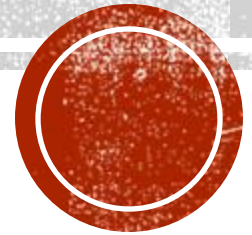# UNIT E

Evaluating Deductive Arguments

VALIDITY AND SOUNDNESS

- Deductive arguments are evaluated on two grounds: **truth** of premises and **validity**

- Validity: a deductive argument is valid **if** the premises are true and it is <u>impossible</u> for the conclusion to be false.

- i.e. the conclusion has to be true if the premises are true

- Upshot: **regardless of the content of the premises**, deductive arguments can be evaluated for their validity

- A **sound** deductive argument is one which is **both** valid <u>and</u> has true premises

TEST FOR VALIDITY

- **Assume** that the premises are true:

- Is the conclusion **conceivably** false?

- As opposed to plausible

- If yes, then the argument is invalid

Premise 1: All men are married
FALSE

Premise 2: Some doctors are not married
TRUE

Conclusion: Some doctors are not men
TRUE

WHICH IS VALID?

- Example 1

P1: The Prime Minister's dog is infested with fleas.

P2: Fleas are bacteria.

C: The Prime Minister's dog is infested with bacteria. (P1-2)

- Example 2

P1: Colette owned a dog.

P2: All French bulldogs are dogs.

C: Colette owned a French bulldog. (P1-2)

WHICH IS VALID?

- Example 3

P1: All television networks are media companies.

P2: NBC is a television network.

C: NBC is a media company. (P1-2)

- Example 4

P1: All automakers are computer manufacturers.

P2: United Airlines is an automaker.

C: United Airlines is a computer manufacturer. (P1-2)

WHICH IS VALID?

▪ <u>Example 5</u>

P1: All banks are financial institutions.

P2: Wells Fargo is a financial institution.

C: Wells Fargo is a bank. (P1-2)

▪ <u>Example 6</u>

P1: Only banks are financial institutions.

P2: Well Fargo is a financial institution.

C: Wells Fargo is a bank. (P1-2)

WHICH IS VALID?

- <u>Example 7</u>

P1: Australia is surrounded by water

P2: All islands are surrounded by water

C: Australia is an island (P1-2)

- <u>Example 8</u>

P1: Ducks lay eggs.

P2: Human beings are not ducks.

C: Human beings don't lay eggs. (P1-2)

WHAT ABOUT THIS?

- Example 9

P1: This argument is valid

C: I am Goh Chok Tong (P1)

Valid! But why?

Do the test of validity – **assume** P1 is true

But if P1 is true, then C **must follow**

Hence, it **is** valid

And thus, P1 is true

Thus, the argument is **sound**!

TEST FOR SOUNDNESS

- 1) Is the deductive argument **valid**?
- 2) Are the premises (including implicit ones) all **true**?

- If **any** of the answers is a "no", then the argument is unsound.
- i.e. an argument needs to be **both** valid <u>and</u> possesses true premises for it to be sound
- Upshot: possible for an argument to be valid and still unsound because of false premises.

SOME PERMUTATIONS

	Valid	Invalid
True premises True conclusion	All wines are beverages. Chardonnay is a wine. Therefore, chardonnay is a beverage. **[sound]**	All wines are beverages. Chardonnay is a beverage. Therefore, chardonnay is a wine. **[unsound]**
True premises False conclusion	None exist	All wines are beverages. Ginger ale is a beverage. Therefore, ginger ale is a wine. **[unsound]**
False premises True conclusion	All wines are soft drinks. Ginger ale is a wine. Therefore, ginger ale is a soft drink. **[unsound]**	All wines are whiskeys. Chardonnay is a whiskey. Therefore, chardonnay is a wine. **[unsound]**
False premises False conclusion	All wines are whiskeys. Ginger ale is a wine. Therefore, ginger ale is a whiskey. **[unsound]**	All wines are whiskeys. Ginger ale is a whiskey. Therefore, ginger ale is a wine. **[unsound]**

CIRCULAR ARGUMENTS

- A sound deductive argument must also be **non-circular** for it to be accepted

- A circular argument occurs when the author/speaker **begins** with what he/she is trying to **end up with**

- Example

P1: A bullfighter is and should be a man.

*C: women shouldn't fight bulls, even though they have rights. (P1)*

- Why is it circular?

- The president is basically saying that women shouldn't fight bulls because… women shouldn't fight bulls

TEST FOR CIRCULARITY

- Is the conclusion of the argument already **fully stated** in the premise(s)?

- If yes, then the argument is circular and to be rejected

Circular reasoning is good...

because...
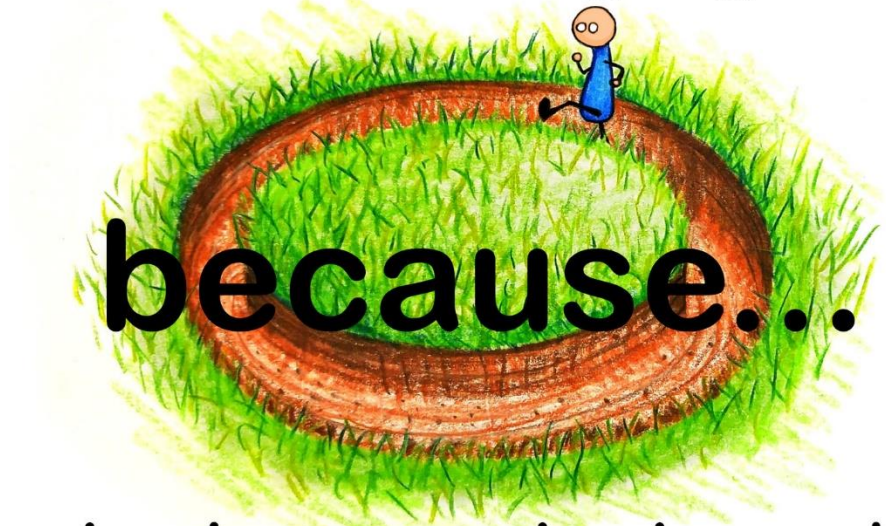
ciruclar reasoning is good?

RECAP

- A deductive argument is accepted only if the following conditions are **all** met:

- 1) Valid

- 2) True premises

- 3) Non-circular

SOME BASIC FORMS

Modus ponens (MP)	Modus tollens (MT)
If A, then B. A. Therefore, B.	If A, then B. Not B. Therefore, not A.
Hypothetical syllogism (HS)	**Disjunctive syllogism (DS)**
If A, then B. If B, then C. Therefore, if A, then C.	Either A or B. Not A. Therefore, B.
Barbara	**Celarent**
All M are P. All S are M. Therefore all S are P.	No M are P. All S are M. Therefore no S are P.
Darii	**Ferio**
All M are P. Some S are M. Therefore some S are P.	No M are P. Some S are M. Therefore some S are not P.

HOMEWORK

- Exercise D in lecture notes

- Reconstruct the following arguments in the form of an Arrow Diagram.

- Evaluate them for validity and truth of premises.

LET'S DO A FEW TOGETHER

▪ 1) Since <u>Moby Dick</u> was written by Shakespeare, and <u>Moby Dick</u> is a science fiction novel, it follows that Shakespeare wrote a science fiction novel.

Moby Dick was written by Shakespeare

Moby Dick is a science fiction novel

False   *Valid*   *True*

Shakespeare wrote a science fiction novel