

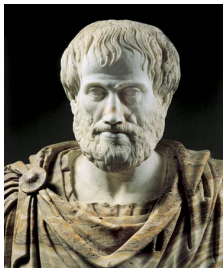
What is an ontology?

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What is ontology?

Aristotle



- Introduced in the *Metaphysics*
- The “science of being *qua* being”

What is ontology?

Aristotle's ontology: 10 distinctions

Classification of things that are said (words):

- substance
- quantity
- quality
- relatives
- somewhere
- sometime
- being in a position
- having
- acting
- being acted upon

What is ontology?

Ontology (philosophy)

An ontology is a system of categories accounting for a particular view of the world.

- only processes (General Process Theory, Seibt)
- only states of affairs (Armstrong, Wittgenstein)
- only tropes (trope/bundle theory, Quine)
- only objects *now* (presentialism)
- only dispositions
- many multi-categorical systems

What is *an* ontology?

AI perspective

The subject of ontology is the study of the categories of things that exist or may exist in some domain. The product of such a study, called an ontology, is a catalog of the types of things that are assumed to exist in a domain of interest D from the perspective of a person who uses a language L for the purpose of talking about D . [John Sowa]

An ontology is a specification of a conceptualization. [Tom Gruber]

What is *an* ontology?

AI perspective

- An ontology (in philosophy) is a system of categories accounting for a particular view of the world.
- An ontology (in philosophy) is language independent.
- An ontology (in artificial intelligence) is constituted by a *vocabulary* plus explicit assumptions regarding the *intended meaning* of the vocabulary.
- An ontology (in artificial intelligence) is language dependent.

What is *an* ontology?

Conceptualization

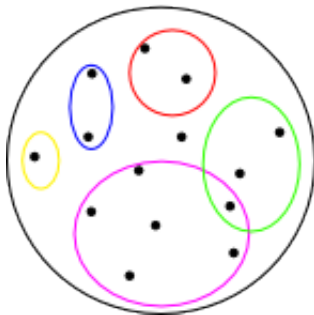
An ontology is a specification of a conceptualization.

- Conceptualization: system of categories accounting for a particular view on the world
- Gruber: conceptualization is a structure $\langle D, R \rangle$, where D is a domain and $R \subseteq D^n$ a set of relations on D .
- Guarino: intensional account of conceptualization

What is *an* ontology?

Conceptualization: Gruber

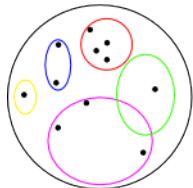
D



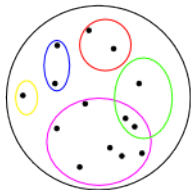
What is *an* ontology?

Conceptualization: Guarino

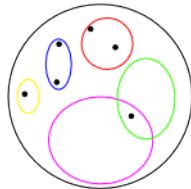
W2



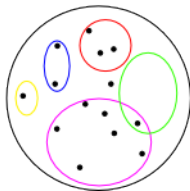
W1



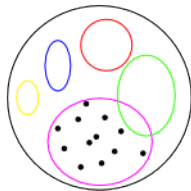
W5



W3



W4



What is *an* ontology?

Ontological commitment

- An ontology (artificial intelligence) is based on a vocabulary L .
- Ontological commitment: relates vocabulary to conceptualization
- A language L commits to a conceptualization C by means of an ontological commitment K .
- *How* does a term t relate to a domain?

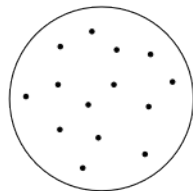
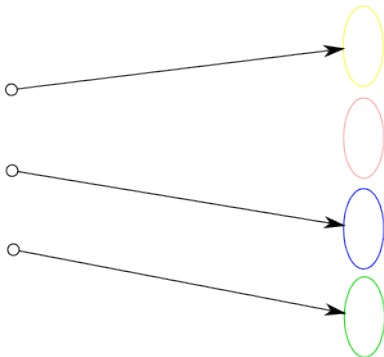
What is *an* ontology?

Ontological commitment

Vocabulary

Conceptualization

World/Domain



What is *an* ontology?

Ontology (artificial intelligence)

An ontology is a logical theory accounting for the intended meaning of a formal vocabulary, i.e. its ontological commitment to a particular conceptualization of the world. [Guarino, 1998]

What is a biological ontology?

Overview

- Controlled, structured vocabularies
- Account for the shared conceptualization of scientific communities
- Intended for database interoperability
- Recently: ontologies built out of terms which are intended to refer exclusively to *universals*
- *Realist* ontologies

What is a biological ontology?

Biology: realism

For an information system, an ontology is a representation of some pre-existing domain of reality which:

- ① *reflects the properties of the objects within its domain in such a way that there obtains a systematic correlation between reality and the representation itself*
- ② *is intelligible to a domain expert*
- ③ *is formalized in a way that allows it to support automatic information processing*

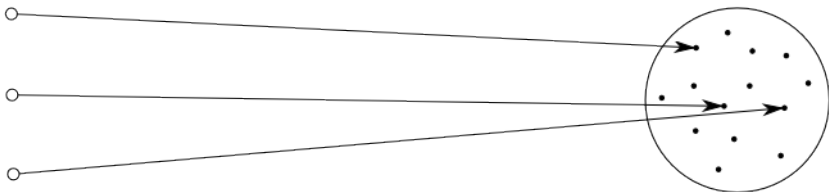
There is no (explicit) conceptualization.

What is a biological ontology?

Biology: realism

Vocabulary

Reality



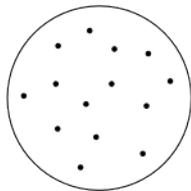
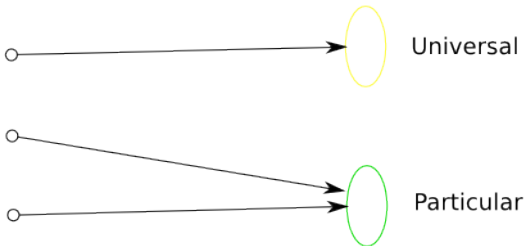
What is a biological ontology?

Biology: realism

Vocabulary

(Conceptualization)

Reality



What is a biological ontology?

Biology: OBO and OBO Foundry

- Common upper level ontology: BFO+RO
- Collaborative development by domain experts
- Based on a particular form of realism: all general terms must refer to universals
- Canonicity: ontologies of prototypes
- Adopted by widely used ontologies: GO, ChEBI, SO, FMA,...

Thank you!