



# Critical Thinking

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## LECTURE 3 Validity & Soundness



### Summary:

In this week's lectures, we will learn ...

- (1) What it is for an argument to be **valid**.
- (2) What it is for an argument to be **sound**.
- (3) How to identify **missing premises** for an argument.

We will also analyse some arguments in relation to ...

- (4) **Animal Rights** (from Tom Regan)
- (5) **Debate Motion (1)**: "Australia has no more right to condemn Japanese whaling than Japan has to condemn the slaughtering of kangaroos (and other animals) in Australia."

# Part I. Validity

An argument is **valid** = The truth of the premises **logically (i.e., 100%) guarantees** the truth of the conclusion (intuitive idea)

An argument is **valid** =<sub>df</sub> It is **logically impossible** for all the **premises to be true but the conclusion to be false at the same time** (official definition)

That means: There is **no** logically possible situation (i.e., **no** situation that can be consistently imagined) in which all the premises are true and yet the conclusion is false at the same time.



## Examples

**P1. All crows have black beaks.**  
**P2. Andrew's bird is a crow.**  
-----  
**C. Andrew's bird has a black beak.**

**valid**

**P1\*. Most crows have black beaks.**  
**P2. Andrew's bird is a crow.**  
-----  
**C. Andrew's bird has a black beak.**

**invalid**

## More Examples

**P. John has yellow fingers.**  
-----  
**C. John has fingers.**

**valid**

It is logically impossible for John to have yellow fingers and yet not to have fingers.

**valid**

**(1) If Sheldon believes  $p$ , then  $p$  is true.**  
**(2) Sheldon believes  $p$ .**  
-----  
**(3)  $p$  is true.**

**(1) and (2) logically (100%) guarantee (3)**

- If (1) and (2) are true then (3) must be true.
- It is logically impossible for (3) to be false under the assumptions of (1) and (2).
- For (3) being false contradicts both (1) and (2) being true.

**P. John has yellow fingers.**  
-----  
**C. John is a cigarette smoker.**

**invalid**

It is logically possible for John to have yellow fingers and yet not be a cigarette smoker.

**invalid**

**(1) If Sheldon believes  $p$ , then  $p$  is true.**  
**(3)  $p$  is true.**  
-----  
**(2) Sheldon believes  $p$ .**

**(1) and (3) don't logically guarantee (2)**

- Even if (1) and (3) are true, (2) could still be false.
- It is logically possible for (2) to be false even under the assumptions of (1) and (3)
- For (2) being false does not contradict both (1) and (3) being true.

An argument is **valid** =<sub>df</sub> It is **impossible** for all the premises to be true but the conclusion to be false at the same time

### More Examples

**valid**

Mark is a doctor or an addict (or both).  
Mark is not a doctor.

-----  
Mark is an addict.

**invalid**

Mark is a doctor or an addict (or both).  
Mark is a doctor.

-----  
Mark is not an addict.

**invalid**

Uluru is in Australia  
I do not live at Uluru.

-----  
I do not live in Australia.

**valid**

Uluru is in Australia.  
I do not live in Australia.

-----  
I do not live at Uluru.

Both arguments below have true premise and true conclusion. Yet one is valid, and the other is invalid.  
An argument's premises and conclusion being true doesn't make the argument valid !

Obama has brown eyes. (T)

-----  
**VALID**

Someone has brown eyes. (T)

Someone has brown eyes. (T)

-----  
**INVALID**

Obama has brown eyes. (T)

Both arguments below have false premise and false conclusion. Yet one is valid, and the other is invalid.  
An argument's premises and conclusion being false doesn't make the argument invalid !

Everything is white. (F)

-----  
**VALID**

All swans are white. (F)

All swans are white. (F)

-----  
**INVALID**

Everything is white. (F)

### **LESSON:**

In general, we cannot tell if an argument is valid / invalid simply by checking the (actual) truth / falsity of its premises and conclusion !

- We must check whether the premises logically guarantee the conclusion – i.e., whether under the assumptions of the premises, the conclusion would have to be true (regardless of whether they are actually true or false).
- If it is logically impossible for the conclusion to be false under the assumptions of the premises, then the argument is valid. But if it is logically possible for the conclusion to be false under those assumptions, then the argument is invalid.

All arguments below have **MIXED** premises and conclusion - in terms of whether they are true or false.

Yet again, some are valid, but some others are invalid.

All men are mortals. (T) All mortals are males. (F) ----- All men are males. (T)	<b>VALID</b>	All men are males. (T) All mortals are males. (F) ----- All men are mortals. (T)	<b>INVALID</b>
All women are humans. (T) Some women have wings. (F) ----- Some humans have wings. (F)	<b>VALID</b>	All women are humans. (T) Some humans have wings. (F) ----- Some women have wings. (F)	<b>INVALID</b>
All dogs are mammals. (T) Dogs exist. (T) ----- Mammals exist. (T)	<b>VALID</b>	All dogs are mammals. (T) Mammals exist. (T) ----- Dogs exist. (T)	<b>INVALID</b>

### Summary

	All premises are <u>true</u>	Some premises are <u>false</u>
Conclusion is <u>true</u>	some <b>valid</b> arguments some <b>invalid</b> arguments	some <b>valid</b> arguments some <b>invalid</b> arguments
Conclusion is <u>false</u>	only <b>invalid</b> arguments	some <b>valid</b> arguments some <b>invalid</b> arguments

### Official Definitions of "Validity"

An argument is valid =<sub>df</sub> The premises logically (i.e., 100%) guarantee the conclusion. (intuitive idea)

An argument is **valid** =<sub>df</sub> It is logically **impossible** for all the premises to be true but the conclusion to be false at the same time.

= It is logically **necessary** that **if** all the premises are true **then** the conclusion is also true. (This is what "100% guarantee" means!)

An argument is **invalid** =<sub>df</sub> It is logically **possible** for all the premises to be true and yet the conclusion to be false at the same time.

= It is **not** logically **necessary** that **if** all the premises are true **then** the conclusion is true. (This means: no 100% guarantee.)

What do we mean by "logically possible" ?

Anything is logically possible so long as it is **not** (and does not imply) a contradiction.

## Part II. Soundness

An argument is **sound** =<sub>df</sub> (1) The argument is **valid**, and  
(2) **all** its premises are **true**.

An **argument** is either **valid** or **invalid**, **sound** or **unsound**.

An **inference** (i.e., the reasoning, the move, from premises to conclusion) can also be said to be valid or invalid.

Please DON'T say that an argument (or inference) is true or false.  
(That would be a misuse of terms.)

A **statement** is either **true** or **false**.

Please DON'T say that a statement is valid or invalid, sound or unsound.  
(That would also be a misuse of terms.)

### Are the following arguments sound ?

Andrew is a man or a woman. (true)  
Andrew is not a woman. (true)  
-----  
Andrew is a man.

**Valid** **Sound**

Andrew is a man or a woman.  
Andrew is not a man. (false)  
-----  
Andrew is a woman.

**valid** **unsound**

Uluru is in Australia.  
I do not live at Uluru.  
-----  
I do not live in Australia.

**invalid** **unsound**

Some dogs have two noses. (true)  
-----  
Some dogs have two noses.

**valid** **sound** **circular !**

**no good**



Important: **Not all sound arguments are good arguments !**

## Part III. Missing Premise

Statement  $p$  is a **missing premise** for an argument

=<sub>df</sub> (1) The argument, as it stands, is invalid, and  
(2) adding  $p$  to the argument as a premise will make it valid (but not circular).

Prostitution is immoral.

-----  
Prostitution should be made illegal.

*Missing premise:* **If X is immoral then X should be made illegal.**

You should not eat unhealthy food.

-----  
You should not eat food that contains trans-fats.

*Missing premise:* **Food that contains trans-fats is unhealthy.**

If you want to go to Heaven then you should believe in my God.

-----  
You should believe in my God.

*Missing premise:* **You want to get to Heaven.**

P1. You trust Andrew.  
P2. Andrew trusts me.

-----  
C. You should trust me.

*Missing premise:*

**If A trusts B and B trusts C, then A should trust C.**

All intelligent beings have a right to life.

-----  
Inspector Rex has a right to life.

*Missing premise ?*

**Inspector Rex is intelligent.**

**YES !**

**Inspector Rex has a right to life.**

**NO**, because that would make the argument **circular**.

**Inspector Rex is an intelligent Alsatian.**

**NOT the best choice**, because in order to made the argument valid, it is *unnecessary* to assume that Rex is an Alsatian.

All rational and civilized people should treat each other as equals.

-----  
You should treat your brother as an equal.

*Missing premise 1:* **Your brother is a rational and civilized person.**

*Missing premise 2:* **You are a rational and civilized person.**

## Part IV. Two Arguments from Tom Regan for Animal Rights

Putting the arguments in the following videos in **Standard Form**:

- 🎧 [Tom Regan: Animal Rights - An Introduction 3/5](http://www.youtube.com/watch?v=_jk9EnqE4H0&feature=related) ([http://www.youtube.com/watch?v=\\_jk9EnqE4H0&feature=related](http://www.youtube.com/watch?v=_jk9EnqE4H0&feature=related))
- 🎧 [Tom Regan: Animal Rights - An Introduction 4/5](http://www.youtube.com/watch?v=fx_V0BdxRno&feature=related) ([http://www.youtube.com/watch?v=fx\\_V0BdxRno&feature=related](http://www.youtube.com/watch?v=fx_V0BdxRno&feature=related))
- 🎧 [Tom Regan: Animal Rights - An Introduction 5/5](http://www.youtube.com/watch?v=i1LjVn5FMjc&feature=related) (<http://www.youtube.com/watch?v=i1LjVn5FMjc&feature=related>)

See model answer at:

<http://www.academics-australia.org/CRT/CRTsemester1/2010crt/LECTURES/ExtraMaterials/extras4crtlecture3/reganstandardformsmall.pdf>

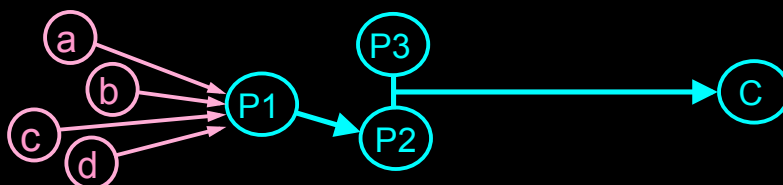
## Part V. Arguments defending Japanese Whaling !!

Click here for [Video](#) and [Transcript](#) of “Racist Australia and Terrorist Sea Shepherd”

### **Argument A** (on the motive of the Australian campaign)

- a.
  - b. Australia has destructive agricultural policies.
  - c. More than 70% of forest in Australia has already been destroyed.
  - d. Australia has one of the world’s highest mammal extinction rates.
- P1. Australia has no respect for nature or endangered animals. (from a, b, c, d)
- P2. The Australian campaign against Japanese whaling has nothing to do with environmental protection. (Intermediate Conclusion, from P1)
- P3. Australia has a history of racism towards non-white people.

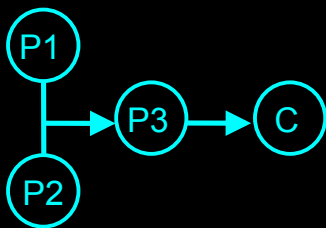
- 
- C. The Australian campaign against Japanese whaling is (mainly) driven by racist attitudes towards Japanese. (Final Conclusion, from P2 & P3)



## Argument B (Defending Japanese Whaling)

- P1. All animals (e.g., whales, kangaroos, foxes) are equally valuable. (evaluative claim)
- P2. The killing of kangaroos and other wildlife in Australia causes just as much animal suffering as Japanese whaling does. (empirical claim)
- P3. The killing of kangaroos and other wildlife in Australia is just as wrong as Japanese whaling - if it is indeed wrong for humans to kill valuable animals or to cause animal suffering. (intermediate conclusion, from P1 & P2)

- C. Australia has no more right to condemn Japanese whaling than Japan has to condemn the killing of kangaroos and other wildlife in Australia. (final conclusion, from P3)



Premises true ?

Sub-arguments legitimate ?

Other relevant factors to the wrongness of killing an animal ?

### Possible objections to P1 (in Argument B)

- ⊙ Australia) are not, makes whales more valuable (and so have a greater right to life) than those other animals. (The Endangered Species Objection)
- ⊙ P1 is false. For the fact that whales are more intelligent than kangaroos (and other animals legally killed in Australia) makes whales more valuable (and so have a greater right to life) than those other animals. (The Intelligent Species Objection)
- ⊙ P1 is false. For the fact that kangaroos (and some other animals legally killed in Australia) are pest because they endanger some plant species, makes them less valuable (and so have a lesser right to life). (The Pest Species Objection)

### Relevant empirical questions

- ⊙ How threatened are the species of whales hunted by Japanese whalers? Are there likewise government sanctioned practices in Australia that endanger animal species within or outside Australia? (relevant to the Endangered Species Objection)
- ⊙ Which species causes most danger to other species on Earth? (relevant to the Pest Species Objection)
- ⊙ Do the methods used by Japanese whalers produce more suffering (pain, fear) in animals than the methods used in Australia to cull e.g., kangaroos and camels? (relevant to P2 in Argument B)

### Possible Doubts

- ⊙ If intelligence is used as a measure of moral value (and so right to life), then does it follow that people with higher intelligence are more valuable (and so have a greater right to life) than people with lower intelligence? (against the Intelligent Species Objection)
- ⊙ If endangering other species reduces one's moral value (and right to life), then does it follow that human beings are the least valuable (and have the least right to life)? (against the Pest Species Objection)



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We have also analysed some arguments in relation to ...

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## Discussion Question #3

Question: The You Tube video "**Anti Anti-Whaling**" ([click here](#)) contains an argument defending Japanese whaling. What is the argument? Put it in the Standard Form. Is it a good argument? Why? Or why not?

*Note: The use of a video in PHI1CRT for teaching and learning purpose does not entail endorsement of its content.*



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# Critical Thinking Homepage

