

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

Climate Change is
the Everest of all
problems...



Climate Change is
the Everest of all
problems...

What does it mean to “understand”?

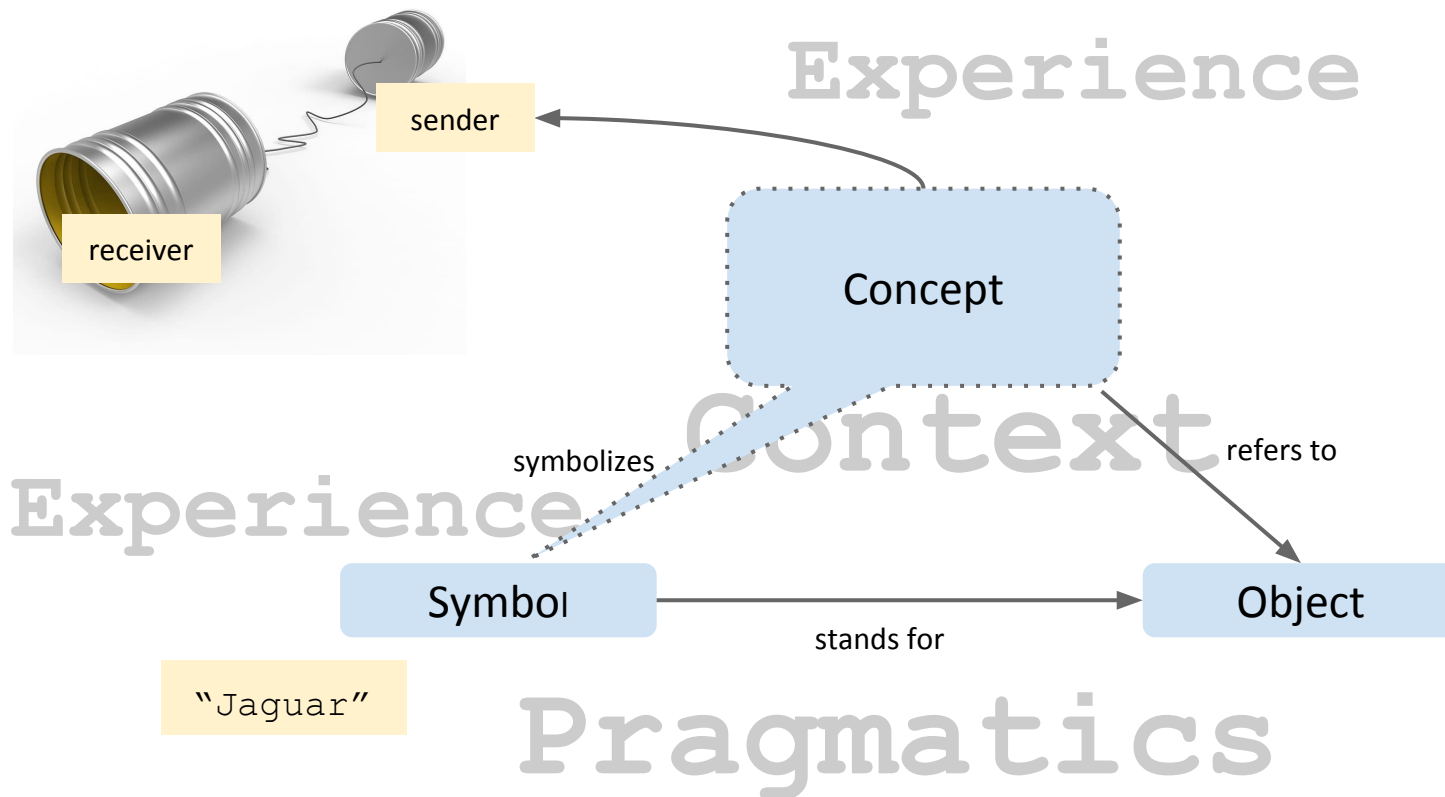
- **Understanding** (in general) is the ability to grasp the meaning of information.
- **Information** is conveyed in a **message** using a specific **language** from a sender to a receiver.



- **Information is understood** by the receiver of a message, if the receiver **interprets** the information **correctly**.

[2,3,4,5]

Meaning and Understanding



Meaning and Understanding

- **Correct Interpretation** depends on
 - Syntax,
 - Semantics,
 - Context,
 - Pragmatics, and
 - Experience.

Syntax

- =[greek] Arrangement, Ordering
- In **grammatics** syntax denotes the study of the **principles** and processes **by which sentences are constructed** in particular languages.
- In **formal languages**, syntax is just a set of rules, by which well formed expressions can be created from a fundamental set of symbols (alphabet).
- In **computer science**, syntax defines the normative structure of data.

Semantics

- =[greek] pertains to the character, the study of meaning
- is part of the linguistics which focuses on **Sense and Meaning** of language or symbols of language.
- is the **study of interpretation of signs or symbols** as used by agents or communities within particular circumstances and **contexts**.
- Semantics asks, how sense and meaning of complex concepts can be derived from simple concepts based on the **rules of syntax**.
- The semantics of a message depends on **context** and **pragmatics**.

Context

- [lat.] contextus = interweaved
- denotes the **surrounding of a symbol** (concept) in an expression resp. its **relationship with surrounding expressions** (concepts) and further related elements,
- Context denotes **all elements of any sort of communication that define the interpretation of the communicated content.**

Pragmatics

- =[greek] action
- reflects the **intention by which the language is used** to communicate a message.
- In linguistics, pragmatics denotes the **study of applying language in different situations.**
- It also **denotes the intended purpose** of the speaker.
- Pragmatics studies **the ways in which context contributes to meaning.**

Experience

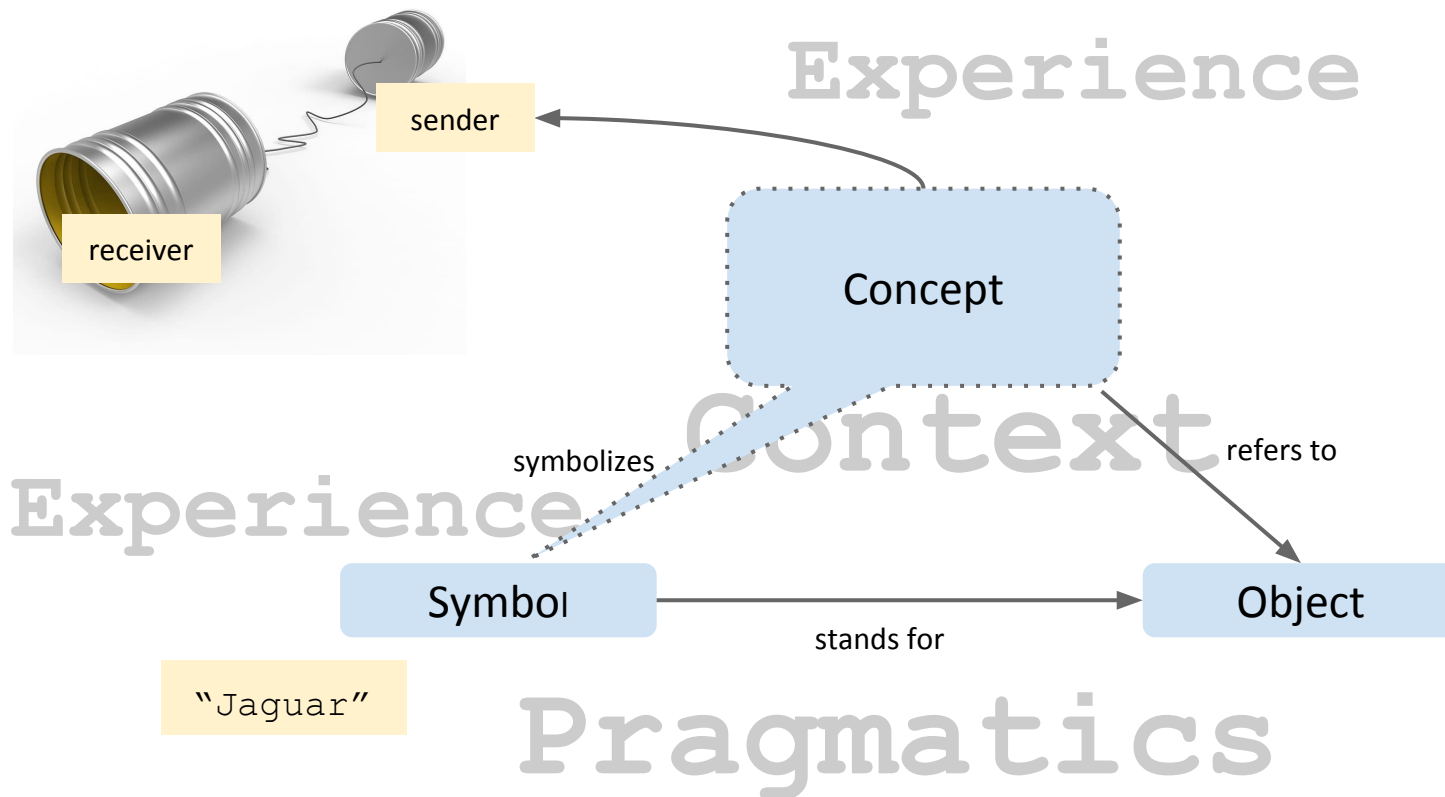
- **Experience** considers all information that you have learned and put in context with the world you are living in.
- Experience in this sense is often referred to as **common sense knowledge** or **world knowledge**.

Successful Communication

- For **successful communication**,
 - information has to be correctly transmitted (**Syntax**)
 - the meaning (**Semantics**) of the transmitted information must be interpreted correctly (= **understanding**)
- **Understanding** depends on
 - the **context** of both sender and receiver and
 - the **pragmatics** of the sender
- (Personal) **experience** determines
 - how sender and receiver **interpret the semantics, context, and pragmatics** of a message, and thus its intended meaning

[2,3,4,5]

Meaning and Understanding



Towards a Universal Knowledge Representation

Next Lecture...

Picture References:

- [1] Mount Everest as seen from an aircraft from airline company Drukair in Bhutan.
Shrimpo1967 derivative work: Papa Lima Whiskey 2 (Diskussion) [CC BY-SA 2.0]
https://commons.wikimedia.org/wiki/File:Mount_Everest_as_seen_from_Drukair2_PLW_edit.jpg?uselang=de
- [2] Phone Conversation Indicating Chit Chat And Discussion, CCO
<https://www.pigsels.com/en/public-domain-photo-jrdox>
- [3] Car Jaguar Vehicle, free photo
<https://www.needpix.com/photo/101821/car-jaguar-vehicle-automobile-transportation>
- [4] Felis onca, Geoffroy-Saint-Hilaire & Cuvier, Histoire naturelle des mammifères, pl. 170, public domain,
https://commons.wikimedia.org/wiki/File:Felis_onca_-_1818-1842_-_Print_-_Iconographia_Zoologica_-_Special_Collections_University_of_Amsterdam_-_white_background.jpg
- [5] Default Jaguar Desktop, Grant Hutchinson, flickr, CC BY-NC-ND 2.0,
<https://www.flickr.com/photos/splorp/75563891/>
- [6] The Ordering of Paradise in the Divine Comedy, by Michelangelo Caetani, 1855, public domain,
https://commons.wikimedia.org/wiki/File:Michelangelo_Caetani,_The_Ordering_of_Paradise,_1855_Cornell_CUL_PJM_1071_06.jpg