Modeling a software of semantic text analysis

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Introduction

- We present an analysis of the steps required to build a system to automatically locate expressions that represent a play on words in a text.
- We rely on the notions of
  - Conceptual metaphor,
  - Semantic network,
  - Ontology.

  as the basic elements that can be considered as primitive in any machine model approach.

Outline

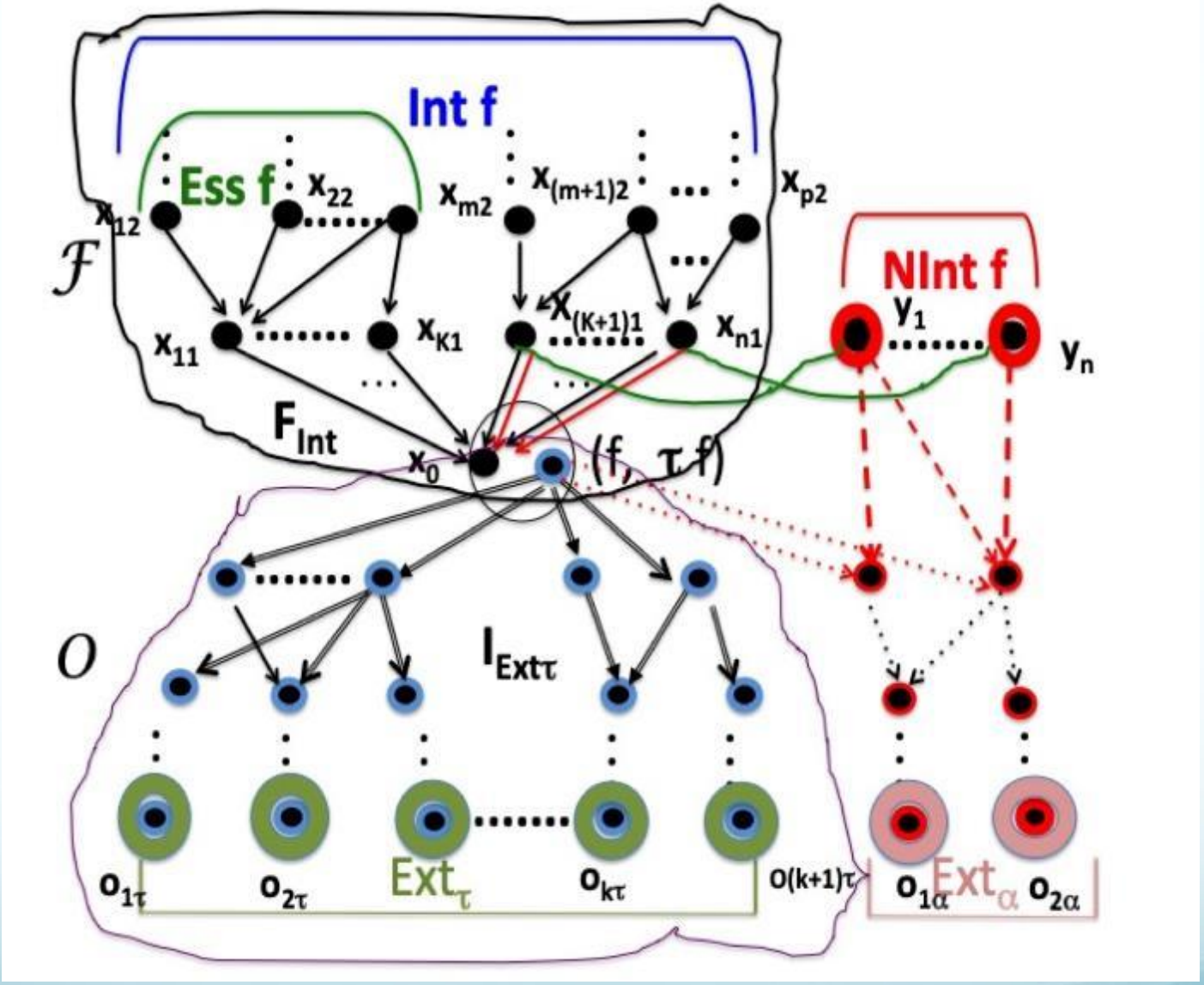
Words, concepts, objects – basic elements primitive for understanding a « text ».

- Frege
- Logic of Determination of Objects (LDO)

- Conceptual metaphor
- Concept map, semantic network, ontology
- Conceptual modeling in a play of words
  - An example
- Conclusions

La notion de concept- mathématisation

- Frege
  - C : $O \longrightarrow$ {v, f} une function of domain O and range the truth values, **truth** et **false**.
    - Object – saturated – Concept (a function) – unsaturated
- Logic of Determination of Objects (LDO) (Desclés, Pascu)
  - property
    - **property** $\longrightarrow$ set of properties $\longrightarrow$ organisation
    - $\longrightarrow$ **concept**
  - Several levels of properties
  - Two types of objects : **more or less determinate** and **totally determinate**.
  - Several levels of **determination**.



A formal description of LDO

Conceptual metaphor

- The notion of **conceptual metaphor** as cognitive notion is related to language.
- This notion has been examined by George Lakoff and Mark Johnson in *Conceptual Metaphor in Everyday Language* and *Metaphor We Live By*.
- In the same way, Gilles Fauconnier and Mark Turner introduced the notion of **conceptual blending**.

Conceptual metaphor

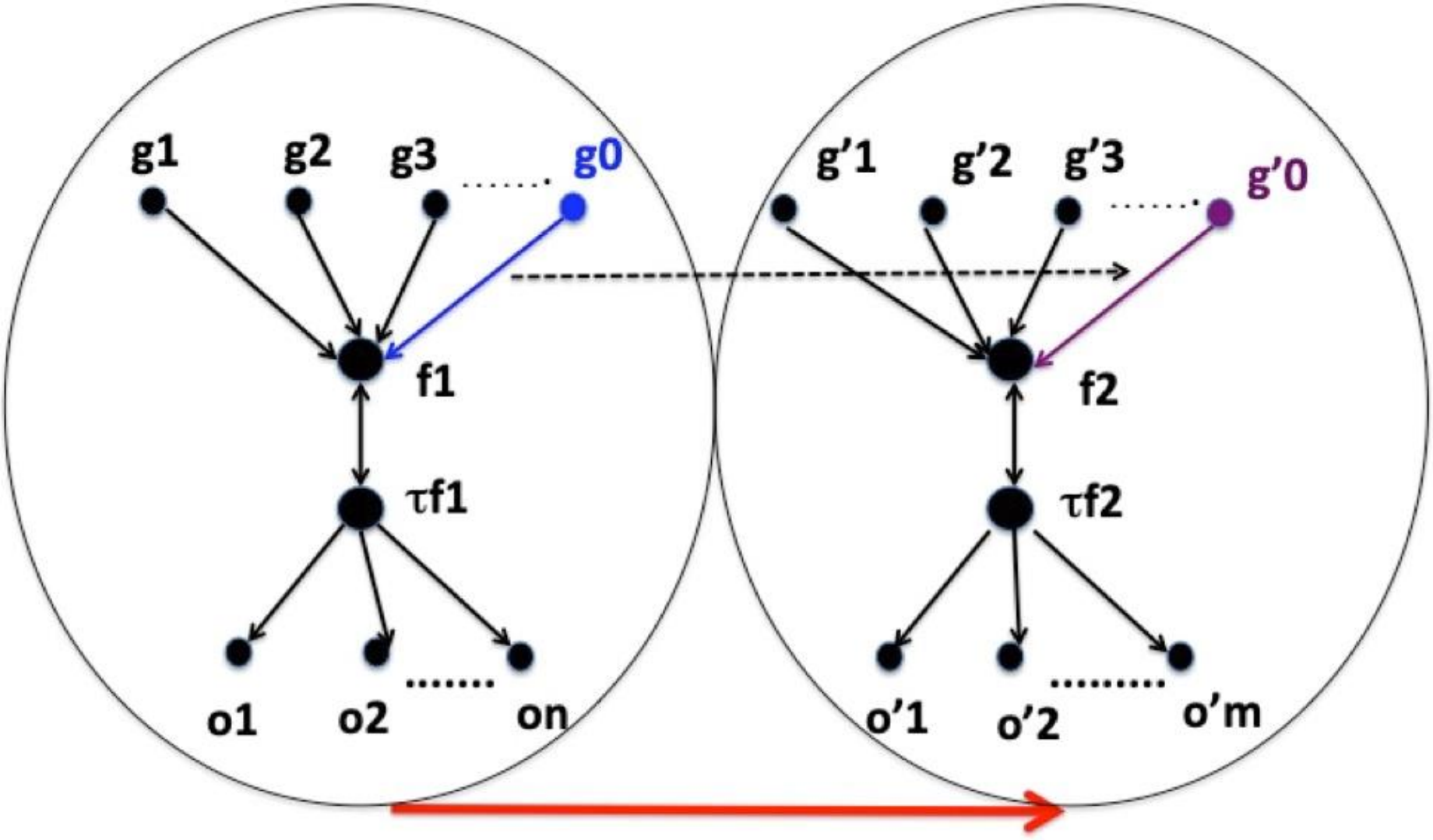
- « Conceptual blending is a basic mental operation that leads to new meaning, global insight, and conceptual compressions useful for memory and manipulation of otherwise diffuse ranges of meaning »

- Fauconnier, G., Turner, M.: Conceptual Blending, Form and Meaning.

- https://tecfa.unige.ch/tecfa/maltt/cofor-1/textes/Fauconnier-Turner03.pdf,(2003)

Conceptual metaphor

- A classical example for **conceptual blending** ([2]) is a blend of the conceptual space of house and the conceptual space of boat, yielding the concept of house- boats and the concept of boathouses as new emergent. structures.
- **Conceptual blending** is the process of analysis of two conceptual spaces, a **source space** and a **target space** and the **transfer operations** leading from the concept in source space to new concept in the target space. The target concept is a new concept obtained from the source concept by transfer.
- Il is a **conceptual metaphor**.

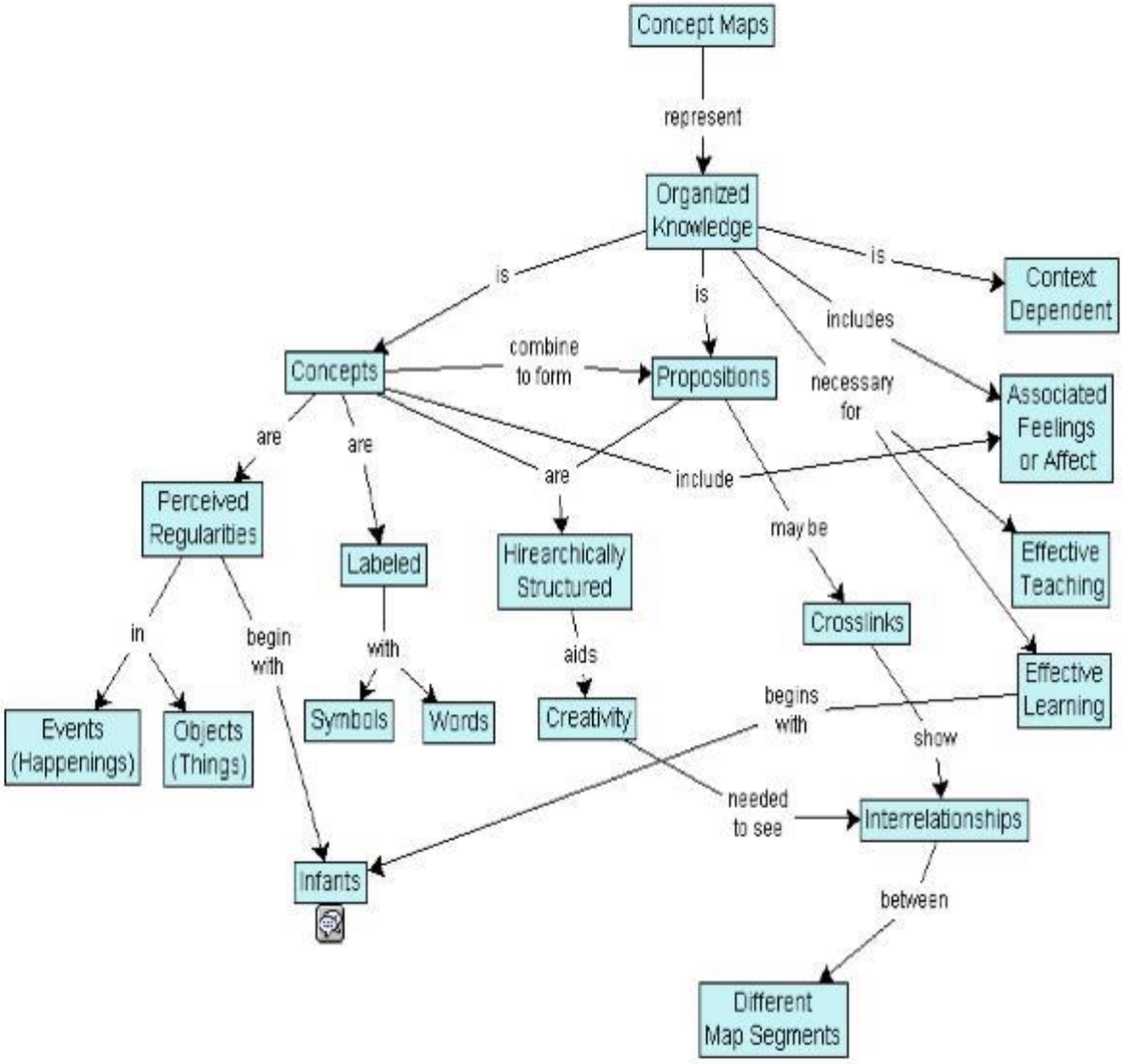


translation operator

Conceptual metaphor by LDO

Concept map

- A **concept map** or **conceptual diagram** is a diagram that depicts suggested relationships between concepts. Concept maps may be used by instructional designers, engineers, technical writers, and others to organize and structure knowledge.
    - *Concept Map*.Wikipédia. https://www.google.fr

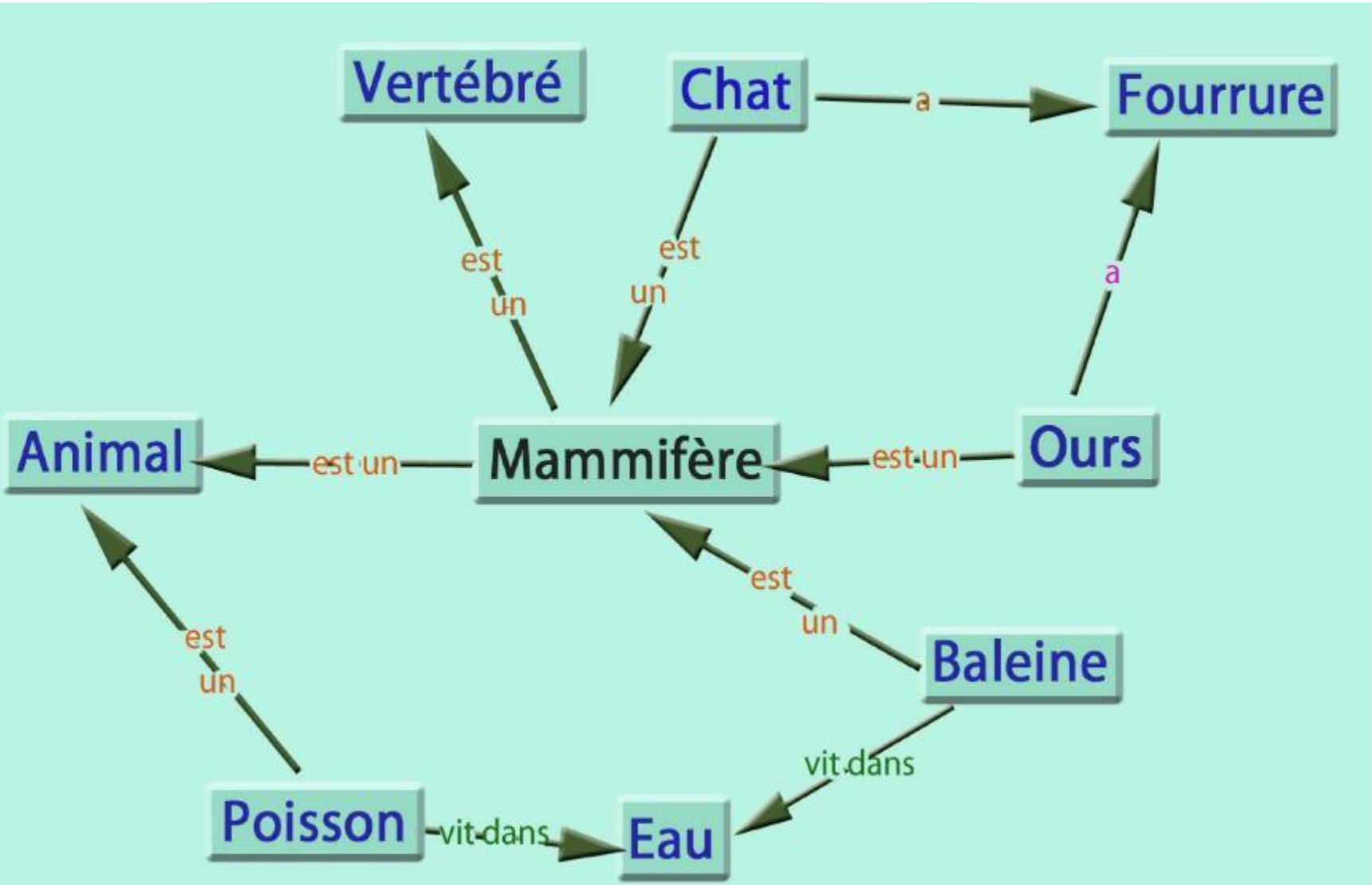


A concept map

Semantic network

- A **semantic network**, or **frame network** is a knowledge base that represents semantic relations between concepts in a network.
- This is often used as a form of knowledge representation. It is a **directed** or **undirected graph** consisting of vertices, which represent concepts, and edges, which represent semantic relations between concepts mapping or connecting se- mantic fields.
- A semantic network may be instantiated as, for example, a graph database or a concept map. Typical standardized semantic networks are expressed as semantic triples.

- *Semantic Network*. Wikipédia. https://www.google.fr

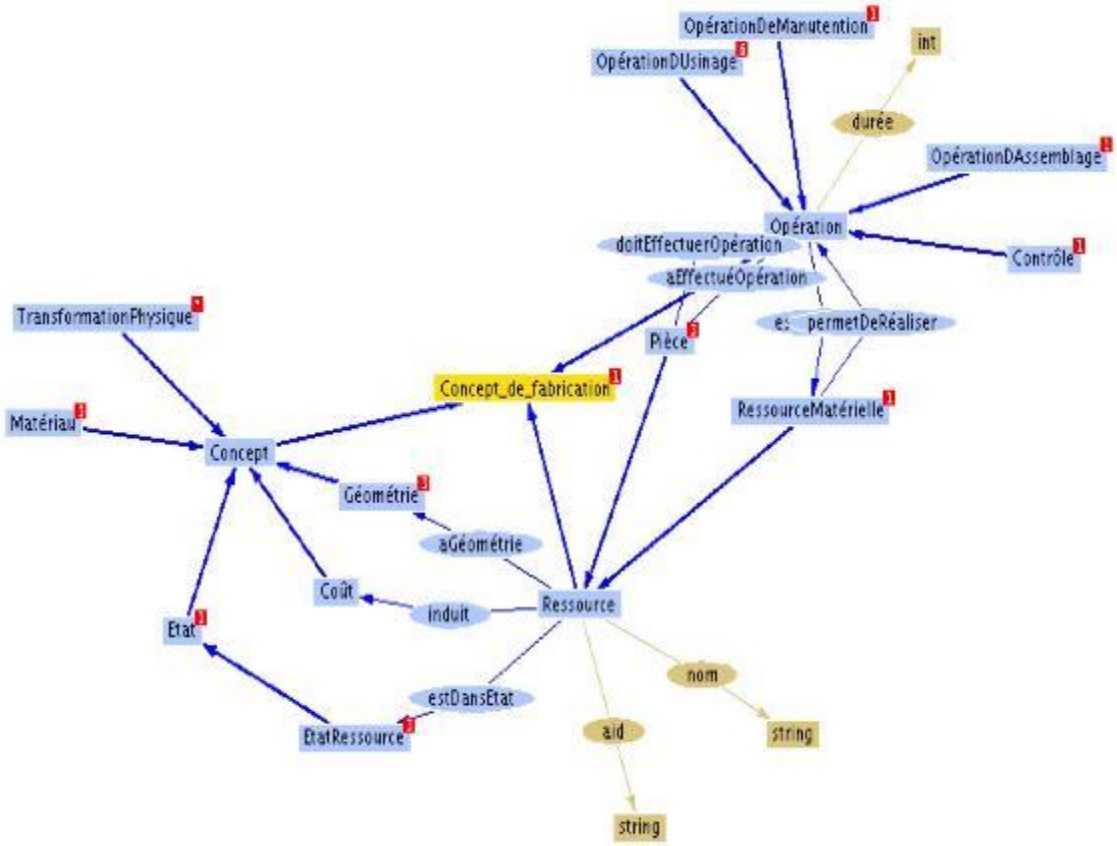


A semantic network

Ontology

- In computer science and information science, an ontology encompasses a representation, formal naming and definition of the categories, properties and relations between the concepts, data and entities that substantiate one, many, or all domains of discourse.
- More simply, an ontology is a way of showing the properties of a subject area and how they are related, by defining a set of concepts and categories that represent the subject.

Ontology. Wikipédia. https://www.google.fr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An ontology

Conceptual modeling in a play of mots-Example

- Question: Comment peut-on appeler la femme du maire de Bordeaux ?
- *How can we call the wife of the mayor of Bordeaux ?*
- Answer: La mère du bordel.
- *The mother of bordel.*

Conclusions

- Analyse épistémologique de la modélisation conceptuelle pour l'analyse de la compréhension des textes assistée par l'ordinateur.
- Epistemological analysis of conceptual modelling for computer-assisted text comprehension analysis.

Conclusions

- Understanding has a **heuristic part** and a **procedural part**.
- Identifying the problem of « understanding ».
- The identification of **objects** and **concepts.**
- The construction of the **semantic network**.
- The construction of the **conceptual metaphor**.
- Machine implementation.

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