

Introduction to **Lexical Semantics**

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Introduction to Lexical Semantics

In this lecture:

- 
- ❑ Part 1: **Linguistic Ontologies vs. Application Ontologies**
 - ❑ Part 2: What is Lexical Semantics
 - ❑ Part 3: What is a Concept
 - ❑ Part 4: Polysemy and Synonymy
 - ❑ Part 5: Multilingualism

Application Ontology vs. Linguistic Ontology

The importance of linguistic ontologies is growing rapidly.

Application ontology

To represent the semantics of a certain domain/application, e.g., the Gene Ontology, the FOAF ontology, the Palestinian e-government ontology.

- Each term convey one concept (no polysemy).
- Represents (/Benchmarked to) application's knowledge.
- Used only by a certain application, or a class of applications.

Linguistic ontology

To represent the semantics of terms in a human language, independently of a particular application.

- Each word may convey several concepts (Polysemy).
- Represents common-sense knowledge (/State-of-art scientific discoveries).
- Can be used for general purposes.

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What is Lexical Semantics?

The study of how and what the words of a language denote.

- Whether the meaning of a lexical unit is established by looking at its neighborhood in the semantic net (by looking at the other words it occurs with in natural sentences), or if the meaning is already locally contained in the lexical unit?
- There are several theories of the classification and decomposition of word meaning, the differences and similarities in lexical semantic structure between different languages, and the relationship of word meaning to sentence meaning and syntax.

Lexical Semantics → focuses on the mapping of words to concepts.

Lexical item: a single word or chain of words that forms the basic elements of a language's lexicon (vocabulary). E.g., "cat", "traffic light", "take care of", "by-the-way", etc.

What is Lexical Semantics?

- There are different theories and approaches in defining the relation between a lexical unit and its meaning(s). For example: can we understand the meaning independently of a sentence? can we understand the meaning independently of the grammar (morphology)? and so on.
- Such theories and approaches are: Prestructuralist semantics, Structuralist and nostructuralist semantics, interpretative semantics and generative semantics, cognitive semantics.
- **In this lecture**, we don't investigate these theories, but rather, we study the “meaning” from a computational and engineering viewpoints, so to enable computer applications.

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What is a concept?

ISO TC37 definitions:

3.2.1 concept

unit of knowledge created by a unique combination of **characteristics** (3.2.4)

NOTE Concepts are not necessarily bound to particular languages. They are, however, influenced by the social or cultural background which often leads to different categorizations.

3.2.2 individual concept

concept (3.2.1) which corresponds to only one **object** (3.1.1)

NOTE 1 Examples of individual concepts are 'Saturn', 'the Eiffel Tower'.

NOTE 2 Individual concepts are usually represented by **appellations** (3.4.2)

This ISO definition is based on Eugen Wuster work [W03] who argued: *concepts and objects are both thoughts existing in our minds, rather than in reality.*

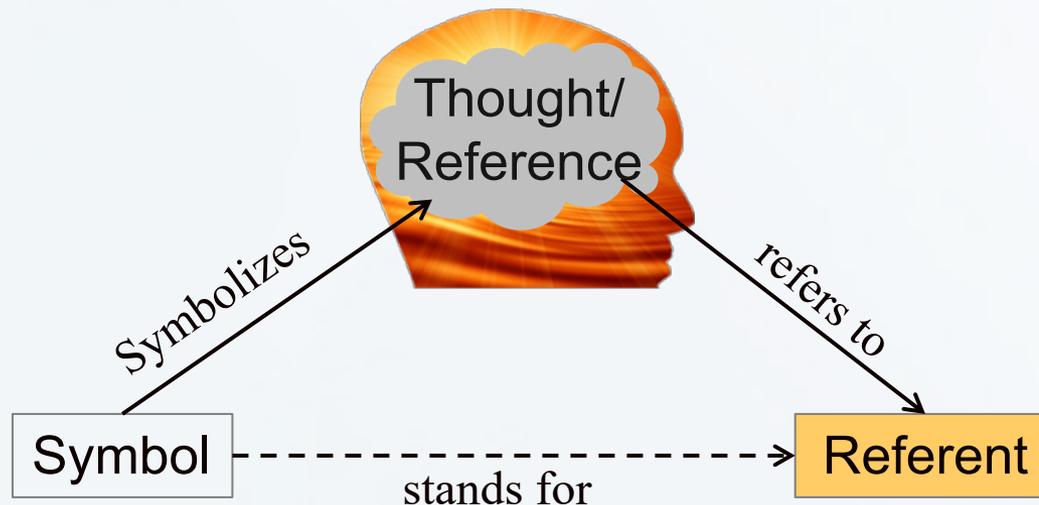
This definition was largely criticized [S04, SCT04, S06]:

Constructing concepts as “thoughts” does not help us to benchmark the correctness of our concept system - as we cannot gain access to the interiors of each other’s brains. Smith Suggested to use **Universal** instead of concept.

The Semiotic Triangle

Ogden CK, Richards IA. **The Meaning of Meaning**. 3rd ed. New York, 1930.

- A psychological account (theory of causality)
- A symbolic representation does not refer directly to an object, but indirectly, through a 'thought or reference' in mind.



What is a concept

- No concept without instances, and no instance can be a concept at the same time [J11, J05].
- Two concepts with exactly the same extension are the same concept [J11].
- Two terms lexicalizing the same concept (same extension) are synonyms [J05].

Concept (/Universal/Defined Class):
the characteristics that its instances
have in common.

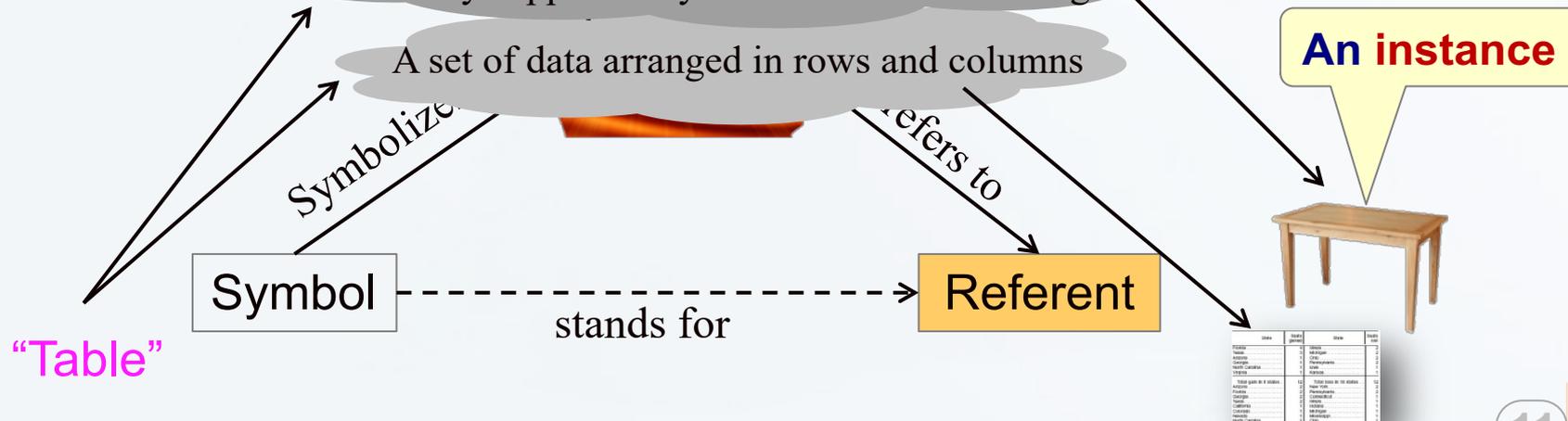
مفهوم

A piece of furniture having a smooth flat top that is usually supported by one or more vertical legs

A set of data arranged in rows and columns

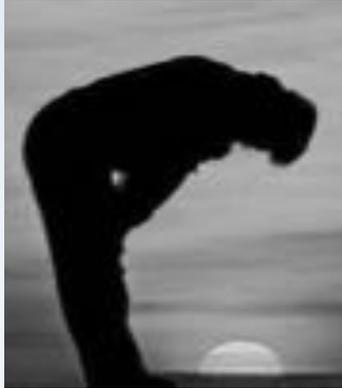
المصدق

An instance



Number of Terms vs Concepts in a Language

How concepts are named and communicated?



ركوع



قرفصاء



سجود



??

Why there is no word
in Arabic to describe
this situation?

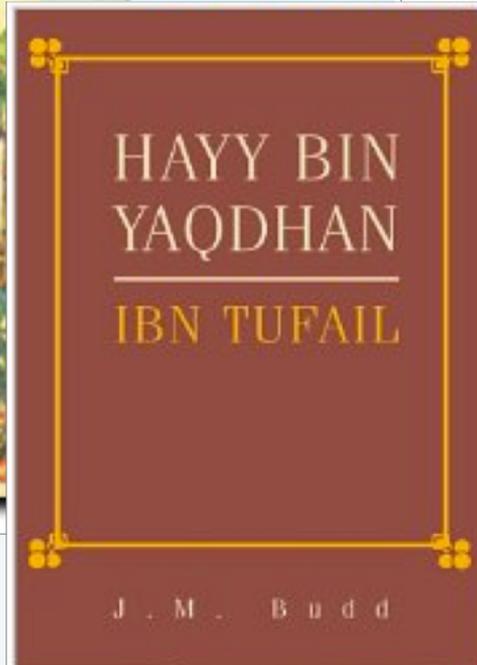
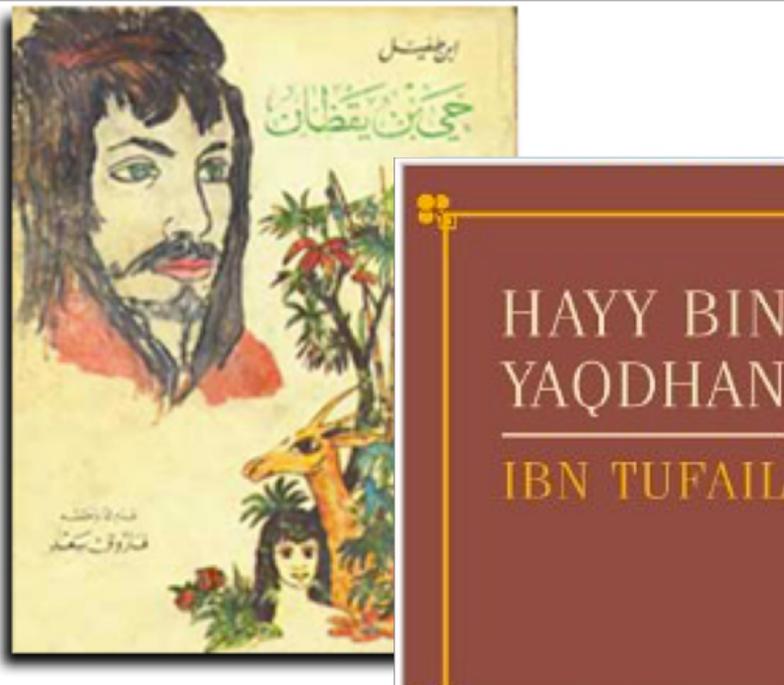
We give names to the concepts we use more.

Some societies love to give/invite names to concepts (as Arabs in the past)

Recommended Reading

Ḥayy Bin Yaqḏhan Novel

Ḥayy ibn Yaqẓān (Arabic: حي ابن يقظان "Alive, son of Awake"; Latin: Philosophus Autodidactus "The Self-Taught Philosopher"; English: The Improvement of Human Reason: Exhibited in the Life of Hai Ebn Yokdhan), the first Arabic novel, was written by Ibn Tufail (also known as Aben Tofail or Ebn Tophail), a Moorish philosopher and physician, in early 12th century Islamic Spain. The novel was itself named after an earlier Arabic allegorical tale and philosophical romance of the same name, written by Avicenna (Ave Cena) in early 11th century,[SO96] though they had different stories.[D92]
-wikipedia



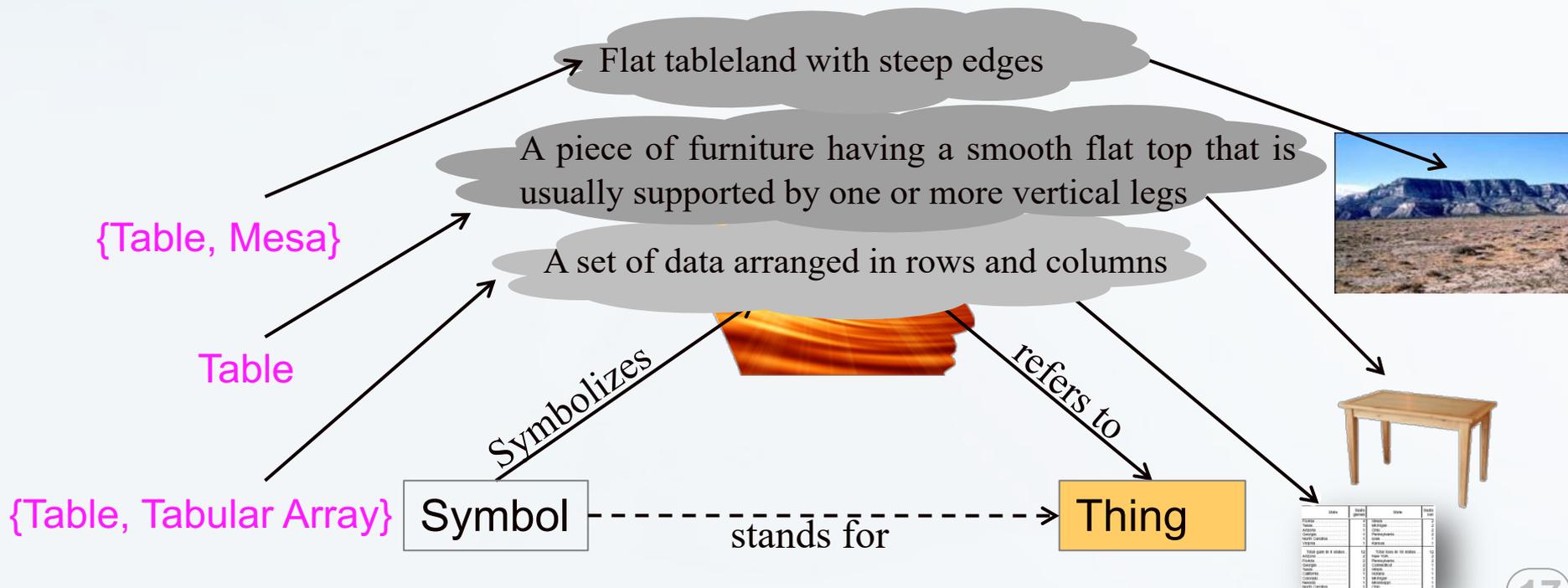
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Synonymy

- **Synonymy**: Different lexical units denoting the **same concept**
- Two lexical units are said to be **synonyms if they can be used interchangeably** in a certain context (/refer to the same extension).
- Mostly, synonyms are generated by the **parallel use**.
- Some lexicographers claim that no synonyms have exactly the same meaning (in all contexts or social levels of language)!!!!.



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Multilingually

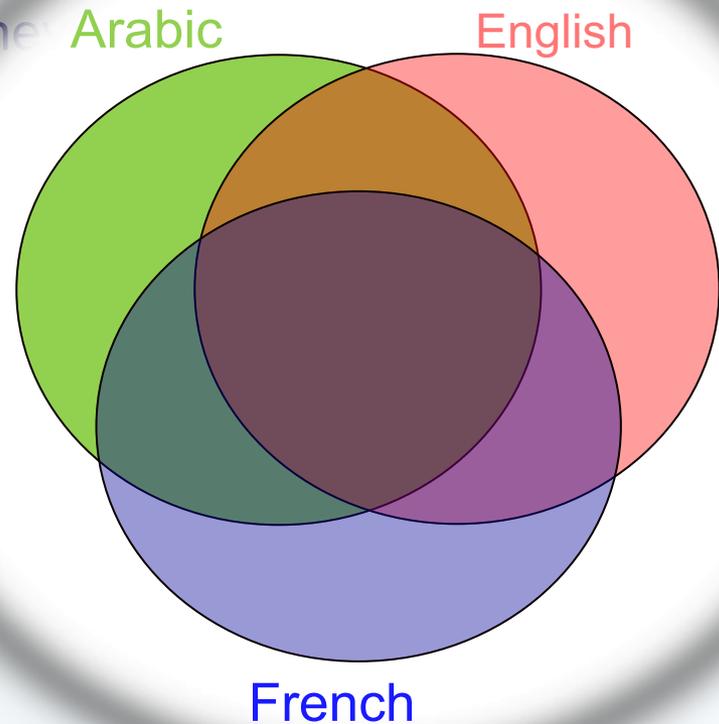
The language- independency of Concepts is problematic:

- Concepts/universals (that are benchmarked to scientific discoveries) **are language independent.**
- Concepts (that are benchmarked to *perceptions*) **are not totally language-independent**, as they typically depend on the perceptions and culture of the language-speakers.
- Many concepts are **shared cross languages**, especially if the speakers of these languages interact with each other.
- **The more interaction** between two communities speaking different languages, **the more shared concepts** can be found.

Multilingually

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- Concepts (that are benchmarked to scientific discoveries) are **not totally language-independent**, as they are influenced by the perceptions and culture of the speakers of the language.
- Many concepts are **shared** by speakers of these languages.
- **The more interaction** between languages, **the more shared** concepts are.



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