

## Critical Thinking – CHAPTERS 1,2,3,4,5,6 STUDY GUIDE

### **CHAPTER 1:**

What is **Critical Thinking**?

- The systematic evaluation or formulation of beliefs, or statements, by rational standards.
- It's systematic because it involves distinct procedures and methods (not just gut feelings).
- It's used to evaluate existing beliefs and formulate new ones.
- It evaluates beliefs in terms of how well they are supported by reasons.

**Assertion** (Statement):

- An **assertion** is a declarative sentence that is intended to make a claim of some sort. (Ex. I have 3 coins in my pocket.)
- Sometimes these are called **statements** or **propositions**.
  - “I am taller than you.”
  - “It is raining.”
  - “She will win the race.”
- Assertion can be true or false.

**Premise:**

- A **premise** is a statement that is offered in support of a *conclusion*.

**Conclusion:**

- A **conclusion** is a statement that is held to be supported by a premise or premises.
- Example:

Premise:                      All whales are mammals.

Premise:                      Moby Dick is a whale.

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Conclusion:                  Moby Dick is a mammal.

**Argument:**

- An **argument** is a set of statements one of which (the conclusion) is taken to be supported by the remaining statements (the premises).
- Here's another way of saying this:

An **argument** is a group of statements in which some (the **premises**) are intended to support another (the **conclusion**).

The conclusion is what the speaker wants you to **accept**.

The premises state the **reasons** or **evidence** for accepting the conclusion.

**Inference:**

- An **inference** is the move from a premise (or premises) to a *conclusion* (or conclusions).
- Critical thinking is *all about inferences*
- Inferences are *identified and evaluated*

**Don't confuse arguments with explanations.**

- An explanation tells you why something happened.
- An argument tells you why you should believe something.
- **Arguments have something to prove; explanations do not.**

Example:

- 1) Adam stole the money, for three people saw him do it. (Argument)
- 2) Adam stole the money because he needed to buy food. (Explanation)

Be aware that **NOT** all series of statements contain arguments.

- So how do we recognize arguments?
- Look for a **conclusion** (a statement that is being supported), and look for **premises**.
- Often we can identify these by the use of certain **indicator words**

### **Conclusion-Indicators**

- Thus
- Therefore
- Hence
- Entail(s)
- ... it follows that ...
- ... we may conclude ...
- Consequently
- So

### **Premise-Indicators**

- Since
- Because
- For
- As
- ... given that ...
- ... inasmuch as ...
- ... for the reason that ...

Two Points about Indicator words:

- First: They may not actually be present in arguments.
- Second: In arguments, premises do not always come before conclusions; conclusions do not always come after premises  
“textual priority versus logical priority”:
- “Religious beliefs cannot be proven. If something is a matter of faith, it cannot be proven, and religious beliefs are obviously a matter of faith.”

Truth versus Logical Strength:

- Premises and conclusions may be true, or they may be false.
- Evaluating the truth-value of premises and conclusions is distinct from evaluating the logical strength of arguments.

- 1) Ryerson University is in Guelph, ON.
- 2) The RAC is located within Ryerson U.

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Therefore,

- 3) The RAC is located in Guelph, ON.

### **Deductive Arguments**

- A deductive argument is intended to provide **conclusive support** for its conclusion.
  - A deductive argument that succeeds in providing conclusive support for its conclusion is said to be **valid**.
  - One that fails to provide conclusive support is said to be **invalid**.
  - A valid argument is such that **if** its premises are true, **then** its conclusion must be true.
  - For this reason, deductively valid arguments are said to be **truth-preserving**.
- 
- An argument is **deductively valid** if and only if it is not possible for the premises to be true and the conclusion false.
  - i.e., if all the premises were true, the conclusion would have to be true too.
  - An argument is **deductively invalid** if and only if it is not deductively valid.

### **Validity and Soundness:**

#### **Deductive Validity:**

A **deductively valid** argument:

- (1) All bachelors are unmarried.
- (2) Ivan is a bachelor.

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Therefore,

- (3) Ivan is unmarried.

An **invalid** argument:

- (1) Some politicians smoke marijuana.
- (2) Jones is a politician.

---

Therefore,

- (3) Jones smokes marijuana.

Remember, a valid argument need not have true premises, and it need not have true conclusions: what's important is the logical relationship between the premise(s) and conclusion(s).

- (1) All Americans are ten feet tall.
  - (2) Prof. Hunter is an American .
- Therefore,
- (3) Prof. Hunter is ten feet tall

- Not all deductively valid arguments have true premises and true conclusions.
- In fact, a valid argument may have **any** of the following combinations:  
(These are all VALID ARGUMENTS)

### 1) False Premises, False Conclusion

- (1) All human beings can fly.
- (2) All things which can fly are red.
- (3) Therefore, All human beings are red.

### 2) False Premises, True Conclusion

- (1) All dogs are reptiles.
- (2) All reptiles are mammals.
- (3) Therefore, All dogs are mammals.

### 3) True Premises, True Conclusion

- (1) If you're taller than 10 feet, you're taller than 5 feet.
- (2) If you're taller than 5 feet, you're taller than 2 feet.
- (3) Therefore, If you're taller than 10 feet, you're taller than 2 feet.

- The **only** combination a valid argument may **not** have is true premises and false conclusion.
- A deductively valid argument with true premises is said to be **sound**.

### Deductive Soundness:

- An argument is **deductively sound** if and only if it is deductively valid and all its premises are true.

### Deductive Versus Inductive Arguments:

- In a deductively-valid argument, the truth of the premise(s) guarantees the truth of the conclusion(s). But, not all arguments are deductive:
- Inductive Strength:
  - **An argument is inductively strong if and only if the conclusion is probably true, given the premises.**
  - **An argument is inductively weak if and only if it is not inductively strong.**

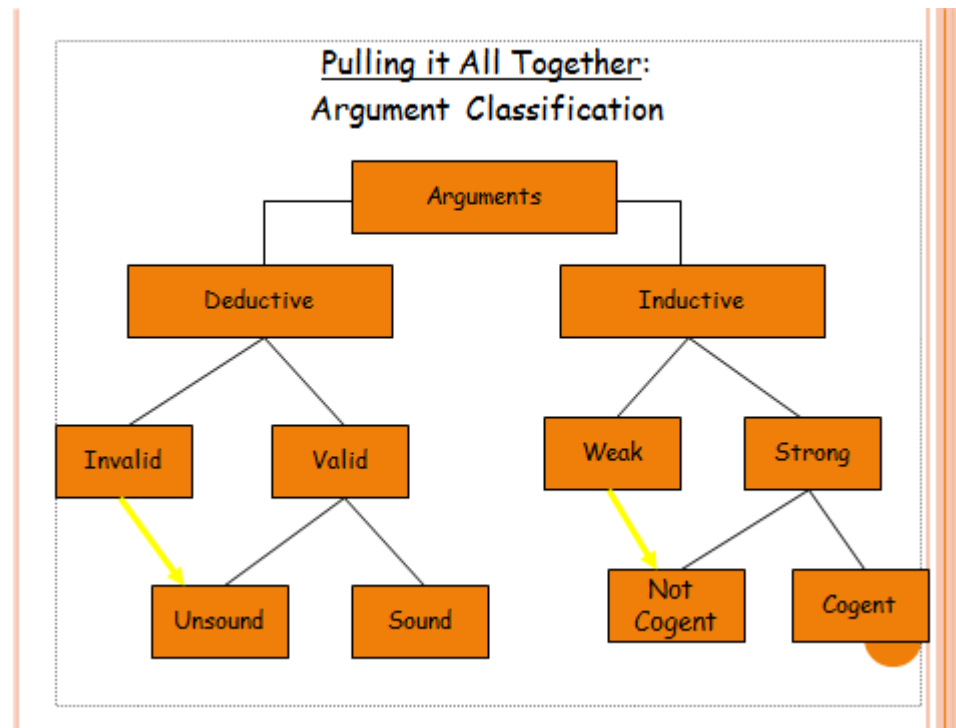
**Inductive Strength:** An argument is inductively strong if and only if the conclusion is probably true, given the premises.

### Inductively Strong Argument:

- (1) Quitting smoking usually improves your health.
- (2) Mary has quit smoking.  
Therefore, probably
- (3) Mary's health will improve.

### Inductively **Weak** Argument:

- (1) A few police officers are corrupt.
  - (2) Jim is a police officer.
- Therefore, probably,
- (3) Jim is corrupt.



## **CHAPTER 2:**

- Impediments to critical thinking classified

Common impediments to critical thinking:

- Category 1:** hindrances that arise because
- Category 2:** hindrances that occur because

**of how we think.**

**of what we think.**

### **Category 1 Impediments to Critical Thinking:**

(a) Self-Interested thinking:

- Accepting a claim solely on the grounds that it advances, or coincides with, our interests.
- Overcoming self-interested thinking:
  - Watch out when things get very personal.
  - Be alert to ways that critical thinking can be undermined (ex: wishful thinking).
  - Ensure that nothing has been left out:
    - Avoid selective attention.
    - Look for opposing evidence.

(b) Group Thinking:

- Peer pressure

**Fallacy:** an argument form that is both common and defective.

- Fallacy of appeal to popularity
  - Fallacy of appeal to common practice
  - Fallacy of appeal to tradition
  - Genetic fallacy
- Stereotyping:
- Drawing conclusions about people or groups without sufficient reasons.

### Some Terminology Concerning Knowledge.

- Different uses of “**knowledge**”:
  - Knowledge by acquaintance
  - Knowledge-how
  - Propositional knowledge (knowledge-that)
- **Three** key ingredients in **propositional knowledge**:
  - Belief
  - Truth
  - Justification

### Category 2 Impediments to Critical Thinking

(a) **Subjectivism:**

- The view that propositions have no truth-value (i.e. they are neither true nor false).  
e.g.: Moral subjectivism: the view that moral claims have no truth-value.

(b) **Relativism:**

- The view that propositions have a truth-value, but that what this is depends upon (i.e. is relative to) some person or social group.

i) **Subjective Relativism:**

- The view that the truth-value of a proposition depends solely upon (is relative to) what some **subject** believes.

“that’s true for you “

“that’s my truth”

**Objections:**

- (a) This is implausible: consider the jar of jelly beans
- (b) This view would make us infallible
- (c) This view is self-defeating (i.e. if it’s true, then it is an example of a truth that is not relative)

ii) **Social Relativism:**

- The view that the truth-value of a proposition depends solely upon (is relative to) **societies**.

**Objections:**

- (a) Implausible
- (b) Intolerant views
- (c) Would make societies infallible
- (c) Self-defeating

(c) **Philosophical Skepticism:**

- The view that propositions have truth-values, but that we know what very few, or none, of them are. (In other words, we know a lot less than we think or nothing at all.)

Consider the following argument for skepticism:

(1) Unless I am *completely certain* that I am not being deceived by an *evil genius*, my beliefs lack justification (they do not count as knowledge).

(2) I am not *completely certain* that I am not being deceived by an *evil genius*.

Therefore,

(3) My beliefs lack justification (they do not count as knowledge).

**Objections:**

- (a) Requiring **absolute certainty** for a belief to count as knowledge is asking too much.

**CHAPTER 3:**

**Deductive Argument Patterns**

- There are some common **patterns** shared by many deductive arguments.
- They form a frame that is common to **many** arguments.
- Understanding some basic argument patterns helps to determine **(a)** whether an argument is deductive and **(b)** whether it is valid or invalid.
- Many of these patterns involve two kinds of statements:
  - Conditionals & Disjunctions

**Conditional Statements**

- A **conditional statement** is a statement of the form  
  
If p, then q.
- Examples:
  - If it rains, then the picnic will be cancelled.
  - If Jones didn't commit the murder, the butler did.
- Conditionals are **compound statements** composed of two parts:
  - The **antecedent** – what follows the word “if”
  - The **consequent** – what follows the word “then”

## Conditional Statements and Necessary Conditions vs. Sufficient Conditions

- "A is a **necessary condition** for B", means "without A, B would not be true."
- "A is a **sufficient condition** for B", means "If A is true, then B would have to be true as well."

(e.g.) If John is a bachelor, then John is unmarried.

The **consequent** – "John is unmarried"

- Expresses a **necessary condition** for its being true that John is a bachelor; if it was false, then he could not possibly be a bachelor.
- But being unmarried is not sufficient for being a bachelor. One must also be **male**.

The **antecedent**– "John is a bachelor"

- Expresses a **sufficient condition** for its being true that John is a unmarried; if it is true that John is a bachelor, then it would have to be true that he is unmarried.
- But being a bachelor is **not a necessary** condition for being unmarried. Women are often unmarried, although they are never bachelors.

- *The antecedent of a conditional statement expresses a sufficient condition for the consequent.*
- *The consequent of a conditional statement expresses a necessary condition for the antecedent.*

## Disjunctive Statements

- A **disjunctive statement** is a statement of the form

Either p or q.

- Examples:

- Either the picnic was cancelled or it rained.
- Either Jones committed the murder or the butler did.

- Disjunctions are **compound statements** composed of two parts called the **disjuncts**.

## Some **VALID** conditional argument patterns

- 1) **Affirming the antecedent** (Modus Ponens):

If p, then q.

p.

Therefore, q.

- Example:

- (1) If the Conservatives won the election, then Stephen Harper is the new Prime Minister.
- (2) The Conservatives won the election.

---

Therefore,

- (3) Stephen Harper is the new Prime Minister. (From premise (1) and premise (2) by Modus Ponens)

2) **Denying the consequent** (Modus Tollens)

If p, then q.

Not q.

Therefore, not p.

- Example:

- (1) If the Liberals won the election, then Paul Martin is the new Prime Minister.
- (2) Paul Martin is not the new Prime Minister.

---

Therefore,

- (3) The Liberals did not win the election. (From premise (1) and premise (2) by Modus Tollens)

3) **Hypothetical Syllogism**

If p, then q.

If q, then r.

Therefore, if p, then r.

- Example:

- (1) If the Conservatives won the election, then Stephen Harper is the new Prime Minister .
- (2) If Stephen Harper is the new Prime Minister, then someone from Alberta is the new Prime Minister.

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Therefore,

- (3) If the Conservatives won the election, then someone from Alberta is the new Prime Minister. (From premise (1) and premise (2) by Hypothetical Syllogism)

Some **INVALID** conditional argument patterns

4) **Denying the Antecedent**

If p, then q.

Not p.

Therefore, not q.

- Example:

- (1) If Einstein invented the computer, then he's a genius.
- (2) Einstein did not invent the computer.

---

Therefore,

- (3) He's not a genius. (From premise (1) and premise (2) by ???)

## 5) Affirming the Consequent

If p, then q.

q.

Therefore, p.

- Example:

- (1) If Einstein invented the computer, then he's a genius. (Expresses a sufficient condition)
- (2) Einstein is a genius.

---

Therefore,

- (3) He invented the computer. (From premise (1) and premise (2) by ???)

- The **antecedent** expresses a sufficient condition for the consequent. (FOR QUIZ 3)
- The **consequent** expresses a necessary condition for the antecedent. (FOR QUIZ 3)

## A VALID disjunctive argument pattern

### 6) Disjunctive Syllogisms

(i) Either p or q.

Not p.

Therefore, q.

(ii) Either p or q.

Not q.

Therefore, p.

Example:

- (1) Either the Liberals won or the Conservatives did.
- (2) The Liberals did not win.

---

Therefore,

- (3) The Conservatives won. (From premise (1) and premise (2) by Disjunctive Syllogism)

### (4) Diagramming Arguments

- Before evaluating an argument, therefore, it often helps to **reconstruct** it in a more perspicuous manner.
- One way to do this is to make a diagram of the argument

## Method for Diagramming Arguments:

**Step 1: Underline all premise and indicator words. Then number the statements.**

**Step 2: Find the conclusion and draw a wavy line under it.**

**Step 3: Locate the premises and draw a line under them.**

**Step 4: Cross out extraneous statements – redundancies, irrelevant sentences, questions, exclamations.**

**Step 5: Draw the diagram, connecting premises and conclusions with arrows showing the logical connections. Include both dependent and independent premises.**

**Dependent Premises:** Depend on each other to provide support for the conclusion.

**Independent Premises:** These offer support for the conclusion without the help of any other premises.

## **Chapter 4**

### 1) When Claims Conflict

- If a claim conflicts with other claims we have good reason to accept, we have good grounds for doubting it.
- If a claim conflicts with our **background information**, we have good reason to doubt it.
- We should **proportion our belief to the evidence**.
- It is not reasonable to believe a claim when there is no good reason for doing so.

### 2) Experts and Evidence

- **We should proportion our belief to the evidence.**
- If a claim conflicts with expert opinion, we have good reason to doubt it.
- When experts disagree about a claim, we have good reason to doubt it.
- **Fallacy of Appeal to Authority:**
  - i) Just because someone is an expert in one field, he or she is not necessarily an expert in another. This point is not that these experts can't be right, but that their expertise in a particular field doesn't give us reason to believe them in all things.
  - ii) We may fall into a fallacious appeal to authority by regarding a non-expert as an expert.
    - Movie Stars
    - TV actors
    - Famous athletes

### 3) Personal Experience

- It's reasonable to accept evidence provided by personal experience **only if there's no good reason to doubt it**. Factors that can give us good reason to doubt the reliability of personal experience:
  - Impairment
    - If our perceptual powers are somehow impaired, we have reason to doubt them.
    - The following are reasons to doubt the trustworthiness of what we experience.
      - Situation: too dark, too bright, too hazy, too noisy
      - Senses: sick, injured, tired, stressed, excited, drugged, distracted, disoriented, drunk
  - Expectation
    - We often perceive exactly what we expect, regardless of whether there's really anything there to detect.
  - Innumeracy
    - 'Innumeracy' means roughly 'being really bad with numbers'.
    - Another error is to think that previous events can affect the probabilities in the random event at hand.
    - We call this the **Gambler's Fallacy**.

### 4) Fooling Ourselves

- We too often fail to give evidence its due. We...
  - Ignore evidence
  - Deny evidence
  - Manipulate evidence
  - Distort evidence
- Three of the most common and most serious mistakes we make are:
  - **Resisting contrary evidence**
    - Often, you will see the evidence you want to see (and be blind to what you don't want to see).
    - We resist evidence that flies in the face of our cherished beliefs.
  - **Looking for confirming evidence – Confirmation Bias**
    - We often seek out and use only confirming evidence. This is known as confirming bias.
    - The result: we can end up accepting a claim that's not true.
    - When we evaluate claims, we should look for disconfirming as well as confirming evidence.
  - **Preferring available evidence – Availability Bias**
    - Availability error: We rely on evidence because it's memorable or striking, or rather, because it is psychologically 'available'.

## Chapter 5

Some bad arguments are fallacies.

- These are arguments that (i) *exhibit a faulty pattern of inference*, but that (ii) *are nonetheless frequently offered*.

We have already seen two examples of (deductive) fallacies:

- Affirming the Consequent
- Denying the Antecedent

In general, a fallacy is a faulty pattern of inference *because* the premises don't provide adequate support for the conclusion.

But what does "adequate support" mean??

- In good arguments, the premises should be both **relevant** and **acceptable**.

We can classify fallacies into two broad categories:

### 1) Irrelevant Premises

- Irrelevant Premises have no bearing on the truth of the conclusion.

### 2) Unacceptable Premises

- Unacceptable Premises may be relevant to the truth of the conclusion, but are dubious for other reasons.

Relevance

- A premise is **irrelevant** to a conclusion if and only if its truth counts neither for nor against the conclusion; otherwise, it is **relevant**.

## Fallacies involving Irrelevant Premises

### 1) The Genetic Fallacy

- Arguing or assuming that a claim is true or false solely because of its origin.
- Example

"We should reject that proposal for solving the current welfare mess. It comes straight from the NDP! "

### 2) The Fallacy of Composition

- Arguing or assuming that what is true of the parts must be true of the whole.
- Example

"Every player on the Blue Jays is the best in the league. Therefore, it must follow that the Blue Jays are the best team in the league."

### 3) The Fallacy of Division

- Arguing or assuming that what is true of the whole must be equally true of the parts.
- Example

"Jane is a human being. Therefore, every cell in her body is a human being."

### 4) The Fallacy of Appeal to the Person (or the ad hominem fallacy)

- Arguing that we should reject a claim solely because of the person who made it.

## Types of the Ad Hominem Fallacy

### 4a) Character

- The premise merely attacks the person's character, instead of providing evidence for the conclusion.
- Example  
"Don't believe what Jack says about love. He's been a pot smoker ever since I met him."

### 4b) Circumstances

- The premise merely points out something about the person's circumstances, instead of providing evidence for the conclusion.
- Example  
"Jose says that the political system in Cuba is perfect. But he has to say so: he's a card carrying communist! So you shouldn't believe what he says about politics."

**The point is that many claims about a speaker's character or circumstances are quite **irrelevant** to whether the conclusion is **true**.**

### 4c) Tu Quoque

- The premise merely points out that the some claim is inconsistent with something else the speaker says or does, instead of providing evidence for the conclusion.
- Example  
"Naomi wears expensive name-brand clothes. So everything she says about excessive consumerism is nonsense!"

**The point is that while somebody may well be a hypocrite, this is generally **irrelevant** to whether what the person says is **true**.**

### 5) The Fallacy of Equivocation

- When a word or expression is used in two different senses in an argument. Typically, one premise uses the word in one way, and another premise uses the word in a different way.
- Example
  1. All men are rational.
  2. No woman is a man
  3. No woman is rational.

### 6) Appeal to Popularity

- Arguing that a claim must be true *simply because* it is a popular belief.
- Example  
"Of course the war is unjustified! After all, everybody thinks so."

### 7) Appeal to Common Practice

- Arguing that something should be done a certain way *simply because* it is commonly done that way.
- Example  
"Nobody has pop quizzes at university. So, there shouldn't be any pop quizzes at university"

### 8) Appeal to Tradition

- Arguing that a claim must be true *simply because* it is part of a tradition.
- Example  
"Obviously, God exists: after all, various religious traditions have said so for thousands of years!"

### 9) Appeal to Ignorance

- An argument which states or assumes a claim like this:  
We don't know that P is true, therefore P is false.  
Or  
We don't know that P is false, therefore P is true.
- Example  
"No one has shown that ghosts are real, so they must not exist"

### 10) Appeal to Emotion

- This fallacy occurs when emotions (guilt, anger, pity, fear, etc.) are appealed to, *instead of relevant reasons*, in an argument.
- Example  
"I deserve a better grade than D on my paper. My parents just got a divorce. If they see that I got a D, they will just blame each other, and the fighting will start all over again. Give me a break!"

### 11) "Red Herring"

- This fallacy occurs when *irrelevant* factors are introduced during an argument.
- Sometimes this is deliberate; other times it's inadvertent. The solution is to bring the discussion back to topics/issues that are relevant.
- Example  
"A lot of people think that football players are stupid and boorish. That's just false! You should have seen the fantastic game our team played last week. They scored three touchdowns before halftime!"

### 12) Straw Man

- This fallacy occurs when an argument attacks a misrepresentation (e.g.: distortion, oversimplification) of a position, instead of the position itself.
- The misrepresentation is **irrelevant** to the worth of the position itself, and attacking the misrepresentation is a violation of the **Principle of Charity** = When someone's meaning is unclear, we should attempt to interpret it in a way that makes sense.
- Example  
"Marcus says that students who cheat on exams should not automatically be expelled from school. But it's ridiculous to insist that students should never be punished for cheating."

## Fallacies Involving Unacceptable Premises

### 1) The Fallacy of Begging the Question (Circular Reasoning)

- Attempting to prove a conclusion by using that same conclusion as a premise. (Sometimes the conclusion is worded differently when it is used as a premise, and sometimes it is implicit.)
- Example  
"God exists. We know that God exists because the Bible says so, and we know that God wrote the Bible"

## 2. The Fallacy of False Dilemma (False Dichotomy)

Alternatives are

exhaustive

non-exhaustive

Alternatives are

exclusive

or

non-exclusive

### Examples of Different Kinds of Alternatives

Exhaustive and exclusive: pregnant or not pregnant

Exclusive and non-exhaustive: you'll either get an A or a C

Exhaustive and non-exclusive: a list of all Ryerson degrees

Non-exhaustive and non-exclusive: sandwich or soup for lunch

- To test whether an alternative is **exhaustive**, ask:  
"Are these all the possible options?"
- To test whether an alternative is **exclusive**, ask:  
"Do these options rule each other out?"
- The **fallacy of false dichotomy** occurs when the premise(s) claim or assume that a choice between two alternatives is **exhaustive** or **exclusive** or **both**, when the choice is not.
- Examples  
"You're either for us or you're against us"  
"You're either a teacher, or else you're a student"

## 3) The Slippery Slope Fallacy

- This occurs when an argument claims or assumes that taking a particular step will *inevitably* lead to a further, undesirable step or steps.
- Arguments that commit this fallacy typically have this form "Doing action A will lead to action B, which will lead to action C, which will certainly result in terrible consequence D. So we should not do A"
- This fallacy makes use of the **Hypothetical Syllogism** [If A, then B. If B, then C. Therefore, if A then C] So why is it offered as a fallacy??
- Example  
"If we allow voluntary, physician-assisted suicide, then tomorrow we'll have non-voluntary assisted suicide on unconscious patients. Then we'll have involuntary assisted-suicide on unwilling patients. Soon, no hospital will be safe from 'helpful' doctors!"

Such arguments are *fallacies* when it is unlikely that one or more of the conditionals is true.

#### 4) The Fallacy of Hasty Generalization

- When an argument concludes something about a group or set on the basis of an inadequate sample size.

- Example

“All the cafeteria food is terrible. I had a burger there once, and it made me queasy.”

#### 5) The Fallacy of Faulty Analogy

- We often reason *by analogy*: by comparing one thing to another.
- Specifically: we conclude something about the **target** by comparing it to the **analogue**.

A = analogue    T = target

Typical Structure of Analogical Arguments

(1) A has property P

(2) A and T are **relevantly similar to degree *n***.

Therefore, **probably**,

(3) T has property P.

- When we reason by analogy, the **analogue** must be

(a) **relevantly-similar**; and

(b) **sufficiently-similar** to the **target**.

1. Suzie did well in SSH105 last year.

2. Her sister, Jane, is similar to Suzie: she is bright and works hard.

Therefore, probably,

Jane will do well in SSH105.

1. Suzie did well in SSH105 last year.

2. Her sister, Jane, is similar to Suzie: she is tall and is vegan.

Therefore, probably,

Jane will do well in SSH105.

An argument commits the **fallacy of faulty analogy** when the analogue fails to be both **relevantly-similar** and **sufficiently-similar** to the target.

## CHAPTER 6

### Simple Statement:

Contains no other statement as a component part. (We represent it with a letter, like "P".)

### Complex Statement:

Contains at least one other statement as a component part.

### Logical Operator:

Special expressions which work to combine simple statements into complex ones.

<b>SYMBOL</b>	<b>MEANING</b>	<b>EXAMPLE</b>
& - Ampersand	Conjunction - AND	$p \& q$ False if and only if one or both of the conjuncts is false.
V- Wedge	Disjunction- OR	$p \vee q$ False if and only if both of the disjuncts are false.
~ - Tilde	Negation- NOT	$\sim p$ False if and only if p is true.
→ - Arrow	Conditional- IF, THEN	$p \rightarrow q$ False if and only if the antecedent is true AND the conditional false.

### The Short Method

To test whether an argument is **invalid**, we do not need to set up a whole truth-table: after all, we only need to try to find a **row** where **all** the premises are **true**, **and** the conclusion is **false**.

Consider this argument:

$$\begin{array}{l} \sim q \\ p \rightarrow (q \vee r) \\ r \\ \hline \therefore p \end{array}$$

Premise 1		Premise 2		Prem3		Conc.		
T		T		T		F		
~	q	p	→	(q	∨	r)	r	p
T	F	F	T	F		T	T	F

