

Class 1: Basic Logical Concepts

LOGIC

@ NYU SHANGHAI
WITH ZEE PERRY

First, some admin

Reminder: we've got things called "Attendance Quizlets" in this class.

They are small questions or problems that you will answer while you are "attending" class, and then upload within 24-48 hours.

There is NO attendance quizlet for today's class!! But you should be aware that future classes will have quizlet assignments on Brightspace that you will have to submit.

What is Logic?

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- Premise 1) Either the Butler or the Gardener did it.
- Premise 2) The Butler didn't do it.
- Conclusion) **Therefore,** the Gardener did it.

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- Premise 1) Either the Butler or the Gardener did it.
- Premise 2) The Butler didn't do it.
- Conclusion) **Therefore**, the Gardener did it.

(conclusion markers: So, Hence, Thus, Accordingly, Consequently)

Some of these sentences are the **premises**. And one of these sentences is the argument's **conclusion**.

In summary:

Arguments, Premises, and Conclusions

Arguments are a collection of sentences, one sentence of which is its **conclusion**, all the other sentences are its **premises**.

What's the difference between premises and the conclusion?

- Premises are supposed to give you *reason to believe* that the Conclusion is true.
- Premises are supposed to support (or "imply") the Conclusion.

Why do I say "supposed to"? Because *not all arguments succeed!*

Good Arguments are Valid Arguments

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An argument is GOOD if its premises **imply** or **support** its conclusion:
meaning: if you accept the premises, you should (must?) accept the conclusion

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_____ Argument A

If it's raining, I'll get my hair wet after class.
It's raining.
So, I'll get my hair wet after class.

_____ Argument B

If it's raining, I'll get my hair wet after class.
I got my hair wet after class.
Hence, It was raining.

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QUESTION: Which argument is Good? (Bad?)

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QUESTION: Which argument is Good? (Bad?)

GOOD Argument A

If it's raining, I'll get my hair wet after class.
It's raining.
So, I'll get my hair wet after class.

BAD Argument B

If it's raining, I'll get my hair wet after class.
I got my hair wet after class.
Hence, It was raining.

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An argument is **VALID** if its premises **imply** or **support** its conclusion:
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QUESTION: Which argument is Good? (Bad?)

VALID Argument A

If it's raining, I'll get my hair wet after class.
It's raining.
So, I'll get my hair wet after class.

INVALID Argument B

If it's raining, I'll get my hair wet after class.
I got my hair wet after class.
Hence, It was raining.

Valid arguments hold in “every case”

If an argument is **Valid**, its premises imply its conclusion no matter what.

- You can dream up any scenario you want, and, so long as the premises are true in the scenario, then the conclusion **must** be true (assuming the argument is valid)

Invalid arguments have Counterexamples.

- Counterexamples are: “cases” that show the argument is bad/invalid.
- Where a “case” is a possible hypothetical scenario (**waves hands**)

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- In the scenario, **the premises are all true, but the conclusion is false.**

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Recall the invalid argument:

If it's raining, I'll get my hair wet after class.
I got my hair wet after class.
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Recall the invalid argument:

If it's raining, I'll get my hair wet after class.

I got my hair wet after class.

Hence, It was raining.

QUIZLET Q2: What would be a **counterexample** to this argument?

Constructing Counterexamples

A **counterexample** to an invalid argument is a “case” (hypothetical scenario), where the premises are true and the conclusion is false.

In this: 1 and 2 are the premises, and 3 is the conclusion.

1. If it's raining, I'll get my hair wet after class.
2. I got my hair wet after class.
3. Therefore, It was raining.

Make premises true: Premise 1 is true if, in our scenario, we make rain behave normally, and assume we don't have a hat or umbrella.

Premise 2 could be made true in our scenario in a number of different ways:

- We could have our hair get wet from the rain, but that would conflict with our *other* premise, so the conclusion is false.
- We could have our hair get wet from another source, e.g. if you were on the swim team (and had practice after class), or if you took a shower before going to bed.

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Make premises true: Premise 1 is true if, in our scenario, we make rain behave normally, and assume we don't have a hat or umbrella.

Premise 2 could be made true in our scenario in a number of different ways:

- We could have our hair get wet from the rain, but that would conflict with our other premises.
- We could have someone else get our hair wet, e.g. if you were on the swim team (and had practice after class), or if you took a shower before going to bed.

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e.g. if you were on the swim team (and had practice after class), or if you took a shower before going to bed.

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Make premises true: Premise 1 is true if, in our scenario, we make rain behave normally, and assume we don't have a hat or umbrella.

Premise 2 could be made true in our scenario in a number of different ways:

- We could have our hair get wet from the rain, but that would conflict with our *other* goal: **make the conclusion false.**
- We could have our hair get wet some *other way*. Would that be possible? Consider, e.g. if you were on the swim team (and had practice after class), or if you took a shower before going to bed.

Counterexamples and Validity

If an argument has a counterexample, then it must be **Invalid**.

If an argument has *no* counterexamples
*meaning it's impossible to conceive of a scenario where
the premises are all true and the conclusion is false*
then it must be **Valid**.

So a **Valid** argument is one where it's **impossible** for all the premises to be true and the conclusion false.

Homework, due Monday at class-time!

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Chapter 1: Do Questions 1, 2 and 4.

Chapter 2: Do all Questions from Blocks A and B.

Chapter 3: Do all Questions from Blocks A and E.
Also do Questions 1, 2, 4, and 5 from Block C.