

## Introduction to Propositional Logic

### *Key Topics*

- \* Why Study Logic?
- \* Atomic Sentences
- \* Translations
- \* Tarski's World
- \* Valid & Sound Arguments

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- Definition 1: Atomic Sentences correspond to the simplest sentences of English, sentences consisting of some names connected by a predicate.
  - Some rules:
    - Every individual constant must name an existing object.
    - No constant can name more than one object
    - An object can have more than one name.
  - Predicate symbols are used to express some property of objects or some relation between objects
  - In FOL, each predicate has a fixed number of arguments or arity. This is the number of constants the predicate needs to form a sentence.
  - Every predicate is interpreted by a determinate property or relation, i.e., it is possible to determine definitively whether or not an object has the property.
  - Definition 2: An Atomic Sentence is a predicate followed by the right number of names (as defined by the arity of the predicate) which makes a claim that must be either true or false.
  - When designing our own FOL, we want a language that can say everything we want but with the smallest "vocabulary".

Translate the following into FOL making up predicates as needed:

1. Elliot shook hands with Caroline.
2. AIDS is less contagious than influenza.
3. Spain is between France and Portugal, in size.
4. Misery loves company.

- An argument is a series of statements in which one, called the conclusion is meant to be a consequence of the others, called premises.
- An argument is valid if the conclusion must be true in any circumstance in which the premises are true.
- An argument is sound if it is valid and the premises are all true.