex Statements
- (3) Necessary and Sufficient Conditions
- (4) An argument as a reason to believe.
- (5) Arguments vs Explanations
- (6) Enthymemes
- (7) Practice Exercises

What is Logic?

- The study of good arguments or good reasoning.
- The study of how we *ought* to reason (not how we *do* reason).
- A *normative* science (as opposed to a *descriptive* science).
- Logic was first formally studied by Aristotle (384-322 BCE).
- Sample Argument:

All Athenians are Mortal.
Aristotle is an Athenian.
Therefore: Aristotle is Mortal.



Logic and Language

Sentences and Statements

A **sentence** is a string of words that follows the rules of grammar.

A **statement** is a sentence with a truth-value (a sentence that is either true or false).

Statements are functionally **informative**, and typically have the form of **assertions**.

Statements and Propositions

A **statement** is a sentence with a truth-value.

A **proposition** is the **meaning** of the statement.

Sentences and Statements

	Sentence	Statement/Proposition
1	I am sitting. [spoken by Steve Naragon at noon on June 3, 2016]	Steve Naragon was sitting at noon on June 3, 2016.
2	He is sitting. [spoken by another of Steve Naragon at noon on June 3, 2016]	
3	I was sitting at noon. [spoken by Steve Naragon later that day]	
4	I am sitting. [spoken by Alice Miller at noon on June 3, 2016]	Alice Miller was sitting at noon on June 3, 2016.

Simple and Complex Statements

Some Complex Statements

Conditional: If P, then Q

If you mow my yard this afternoon, then I'll pay you \$20.

P

Q

P and Q
are simple
statements

Conjunction: P and Q

Ed and Bob are Republicans. = Ed is a Republican and Bob is a Republican

P

Q

Disjunction: P or Q

Either that's a hedgehog climbing up your trousers or it's a porcupine. =

A hedgehog is climbing up your trousers or a porcupine is climbing up your trousers.

P

Q

Necessary and Sufficient Conditions

NC and SC are Everywhere

Conditional Statements: If P, then Q

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

P: Fido is a dog.

Q: Fido is a mammal.

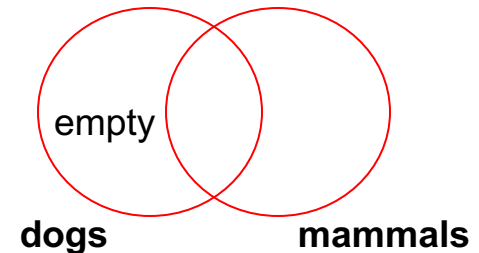
Categorical Statements: All P are Q

All dogs are mammals.

P: dogs

Q: mammals

P is a sufficient condition of Q
Q is a necessary condition of P



P is **sufficient** for Q = P being true is enough for Q to be true.

Q is **necessary** for P = P cannot be true unless Q is true.

SG Practice: Necessary and Sufficient

- Having a son is a _____ of being a parent.

Sufficient Condition

- Having four sides is a _____ of being a square.

Necessary Condition

- Being bald is a _____ of being a professor.

Neither necessary nor sufficient

- Being an unmarried man is a _____ of being a bachelor.

Both necessary and sufficient

SG Practice: Necessary and Sufficient

- Taking the exam is a _____ of passing the exam.

Necessary Condition

- Drinking that entire bottle of whisky at one sitting is a _____ of becoming inebriated.

Sufficient Condition

- Lighting a match is a _____ of starting a fire.

Sufficient Condition

- Being a mammal is a _____ of being an otter.

Necessary Condition

Identifying Arguments

Logic is about arguments.

Logic is about arguments.

and

An argument is a set of statements that support the truth of a further statement.

A Few Logic Terms

Sentence: A string of words following the rules of grammar.

Statement: A sentence with a truth-value.

Proposition (or “propositional content”): The meaning of the statement.

Truth-Value: The property of being true or of being false.

Argument: An attempt to prove the truth of some statement (the **conclusion**) by appealing to other statements already believed to be true (the **premises**).

Inference: The relationship that ties the premises to the conclusion, suggesting that the conclusion is true because the premises are true.

Fallacy: An argument that **appears** to support the conclusion, more than it actually does.

Sample Argument

- (1) If human beings consist entirely of matter, then none of their actions are free. } Premise
- (2) But human beings *do* consist entirely of matter. } Premise
- (3) Therefore none of their actions are free. } Conclusion

The premises, if true, give us a reason to believe that the conclusion is true.

Sample Argument

- (1) If human beings consist entirely of matter, then none of their actions are free. Premise
- (2) But human beings *do* consist entirely of matter. Premise
- (3) Therefore none of their actions are free. Conclusion

The premises and conclusion do *not* include “indicator”-words and other particles.

In Summary...

Argument = premises + conclusion +
inference

Premises/conclusion are all **statements**,
each expressing some **proposition**.

A **fallacy** is an argument whose **inference** is
weaker than it appears.

Identifying Arguments

When individuals voluntarily abandon property, they forfeit any expectation of privacy in it that they might have had. Therefore, a warrantless search or seizure of abandoned property is not unreasonable under the Fourth Amendment.

(Judge Stephanie Kulp Seymour, *United States v. Jones*)

Identifying Arguments

(1) When individuals voluntarily abandon property, they forfeit any expectation of privacy in it that they might have had. **Therefore**, (2) a warrantless search or seizure of abandoned property is not unreasonable under the Fourth Amendment.

(Judge Stephanie Kulp Seymour, *United States v. Jones*)

(1) gives us reason to believe (2).

Identifying Arguments

If Socrates is a student of nature, then he is an atheist. He is a student of nature. Therefore, he is an atheist.

(Plato, *Apology*)

Identifying Arguments

(1) If Socrates is a student of nature, then he is an atheist. (2) He is a student of nature.
Therefore, (3) he is an atheist.

(Plato, *Apology*)

(1) and (2) give us reason to believe (3).

Indicator Words

Conclusion Indicators

therefore, wherefore, thus, consequently, hence, accordingly, entails that, for this reason, so, it follows that, as a result, suggests that, proves that, indicates that, is likely that, ...

Premise Indicators

since, because, given that, in that, as indicated by, for, owing to, inasmuch as, may be inferred from, in view of ...

Explanations

(as backward arguments)

Arguments vs Explanations

- (1) John broke the window because he tripped.
- (2) John broke the window because he had forgotten his key and needed to get in.
- (3) John broke the window because he was the only person in the house.

(Fisher, *Logic of Real Arguments*, p. 18)

Arguments vs Explanations

(1) Explanandum: (John broke the window)

Why did he do that? Because ...

Explanans: (he tripped).

(2) Explanandum: (John broke the window)

Why did he do that? Because ...

Explanans: (he forgot his key).

(3) Conclusion: (John broke the window)

Why should I believe that? Because ...

Premise: (he was the only person in the house).

Enthymemes

Enthymemes #1

An enthymeme is any deductive argument that is missing either a premise or a conclusion, or sometimes both. For example:

We cannot trust this man, for he has lied
in the past.

Enthymemes #1

An enthymeme is any deductive argument that is missing either a premise or a conclusion, or sometimes both. For example:

We cannot trust this man, for he has lied in the past.

The complete argument would read:

Those who have lied in the past cannot be trusted.
This man has lied in the past.
Therefore, we cannot trust this man

Enthymemes #2

If you spend that much time playing video games,
then you will not do well in college

SKIP

Enthymemes #2

If you spend that much time playing video games, then you will not do well in college.

The complete argument could read:

If you spend that much time playing video games, then you will not do well in college.

You **are** spending that much time playing video games. Therefore, you will not do well in college.

Enthymemes #2

If you spend that much time playing video games, then you will not do well in college.

The complete argument could read:

If you spend that much time playing video games, then you will not do well in college.

You **are** spending that much time playing video games. Therefore, you will not do well in college.

Or, more hopefully, it might read:

If you spend that much time playing video games, then you will not do well in college.

You **want** to do well in college.

Therefore, you'll spend less time playing video games.

Logic Review

- (1) Sentences and Statements and Propositions
- (2) Simple and Complex Statements
- (3) Necessary and Sufficient Conditions
- (4) Premises give a reason to believe the conclusion.
- (5) Arguments vs Explanations
- (6) Enthymemes

Practice

Small Group Roles

Facilitators: start and stop the discussion, keep things on track.

Monitors: make sure everyone participates and all ideas are heard and considered.

Recorders: keep minutes; write down your group answer.

Everyone: listen closely to each other and ask questions when something isn't clear to you.

What's the Conclusion? (1/3)

That bicycle must belong to Mary, since it's either John's or Mary's, and it's way too big for John.

What's the Conclusion? (1/3)

- (1) That bicycle must belong to Mary, **since**
- (2) it's either John's or Mary's, **and**
- (3) it's way too big for John.

(2) and (3) give us reason to believe (1).

What's the Conclusion? (2/3)

Belief by U.S. citizens in global warming dropped by 20%, even though the scientific data still unequivocally support the claim that global temperatures are rising. This suggests that public opinion is being swayed by something other than the facts.

What's the Conclusion? (2/3)

(1) Belief by U.S. citizens in global warming dropped by 20%, **even though** (2) the scientific data still unequivocally support the claim that global temperatures are rising. **This suggests that** (3) public opinion is being swayed by something other than the facts.

(1) and (2) give us reason to believe (3).

What's the Conclusion? (3/3)

If Ed has black hair, then Ed is Italian, and Ed does indeed have black hair, so he must be Italian.

What's the Conclusion? (3/3)

- (1) If Ed has black hair, then Ed is Italian.
- (2) Ed does have black hair, **so**
- (3) Ed is Italian.

(1) and (2) give us reason to believe (3).

What's Missing? (1/2)

He's clearly not home, since his light is not on.

What's Missing? (1/2)

(1) He's clearly not home, **since** (2) his light is not on. [and (3) If his light is not on, then he's not home]

(2) and the missing premise (3) give us reason to believe (1).

What's Missing? (2/2)

If I want pizza, then I'll order pizza, but I don't want pizza.

What's Missing? (2/2)

- (1) If I want pizza, then I'll order pizza, but
(2) I don't want pizza. [Therefore (3) I
won't order pizza.]

(1) and (2) give us reason to believe the omitted conclusion (3).