

Knowledge Graphs

Lecture 1 - Knowledge Graphs in the Web of Data

1.2 How to Represent Knowledge?

Prof. Dr. Harald Sack & Dr. Mehwish Alam

FIZ Karlsruhe - Leibniz Institute for Information Infrastructure

AIFB - Karlsruhe Institute of Technology

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Knowledge Graphs

Lecture 1: Knowledge Graphs in the Web of Data

1.1 Data, Information, and Knowledge

1.2 How to Represent Knowledge?

1.3 The Art of Understanding

1.4 Towards a Universal Knowledge Representation

1.5 The Semantic Web

1.6 Linked Data and the Web of Data

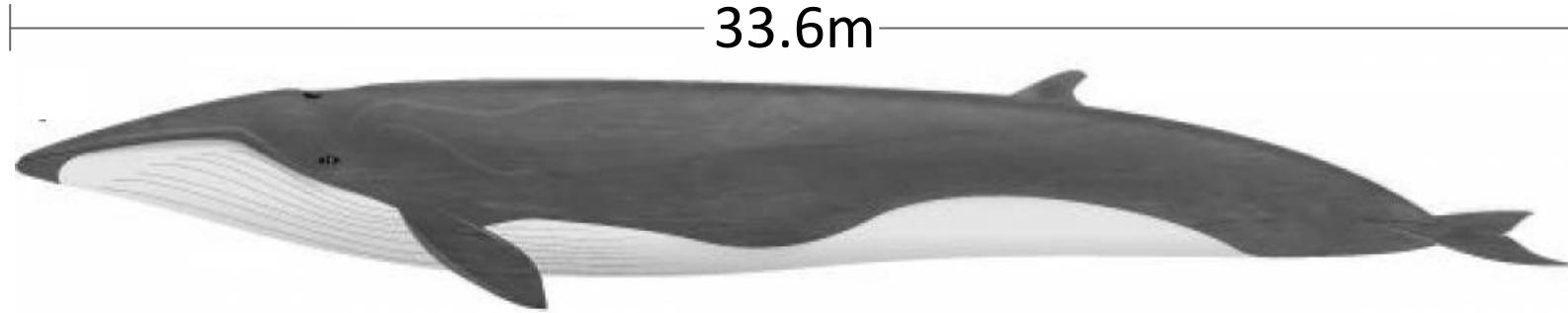
33.6

- 33.6 is a number

33.6 m

- 33.6 is a number
- 33.6 m is a length

Data, Information & Knowledge



- 33.6 is a number
- 33.6 m is a length
- 33.6 m is the length of a Blue Whale.

Data, Information & Knowledge

33.6m



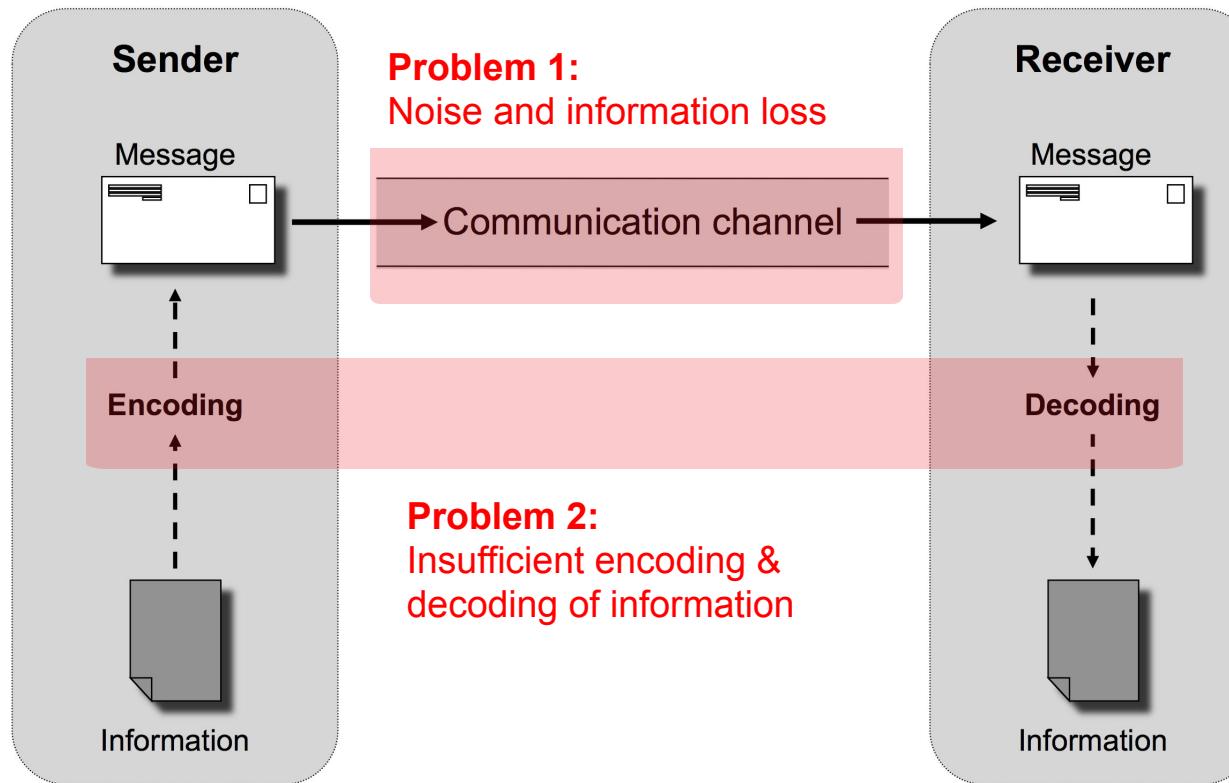
Language

- We want to express more:
 - The blue whale is a whale. A whale is a mammal. A mammal is an animal.
 - The whale lives in the oceans. An ocean is a body of water.
 - This is 'Moby', a specific blue whale. He lives in the Atlantic Ocean.
 - The longest ever measured blue whale had a length of 33.6 m
 - This means that - up to now and unless we may find a longer one - the largest blue whale measures 33.6 m, or no blue whale is longer than 33.6 m.
 - Moby is not longer than 33.6 m.
 - If you happen to find a longer whale, then either it is no blue whale or we have to change our previous assumptions.

Language as Knowledge Representation

- **(Natural) Language can be a way to represent knowledge**
- **What is Language?**
 - **Language** is a system of conventional **spoken, manual, or written symbols** that combine to **convey meaning**, and by means of which human beings, as members of a social group and participants in its culture, **express** themselves.
 - One of the most important functions of language is **communication**.

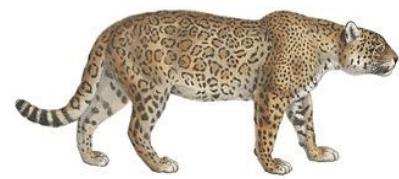
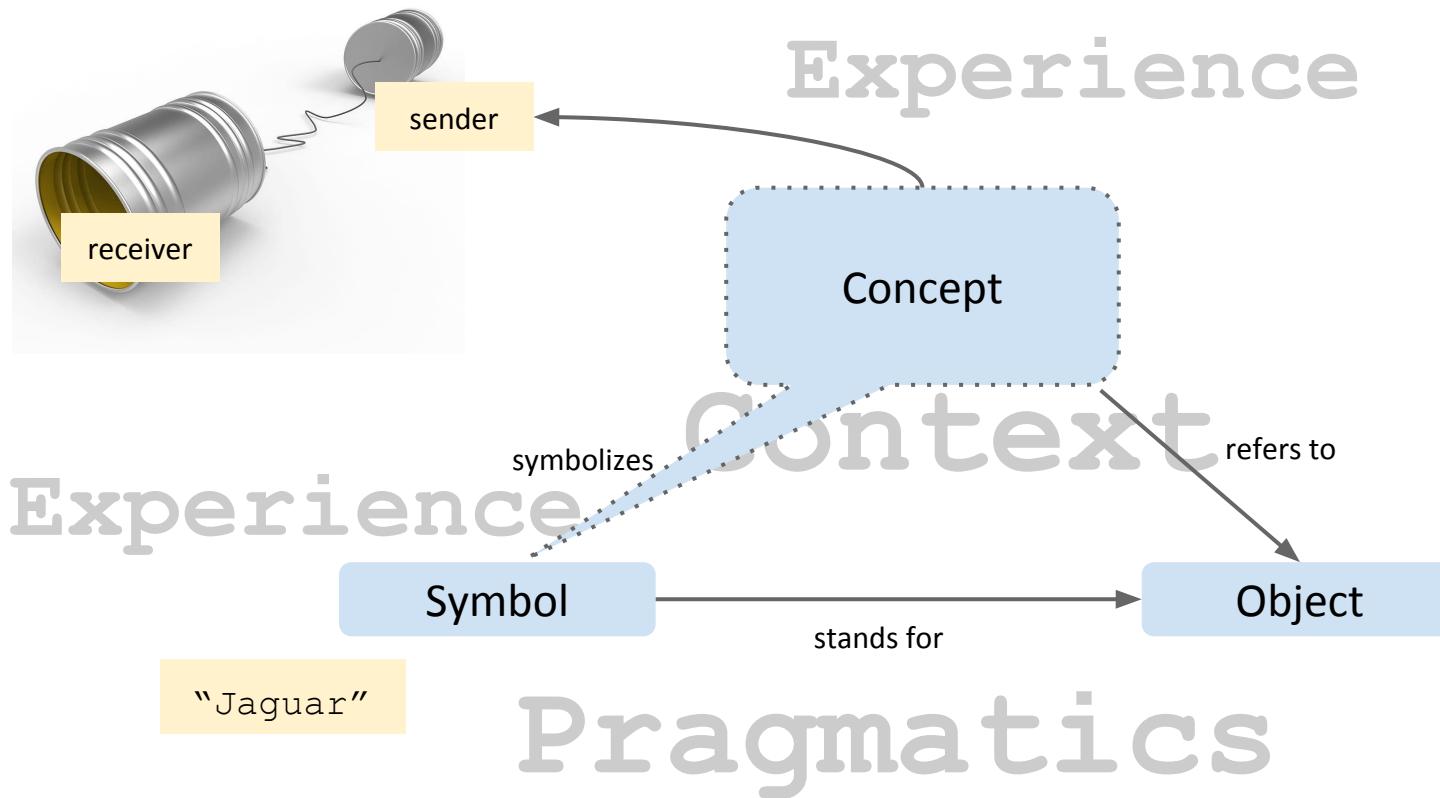
Language and Communication



Ch. Meinel, H. Sack:
Digital Communication -
Communication Multimedia,
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[2,3,4,5]

Communication of Meaning

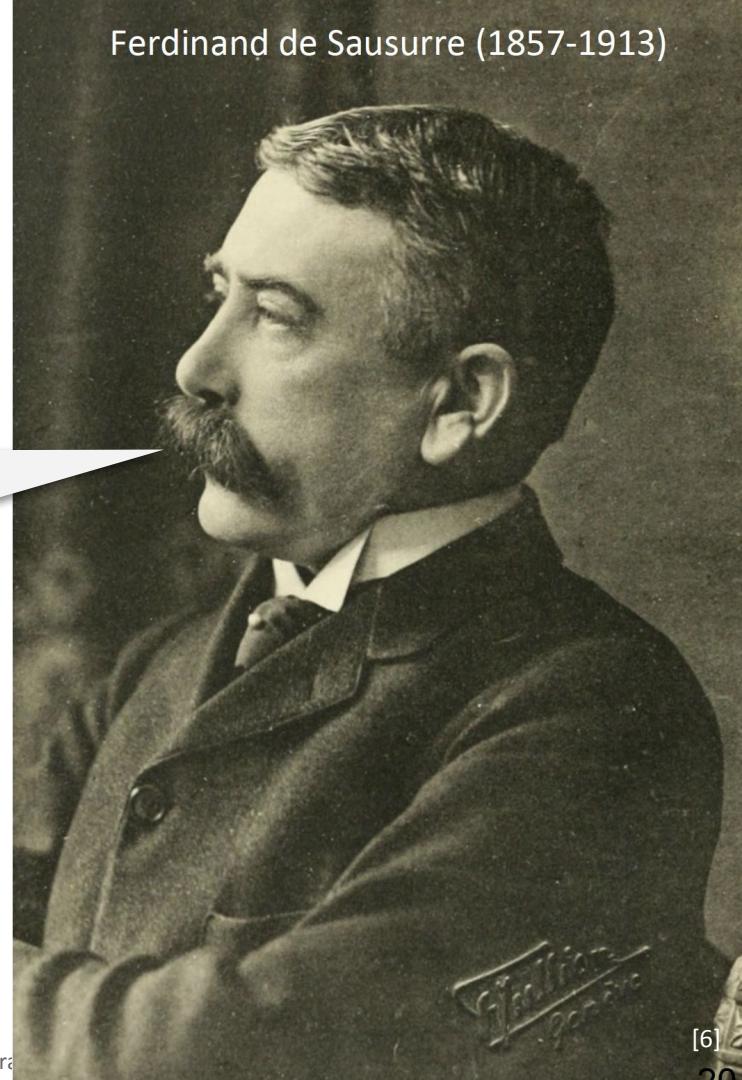


Why (Natural) Language is so difficult

I am a Linguist.

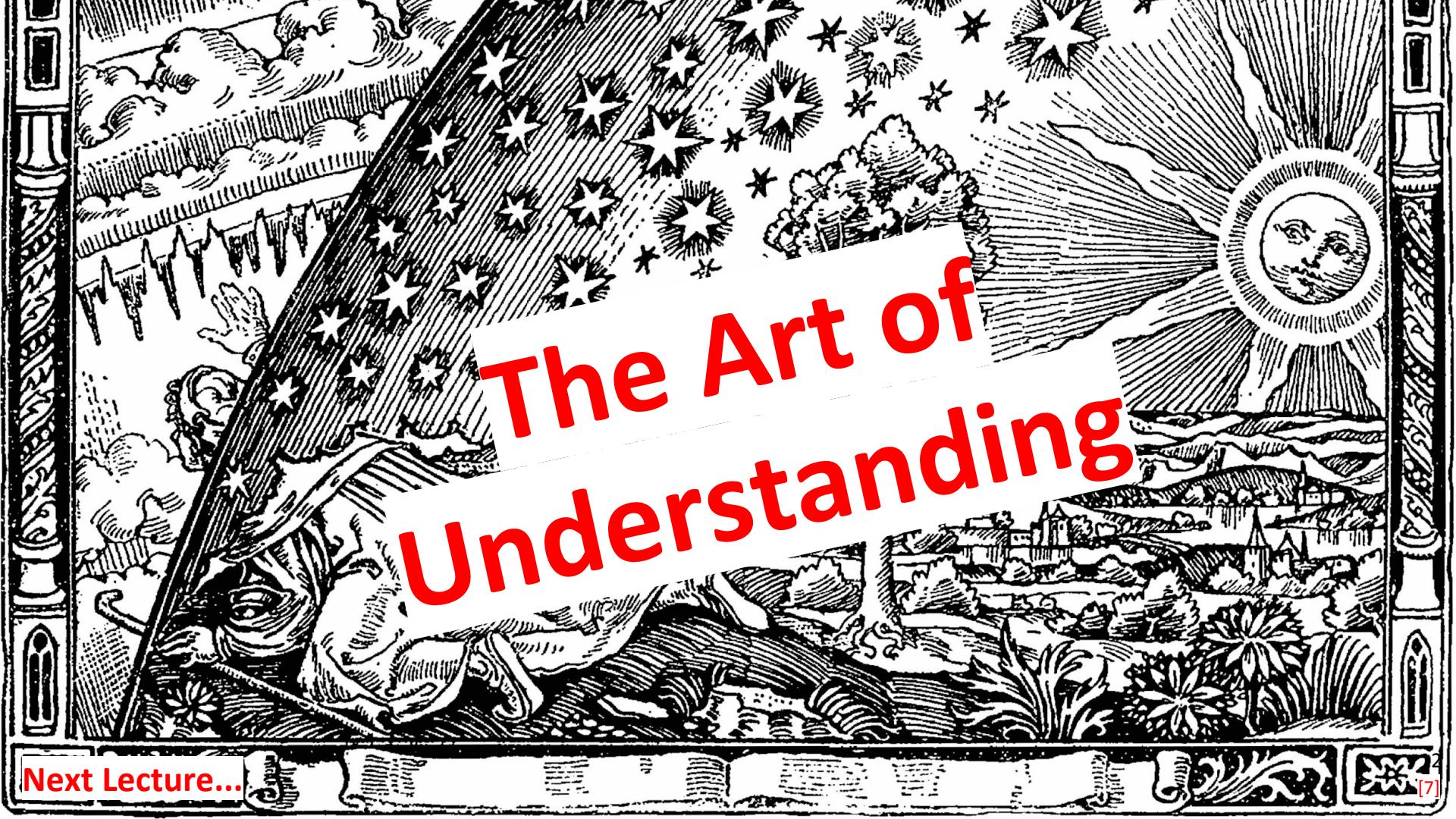
I love language more than most people.

1. Paraphrasing
2. Ambiguity



Formal Knowledge Representation

- **Formal Knowledge Representation**
 - is a field of **artificial intelligence (AI)**,
 - which (unambiguously) captures the **semantics (meaning)** of **concepts, properties, relationships, and entities**
 - of specific **knowledge domains**, i.e., fields of interest or areas of concern,
 - as **structured data**.
- **Machines (computers)** must be able to **understand** formal knowledge representations.
- To “**understand**” a knowledge representation, the machine must be able to **interpret it correctly**.



The Art of Understanding

Next Lecture...

Picture References:

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- [6] The Swiss linguist Ferdinand de Saussure (1857–1913), photo by F. Jullien Genève, public domain,
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- [7] Flammarion engraving, Paris 1888, for Flammarion's 1888 *L'atmosphère : météorologie populaire* (p. 163), public domain,
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