CRITICAL THINKING Lecture #22



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Categorical Syllogisms





Four Standard Forms of Categorical Statements (Generalized)

Universal Positive

\mathbf{A} : All X is Y.

Particular Positive

I: Some X is Y.

Note: A complement like non-S or non-P can substitute X or Y.

Universal Negative

E: No X is Y.

Particular Negative

O: Some X is not Y.

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Categorical Syllogisms

A categorical syllogism is an argument involves exactly three categorical statements (two premises, and one conclusion) that have a special form involving only three categories in total.





Some famous CEOs are mediocre hacks, but no insightful entrepreneurs are mediocre hacks. As a result, some famous CEOs are not insightful entrepreneurs.



Argument #1: Initial Parse

Some famous CEOs are mediocre hacks, but no insightful CEOs are not insightful entrepreneurs.

Note #1: Now we return to breaking apart any *conjunctive* statements (like that first sentence above) by treating each conjunct as a separate statement.

Note #2: There are two premises in the above argument, but I have not yet numbered them. There is a special way for numbering the statements in a categorical syllogism that I will explain in a moment.







Categorical Syllogisms: The Terms

The major term (*P*) of a categorical syllogism is the predicate term of the conclusion.

The minor term (S) of a categorical syllogism is the subject term of the conclusion.

in the conclusion.

- The middle term (M) of a categorical syllogism is the term appearing in both premises but not





Argument #1: The Terms

<u>Some famous CEOs are mediocre hacks, but no insightful</u> CEOs are not insightful entrepreneurs.

Major term (P): Insightful entrepreneurs. Minor term (S): Famous CEOs. Middle term (M): Mediocre hacks.



Categorical Syllogisms: Standard Symbolic Form

We can use these terms to put categorical syllogisms into standard symbolic form.

To do so, we now need to number the premises of the syllogism:

it. This is the major premise.

in it. This is the minor premise.

- Premise 1 is always the premise of the categorical syllogism that has the major term (P) in

Premise 2 is always the premise of the categorical syllogism that has the minor term (S)







Argument #1: Final Parse

Some famous CEOs are mediocre hacks, but no insightful

CEOs are not insightful entrepreneurs.

Major term (P): Insightful entrepreneurs. Minor term (S): Famous CEOs. Middle term (M): Mediocre hacks.



Note: In this case, the premises are *not* numbered in the order in which they appear. This is because the major premise, the premise with the major term (*P* = insightful entrepreneurs), is *always* treated as the first premise—even if it appears sequentially later in the argument.



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Categorical Syllogisms: Standard Symbolic Form

With the premises numbered, it is easier to symbolize the categorical syllogism using the major (P), minor (S), and middle (M) terms. Putting the argument in this form will now make it much easier to check its validity.





Argument #1: Standard Symbolic Form

Some famous CEOs are mediocre hacks, but no insightful

CEOs are not insightful entrepreneurs.

Major term (P): Insightful entrepreneurs. Minor term (S): Famous CEOs. Middle term (M): Mediocre hacks.





Assessing Categorical Syllogisms

Today, I will show the "memorization" method for assessing the validity of a categorical syllogism. Next class, I will show the much more useful Venn diagram method.





Categorical Syllogisms: Mood

The mood of a categorical syllogism expresses the three standard-form categorical statements that it contains. Therefore the mood consists of three letters:

I. Premise i's logical form (this is the major premise with P in it),

2. Premise 2's logical form (this is the minor premise with S in it), and

3. The conclusion's logical form.



Argument #1: Mood



statement, and the conclusion is an **O** statement.

and the conclusion's form is last.

- [An **E** statement.]
- An I statement.
- [An **O** statement.]
- For this argument, the mood is EIO because premise 1 is an E statement while premise 2 is an I
- The order of the letters matters. Premise i's logical form comes first, premise i's form is second,





Categorical Syllogisms: Figure

The figure of a categorical syllogism represents the argument's logical shape, which is determined by the position of the middle term (M) in the premises. There are only four possible figures:









Argument #1: Figure

looks like this



Hence this categorical syllogism has the second figure (or figure 2).

In this argument, the middle term (M) appears as the predicate in both premises, so its figure is





Categorical Syllogisms: Form

Any categorical syllogism can be categorized by its form, which is simply the syllogism's 3-letter mood, followed by a hyphen (-), followed by the number of the syllogism's figure.

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Argument #1: Form



This argument's mood is **EIO** and it has the second figure.

Putting these together, the form of this argument is EIO-2.

[An I statement.]

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Assessing Categorical Syllogisms: "Memorization" Method

It turns out that the form of a categorical syllogism (it sequence of three letters and number) is sufficient to determine the validity of that argument. The complete list of all valid categorical syllogisms (along with its Latin name):

AAA-1 Barbara AEE-2 (amestres AII-3 Datisi AEE-4 (amenes
EAE-1 (elarent EAE-2 (esare IAI-3 Disamis IAI-4 Dimaris
AII-1 Darii AOO-2 Baroko EIO-3 Ferison EIO-4 Fresison
EIO-1 Ferio EIO-2 Festino OAO-3 Bokardo

Any categorical syllogism whose form is *not* on this list is invalid.





Argument #1: Validity

1. No P is M. 2. Some S is M.

 \therefore Some S is not P.

This argument has form **EIO-2**.

It is a *valid* argument because this form is on the list of valid arguments. (It is *Festino*.)





Is this a valid or invalid argument?

failures are mediocre hacks. Thus, some popular CEOs are not





Some popular CEOs are mediocre hacks, but <u>all pathetic</u> failures are mediocre hacks. Thus, some popular CEOs are not CI C





Major term (*P*): Pathetic failures. Minor term (S): Popular CEOs. Middle term (M): Mediocre hacks.

failures are mediocre hacks. Thus, some popular CEOs are not





Major term (*P*): Pathetic failures. Minor term (S): Popular CEOs. Middle term (M): Mediocre hacks.







Major term (*P*): Pathetic failures. Minor term (S): Popular CEOs. Middle term (M): Mediocre hacks.

failures are mediocre hacks. Thus, some popular CEOs are not

- 1. All P is M. 2. Some S is M.
- Some S is not P.



Argument #2: Mood



Mood: AIO.

- [An A statement.]
- [An I statement.]
- [An **O** statement.]



Argument #2: Figure



Figure: 2.



Argument #2: Form



Mood: AIO.

Figure: 2.

Form: AIO-2

[An I statement.] [An **O** statement.]

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Argument #2: Validity



Mood: AIO.

Figure: 2. Form: AIO-2.

This argument is *invalid* because AIO-2 is not on the list of valid forms.

[An A statement.]

[An I statement.] An **O** statement.





Some clever people are entrepreneurs, and all clever people work hard. Therefore, some entrepreneurs work hard.

Is this a valid or invalid argument?



Argument #3: Initial Parse

Some clever people are entrepreneurs, and all clever people work hard. Therefore, some entrepreneurs work hard.



Argument #3: The Terms

Some clever people are entrepreneurs, and all clever people work hard. Therefore, some entrepreneurs work hard.

Major term (*P*): Hard workers. Minor term (S): Entrepreneurs. Middle term (M): Clever people.



Argument #3: Final Parse

work hard. Therefore, some entrepreneurs work hard.

Major term (*P*): Hard workers. Minor term (S): Entrepreneurs. Middle term (M): Clever people.



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Argument #3: Standard Symbolic Form

Some clever people are entrepreneurs, and all clever people $\frac{1}{2}$ work hard. Therefore, (some entrepreneurs work hard.)

Major term (*P*): Hard workers. Minor term (S): Entrepreneurs. Middle term (M): Clever people.

1. All M is P. 2. Some M is S. . Some S is P.



Argument #3: Mood



Mood: AII.

[An A statement.] [An I statement.] [An I statement.]



Argument #3: Figure

1. All M is P. 2. Some M is S.

Figure: 3.



Argument #3: Form



Mood: AII.

Figure: 3.

Form: AII-3.

[An A statement.]

[An I statement.] [An I statement.]



Argument #3: Validity

1. All M is P. Third figure. 2. Some M is S. \therefore Some S is P.

Mood: AII.

Figure: 3. Form: **AII-3**.

This argument is *valid* because **AII-3** is on the list of valid forms. (It is *Datisi*.)

[An A statement.]

[An I statement.] [An I statement.]

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Next Class...

We will learn how to use Venn diagrams to assess the validity of categorical syllogisms.

This is a much better way for checking validity, though the memorization method is still a possible way for checking your work.

