

# Critical thinking

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**Definition 1.** *Retrograde analysis: Reasoning that seeks to explain how things must have developed from things that have happened before.*

## 0.1 Definitions

**Definition 2.** *Definiendum: The word or symbol being defined*

**Definition 3.** *Definiens: A symbol or group of symbols that have the same definition as the Definiendum*

**Definition 4.** *Ambiguity: A term is ambiguous **in a given context** when it has more than one distinct meaning, and the context does not make clear what is intended.*

**Definition 5.** *Vagueness: A term is vague, when there are borderline cases where the term may or may not apply.*

### 0.1.1 Types of definitions — (5)

S(tipulative)L(exical)IT(theoretical) P(precising)P(ersuasive)

- **Stipulative definition:** A new definition where some meaning is arbitrarily defined. Such a definition cannot be correct or incorrect. Eg. Zetta has been stipulatively defined to mean  $10^{12}$ .
- **Lexical definition:** Reports the meaning that the Definiendum already has. The report maybe correct or incorrect, so such a definition maybe true or false.
- **Precising definition:** A definition used to eliminate vagueness or ambiguity.

It reports on a word that already exists, but it makes the known meaning more precise. It could increase the precision by stipulating, but the purpose of this stipulation is to *improve a pre-existing meaning*.

- **Theoretical definition:** A definition that encapsulates an understanding of the theory in which the term is a key element.
- **Persuasive definition:** A definition used to resolve disputes by influencing attitudes and stirring emotion. Often uses emotive language.

## 0.2 Intention and extension

**Definition 6.** *Extension:* The set of all objects to which a term may be applied.

$$\text{extension}(P) \equiv \{x \mid \forall x \in \text{universe}, P(x)\}$$

**Definition 7.** *Intension:* The attributes shared by all and only the objects in the class the term denotes. Or, the connotation of the term.

$$\text{intension}(P) \equiv \bigcap_{\forall x \in \text{extension}(P)} \text{attribs}(x)$$

**The equilateral triangle example** Consider equi-**angular** triangle, whose intention is different from equi-**lateral** triangle.

Both of these have the same *extension* (since the sets are the same), but have different *intentions*.

## 0.3 Extension and denotative definitions

Means of defining extensive terms:

**Definition 8.** *Denotative definition:* A definition that identifies the extension of a term, by (for eg.) listing the members of the definition. An extensive definition

**Definition 9.** *Ostensive definition:* A denotative definition, where the definition is made by pointing.

For example, the word desk means this.

**Definition 10.** *Quasi Ostensive definition:* Example: the desk is means this article of furniture. This presupposes the meaning of article of furniture.

## 0.4 Intention and Intensional Definitions

### 0.4.1 Types of intentional definitions

**Definition 11.** *Subjective intension:* Set of all attributes speaker believes are possessed by objects denoted by that word

**Definition 12.** *Objective intension:* Total set of characteristics shared by all objects in the word's extension

**Definition 13.** *Conventional intension:* Commonly accepted intension of a term;

### 0.4.2 Techniques for creating intensional definitions

**Definition 14.** *Synonymous definition: A word, phrase, etc. is defined in terms of another*

**Definition 15.** *Operational definition: Defined by means of operations. Example: length can be defined by the measuring procedure.*

**Definition 16.** *Definitions by genus and difference (Analytical definitions): Class whose membership is divided: **genus**. Subclasses: **species**.*

## 0.5 Fallacies

### 0.5.1 Fallacies of relevance - 8

MISS(ing the point) TWO S(trawman)A(d hominem)F(force)E RED(herring), APPLES(appeal to populace, emotion)

- **Appeal to populace:** Appeal to people's emotions. Eg. speeches by fascist leaders.
- **Appeal to emotion:** Appeal to base emotions such as pity.
- **Red herring:** Distract from the actual argument with a *deliberately misleading trail*. Etymology: People who used to try and save foxes from being hunted by leaving a smoked herring, which confuses dogs, and also turns red.
- **Strawman:** Misconstrue argument to make it seem weaker than it actually is, and then defeat the weakened argument.
- **Ad hominem — abusive type (Argument against the person):** Attack moral character of person.
- **Ad hominem — circumstantial type:** Attacking someone's argument based on their *circumstance*. Eg. calling a non-vegetarian who argues for reduced meat consumption a hypocrite. This does not reduce the validity of the argument at all.
- **Appeal to force:** Appeal to threats to coerce the other person to accept your argument.
- **Missing the point:** One attacks a different thesis than the one the interlocutor was advancing.

### 0.5.2 Fallacies of defective induction - (4)

IGNORE AUTHORITY CA(use) GE(generalization)

- **Argument from ignorance:** Arguing that just because something is not *proven* true, it *must be* false, or the converse.
- **Appeal to inappropriate authority:** Appeal to the authority of someone who is not an authority on the subject at hand.  
Example: Invoking Picasso on a discussion about economics.
- **False cause:** Arguing for a cause-and-effect relationship where none exists. Eg. you fell sick because of the bees this time of year.
- **Hasty Generalization:** Performing induction from a very small sample size.

### 0.5.3 Fallacies of presumption - (3)

A(ccident) B(egging the question) C(omplex question) These come from presuming unjustified assumptions.

- **Accident:** Assuming a generalization applies to all concrete cases.  
Example: It is wrong to steal. We can create corner cases such as “what if the person was hungry”? This falls under accident.
- **Complex question:** Constructing a loaded question where refuting a part of the question implicitly provides truth to another part, which was unintended.  
Example: “With all of the hysteria, all of the fear, all of the phony science, could it be that man-made global warming is the greatest hoax ever perpetrated on the American people?”
- **Begging the question:** Assuming the conclusion in the supposition.  
Example: “There is no such thing as knowledge which cannot be carried into practice, for such knowledge is really no knowledge at all.”