CRITICAL THINKING

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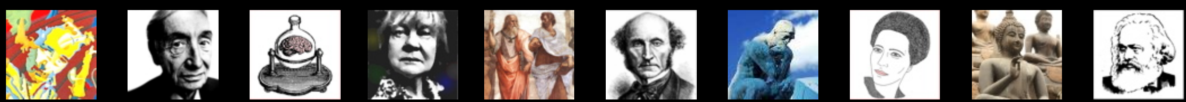
LECTURE 4

Nondeductive Success:
Statistical Syllogism, Inductive Generalization, Analogical Argument



<u>Summary</u>

In this week's lecture, you will learn:

(1) The concept of "nondeductive success".

(2) Three types of <u>nondeductive arguments</u>

(a) Statistical Syllogism

(b) Inductive Generalization

(c) Analogical Argument

Part I. Nondeductive Success & Deductive Validity

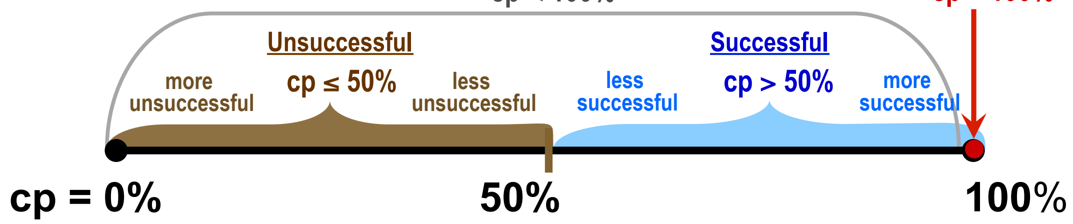
An argument from premises Ps to conclusion C is deductively valid (i.e., valid)
$=_{df}$ The truth of Ps logically guarantees the truth of C.
= Under the assumption that all Ps are true, there is exactly a 100% chance for C to be true.
i.e., **Conditional Probability for C given Ps is exactly 100%.** (for short: **cp** = 100%)

✦ **Deductive validity is a matter of all or nothing. An argument cannot be more or less valid.**

An argument from premises Ps to C is nondeductively successful
$=_{df}$ The truth of Ps makes C more likely to be true than false.
= Under the assumption that all Ps are true, there is a greater than 50% chance for C to be true.
i.e., **Conditional probability for C given Ps is greater than 50%.** (for short: **cp** > 50%)

✦ **Nondeductive success comes in degrees. An argument can be more or less nondeductively successful.**
✦ **If cp = 100%, the argument is successful** (because cp > 50%) **and also valid** (because cp = 100%)**.**
✦ **Deductive validity is said to be the "limiting case" of nondeductive success.**

Examples on next slide!



Argument A
P1. 80% of Australians watch TV regularly.
P2. Tom is Australian.

C. Tom watches TV regularly.

Argument B
P1*. 70% of Australians read newspapers regularly.
P2*. Tom is Australian.

C*. Tom reads newspapers regularly.

✦ If both P1 and P2 are true, then the probability for C to be true is 80%.
✦ The **conditional probability of C given P1 and P2** is 80%, which is greater than 50%.
✦ Argument A is *nondeductively* ***successful***.
✦ But It is logically possible for C to be false under P1 and P2. Argument A is still *deductively* ***invalid***.

✦ The conditional probability of C* given P1* and P2* is 70%, which is greater than 50%.
✦ Argument B is *nondeductively* ***successful***.
✦ But Argument B is *nondeductively* ***less*** *successful* than Argument A. It is also ***invalid***.

Argument C
P1. 50% of Australians work part time.**
P2. Tom is Australian.**

C. Tom works part time.**

Argument D
P1*. 100% of Australians have the right to life.**
P2*. Tom is Australian.**

C*. Tom has the right to life.**

✦ The conditional probability of C** given P1** and P2** is 50% (which is not greater than 50%).
✦ Argument C is *nondeductively* ***unsuccessful***. It is also ***invalid***.

✦ The conditional probability of C*** given P1*** and P2*** is 100%.
✦ Argument D is *nondeductively* ***successful*** as well as *deductively* ***valid***.

Part II. Three Types of Nondeductive Arguments

- Many text books define "nondeductive arguments" as arguments that are …
  (a) not meant to be deductively valid, but
  (b) meant to be nondeductively successful.

  It follows from this definition that the author's intention determines whether an argument is a "deductive argument" or a "non-deductive argument".
- **What if** an author intends to put forward a deductively invalid but nondeductively successful argument (and so it is a "nondeductive argument" by the above definition), but the author reasoned wrongly and the argument turns out to be actually deductively valid? Given the above definition, it would be a deductively valid nondeductive argument!
  (It looks like a potentially confusing definition …)
- When we assess an argument, **it will be simpler** just to evaluative whether it **is** or **is not** deductively **valid**, and whether it **is** or **is not** nondeductively **successful** – independently of what the author intends. (But what do we call a given argument if we have not yet worked out whether it is deductively valid or not, nondeductively successful or not? There are specific names for different forms of arguments (see below). If an argument fits a form that has a specific name, call it by that name.)

(a) Statistical Syllogism

P1. N% members of group X have feature F.
P2. Individual *i* is a member of group X.
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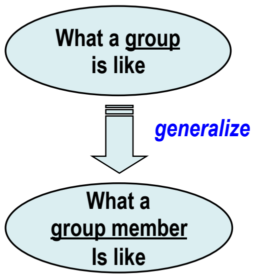
C. Individual *i* has feature F.

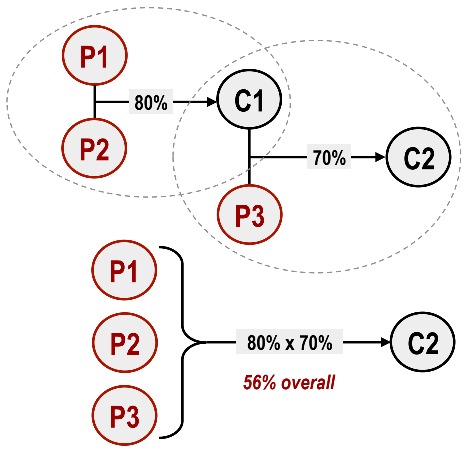


- **Conditional probability** for C given P1 and P2 = **N%**
- A statistical syllogism is **nondeductively successful** only when **N > 50**. It is **valid** only when **N = 100**.
- Among all different types of nondeductive arguments, it is the easiest to determine the degree of nondeductive success in the case of statistical syllogisms.

Example #1 (complex argument containing multiple Statistical Syllogisms)

P1. 80% of Australians watch TV regularly.
P2. Tom is Australian.
C1. Tom watches TV regularly. (intermediate conclusion, from P1 & P2)
P3. 70% of those who watch TV regularly watch TV commercials regularly.
--
C2. Tom watches TV commercials regularly. (final conclusion, from C1 & P3)

- This is a **complex** argument. It contains two sub-arguments - all in the form of **statistical syllogism**.
- **1st** sub-argument goes from P1 and P2 to C1.
  - Conditional probability for C1 given P1 & P2 = **80%**.
  - 1st sub-argument is nondeductively **successful**.
- **2nd** sub-argument goes from C1 and P3 to C2.
  - Conditional probability for C2 given C1 & P3 = **70%**.
  - 2nd sub-argument is also nondeductively **successful**.
- **Overall conditional probability** for C2 given P1 & P2 & P3
  = 80% x 70% = 56%
- The whole complex argument is nondeductively **successful overall**.

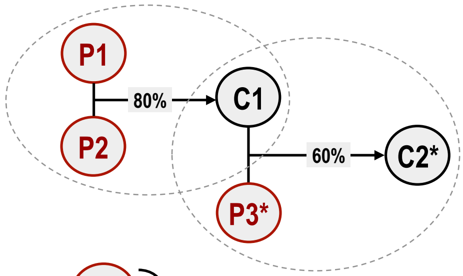


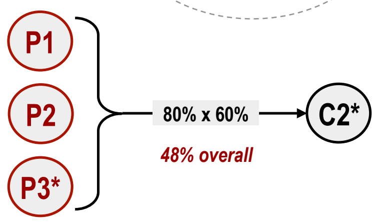
Method: To get the overall conditional probability for the final conclusion given all the premises, multiply together all the individual conditional probabilities for the conclusions in all the sub-arguments.

Example #2

P1. **80% of Australians watch TV regularly.**
P2. **Tom is Australian.**
C1. **Tom watches TV regularly.** (intermediate conclusion, from P1 & P2)
P3*. **60% of those who watch TV regularly watch TV news reports regularly.**

C2*. **Tom watches TV news reports regularly.** (final conclusion, from C1 & P3*)





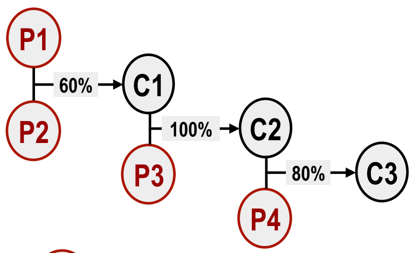
- **1st** sub-argument goes from P1 and P2 to C1.
  - Conditional probability for C1 given P1 & P2 is **80%**.
  - 1st sub-argument is nondeductively **successful**.
- **2nd** sub-argument goes from C1 and P3* to C2*.
  - Conditional probability for C2* given C1 & P3* is **60%**.
  - 2nd sub-argument is also nondeductively **successful**.
- **Overall conditional probability** for C2* given P1 & P2 & P3* **= 80% x 60% = 48%**
- The complex argument is nondeductively **unsuccessful overall**.

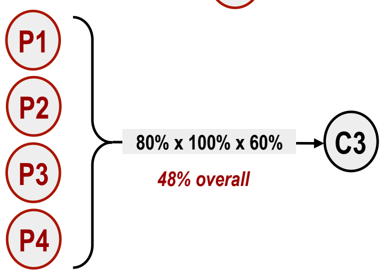
Important: Even if all the sub-arguments are individually successful, the complex argument as a whole can still be unsuccessful overall.

Example #3

P1. **60% of university students earn a taxable income.**
P2. **Jane is a university student.**
C1. **Jane earns a taxable income.** (from P1 and P2)
P3. **100% of those who earn a taxable income pay tax.**
C2. **Jane pays tax.** (from C1 and P3)
P4. **80% of those who pay tax pay less than $50,000 on tax p.a.**

C3. **Jane pays less than $50,000 on tax p.a.** (from C2 and P4)



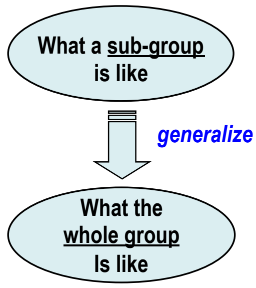


- Conditional probability for C1 given P1 & P2 = 60% (**1st** sub-argument successful)
- Conditional probability for C2 given C1 & P3 = 100% (**2nd** sub-argument successful **and** valid)
- Conditional probability for C3 given C2 & P4 = 80%. (**3rd** sub-argument successful)
- **Overall conditional probability** for C3 given all the premises = 60% x 100% x 80% = **48%.**
- The whole complex argument is nondeductively **unsuccessful overall**.

Again: Even if all the sub-arguments are individually nondeductively successful (and even some of which is valid), the whole complex argument can still be nondeductively unsuccessful overall.

We are going to look at other types of nondeductive arguments. It will be considerably more difficult to determine whether or not arguments of those other types are nondeductively successful.

(b) Inductive Generalization



P. N% of a sub-group in group X have feature F.

C. N% of the whole group X have feature F.

- Clearly, whether an argument in the form of inductive generalization is nondeductively successful depends on whether the sub-group under consideration is **representative** of the whole group.
- An inductive generalization is successful only when the sub-group (or sample group) is representative.
- A common way to defend (or reject) an inductive generalization is to argue that the sub-group considered is (or isn't) representative of the whole group – e.g., by whether or not the sub-group was selected by methods of **random** and **diverse** sampling.

P. 80% of 1,000 randomly selected Australians below 25 years old support a ban on the 'Mosquito' device.

C. 80% of Australians support the ban.

Sample group should also include people at/above 25

P. 80% of 1,000 randomly selected shop owners and shopkeepers in Australia support the use of the 'Mosquito' device.

C. 80% of Australians support its use.

Sample group should also include …

P. N% of a sub-group in group X have feature F.

C. N% of the whole group X have feature F.

P. 70% of randomly surveyed university academics regularly work 60 hours a week.

C. 70% of university workers regularly work 60 hours a week.

P. 40% of men randomly surveyed by Coles cook at least once a week.

C. 40% of Australian men cook at least once at week.

P. 65% of Australians randomly surveyed outside the Flinders Street railway station support carbon tax.

C. 65% of Australians support carbon tax.

P. 90% of the year 2005 PHI1CRT students who filled in an anonymous university survey for the subject were satisfied with the subject.

C. 90% of the year 2005 PHI1CRT students were satisfied with the subject.

Date of survey: Friday, Week 13

For each argument above, point out its potential weaknesses.

(c) Analogical Argument

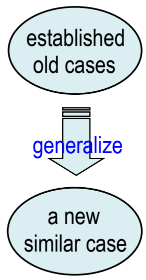
A1 has the set of features **{Fs}** and also feature **K**. (established)
A2 has the set of features **{Fs}** and also feature **K**. (established)
:
A*i* has the set of features **{Fs}** and also feature **K**. (established)

Items A1, A2, ..., A*i* = **primary analogues**

B is **similar** to A1, A2, …, A*i* in having the set of feature **{Fs}**. (**new** case)

B is **also similar** to A1, A2, …, A*i* in having feature **K.** (analogically **inferred**)

Item B = **secondary analogue**



In an analogical argument, the **items** being compared (e.g., items A1, A2, …, A*i*, and B) are called "**analogues**".

- Items A1, A2, … A*i* are called the "**primary analogues**". They are used as *precedents* (i.e., established cases).
- Item B is called the "**secondary analogue**". It is the new case being compared to the established ones.

There are **five criteria** for evaluating analogical arguments:

(1) **Relevance** of the similar features {Fs} between the As and the B to the extra feature K in question (the more relevant features {Fs} are to feature K, the more successful the analogical argument).

(2) **Number** of similar features {Fs} (the more similar features between the As and the B, the more successful the analogical argument).

(3) **Number** of primary analogues A1, A2, ..., A*i* (the more primary analogues, the more successful the argument).

(4) **Diversity** among primary analogues A1, A2, ..., A*i* (the more diversity, the more successful the argument).

(5) **Disanalogies** between primary analogues A1, A2, ..., A*i* and the secondary analogue B (the fewer disanalogies, the more successful the argument).

Arguments from analogy are very often used in reasoning about morality (examples coming)**.**

Example #4

P1. People who are victims of a sexual offence are victims of a violent crime, and they are entitled to financial compensation from state or territory government.

P2 People who are victims of an actual or threatened assault or injury are victims of a violent crime, and they are entitled to financial compensation from state or territory government.

P3. Members of the Stolen Generations are victims of a violent crime.

C. Members of the Stolen Generations are (or should be) entitled to financial compensation from state or territory government. (from P1, P2 & P3)

- **Primary analogues:** (A1) people who are victims of a sexual offence, (A2) people who are victims of an actual or threatened assault or injury.
- **Secondary analogue:** (B) members of the Stolen Generations.
- **Similar feature:** (F) being victims of a violent crime.
- **Further similar feature inferred by analogy:** (K) being entitled to financial compensation from their state or territory government.

Question (1): **Can the analogical argument be strengthened by adding more similar features (Fs)?**

Question (2): **Can the analogical argument be weakened by any disanalogy between the primary and secondary analogues?**

Question (3): **Are all the premises actually true?**

Example #5

P1. People like you and me have a future that will be valuable to themselves, and it is wrong to kill them.

P2. Temporarily unconscious people have a future that will be valuable to themselves, and it is wrong to kill them.

P3. Suicidal teenagers have a future that will be valuable to themselves, and it is wrong to kill them.

P4. Infants and very young children have a future that will be valuable to themselves, and it is wrong to kill them.

P5. Human fetuses (usually) have a future that will be valuable to themselves.

C. It is (usually) wrong to kill human fetuses.

Don Marquis, "Why abortion is immoral", *The Journal of Philosophy*, Vol. 86 (1989), pp. 183-202.

Question (1): What are the primary analogues and the secondary analogue?

Question (2): What is the similar feature between the analogues? And what is the further similar feature inferred by analogy?

Question (3): Is the similar feature in question, when possessed by X, **relevant** to the issue on whether it is wrong to kill X?

Question (4): Is there any **disanalogy** between the primary and secondary analogues that might weaken the argument?

Question (5): Are all the premises **true**? – e.g., Does a human fetus really have a future that will be valuable to itself in the same way that a temporarily unconscious person's future will be valuable to him/her ?

Examples #6 & #7

P1. Racism is the disregard of an individual's interest **due to some morally irrelevant quality** possessed by the individual (membership in a racial group), and it is **morally wrong**.

P2. Sexism is the disregard of an individual's interest **due to some morally irrelevant quality** possessed by the individual (membership in a gender group), and it is **morally wrong**.

P3. Speciesism is the disregard of an individual's interest **due to some morally irrelevant quality** possessed by the individual (membership in a species).

C. Speciesism is morally wrong.

Peter Singer, *Practical Ethics*, Cambridge University Press (1979)

P1. Infants and very young children are **"subjects of a life"**, and they have the moral **rights** to life and not to be harmed.

P2. People who are born mentally impaired are still "**subjects of a life**", and they have the moral **rights** to life and not to be harmed.

P3. People who suffer from dementia and other mental illness are still **"subjects of a life"**, and they have the moral **rights** to life and not to be harmed.

P4. Animals are "subjects of a life".

C. Animals have the moral rights to life and not to be harmed.

Tom Regan, *The Case for Animal Rights*, University of California Press (1985)

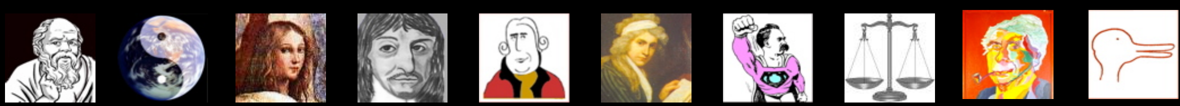
Summary

In this week's lecture, you have learnt:

(1) The concept of "nondeductive success".

(2) Three types of nondeductive arguments

- **(a) Statistical Syllogism**
- **(b) Inductive Generalization**
- **(c) Analogical Argument**



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