

# 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.

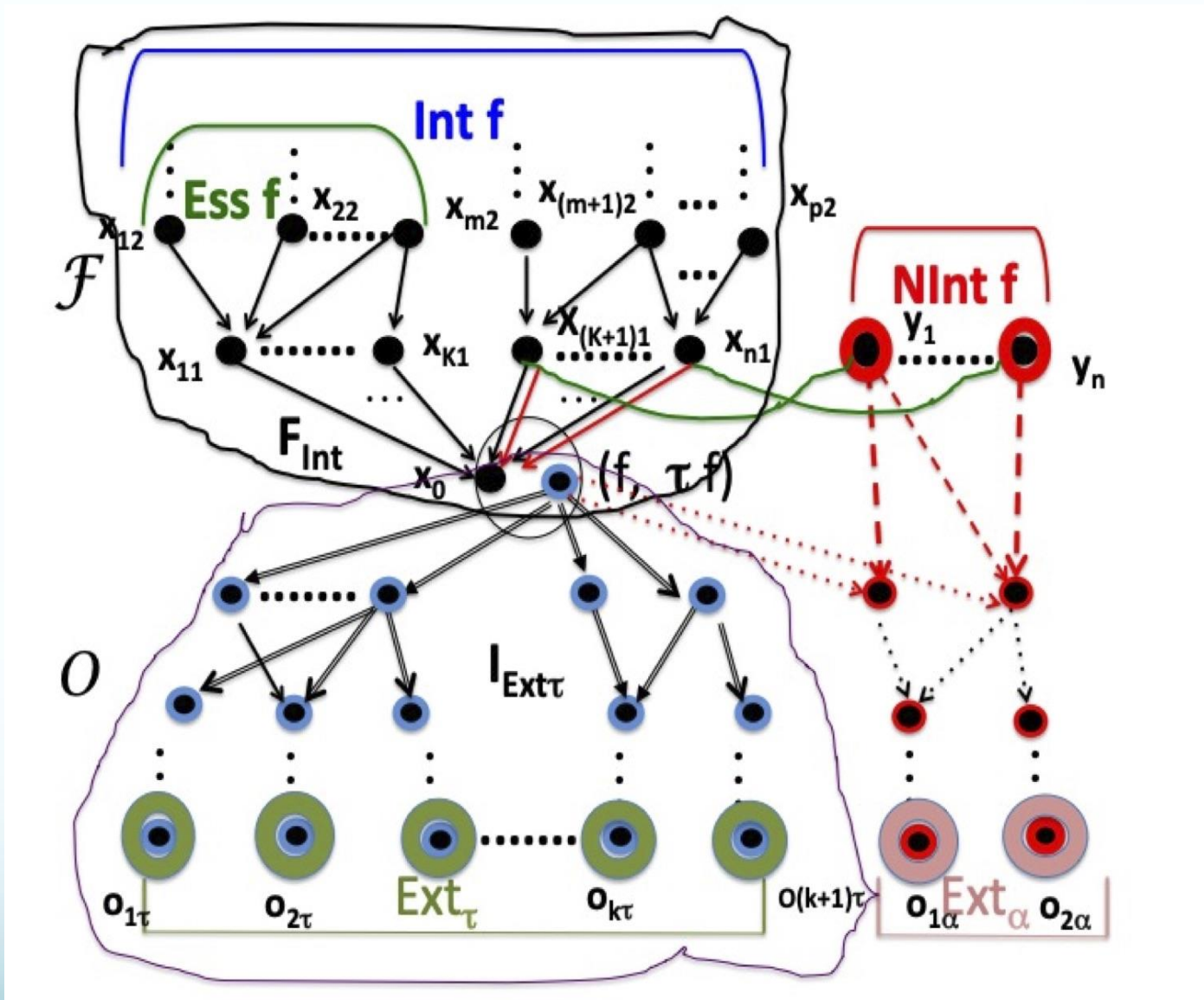
# Plan

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 fonction of domain  $O$  and range the truth values, **truth** et **false**.
    - Objet – saturated – Concept (a function) – unsaturated
- Logic of Determination of Objects (LDO) (Desclés, Pascu)
  - property  $\implies$  set of properties  $\implies$  organisation
    - ~~property~~
    - **concept**
  - Several levels of properties
  - Two types of objects : **more or less determinate** and **totally determined**.
  - 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**.

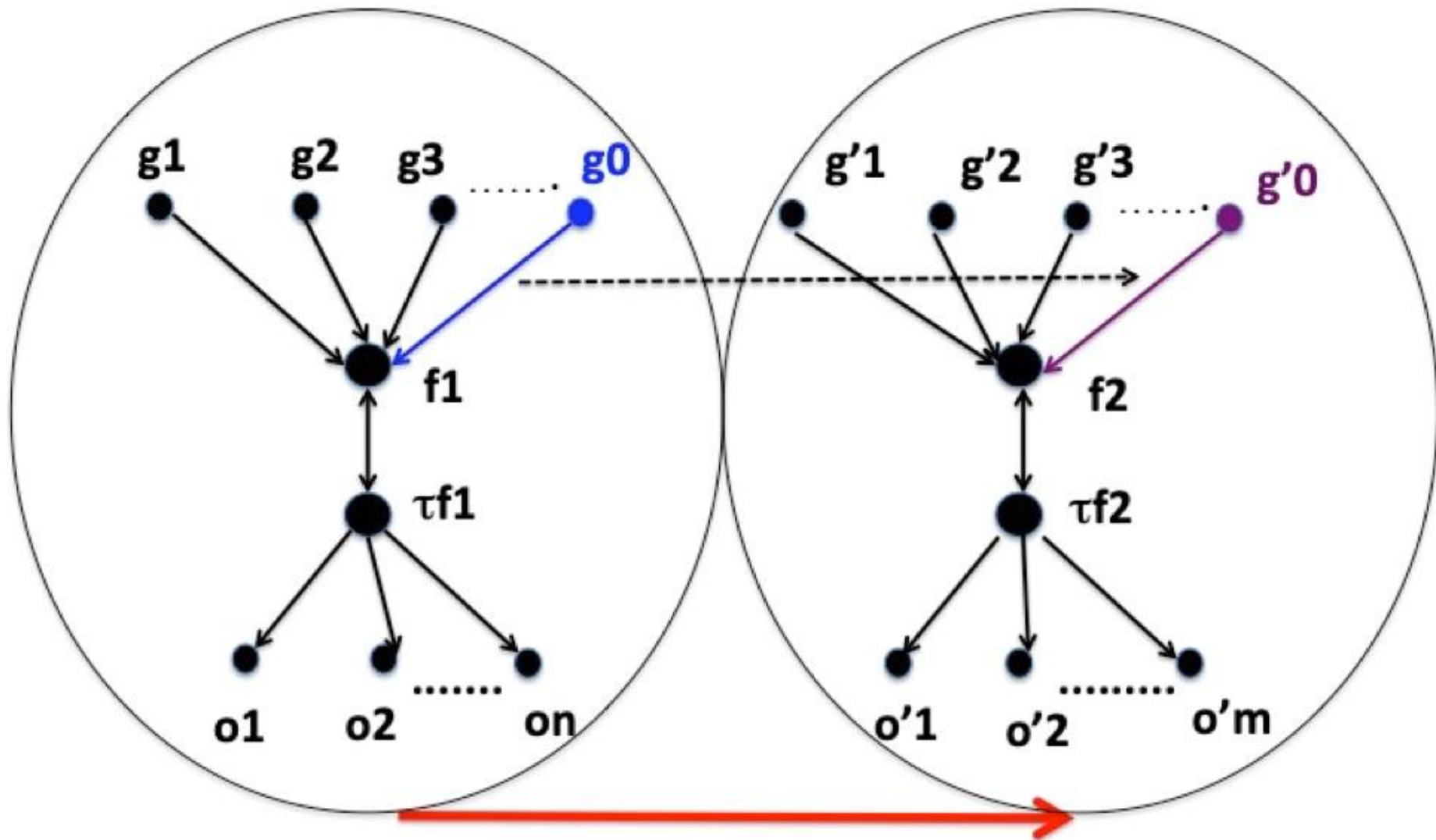
# Conceptual metaphor

- « 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/malitt/cofor-1/textes/Fauconnier-Turner03.pdf>,(2003)

# Conceptual metaphor

- A classical example for **conceptual blending** ([17]) 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.
- It is a **conceptual metaphor**.

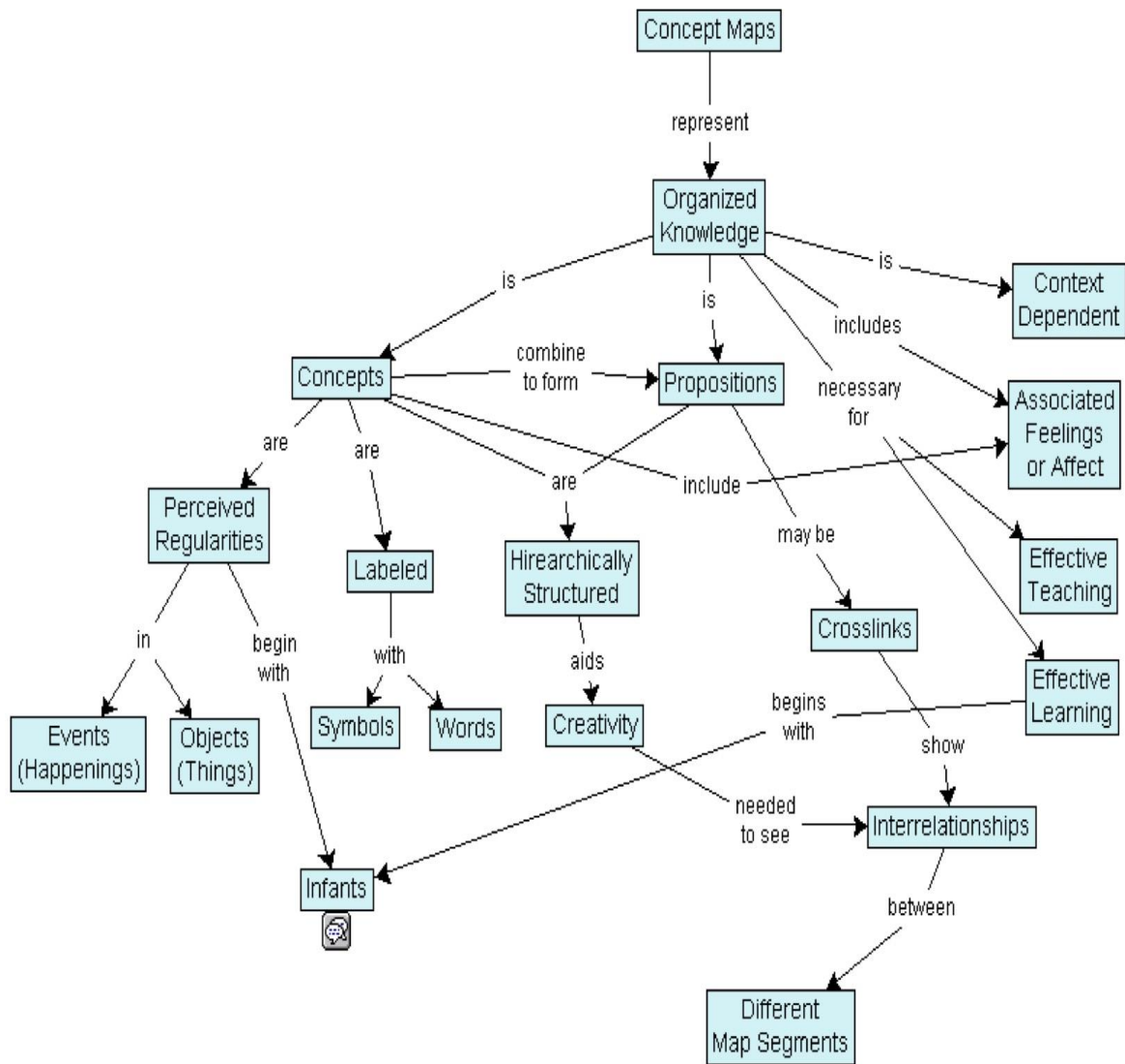




**translation operator**  
 Conceptual metaphor by LDO

# 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>

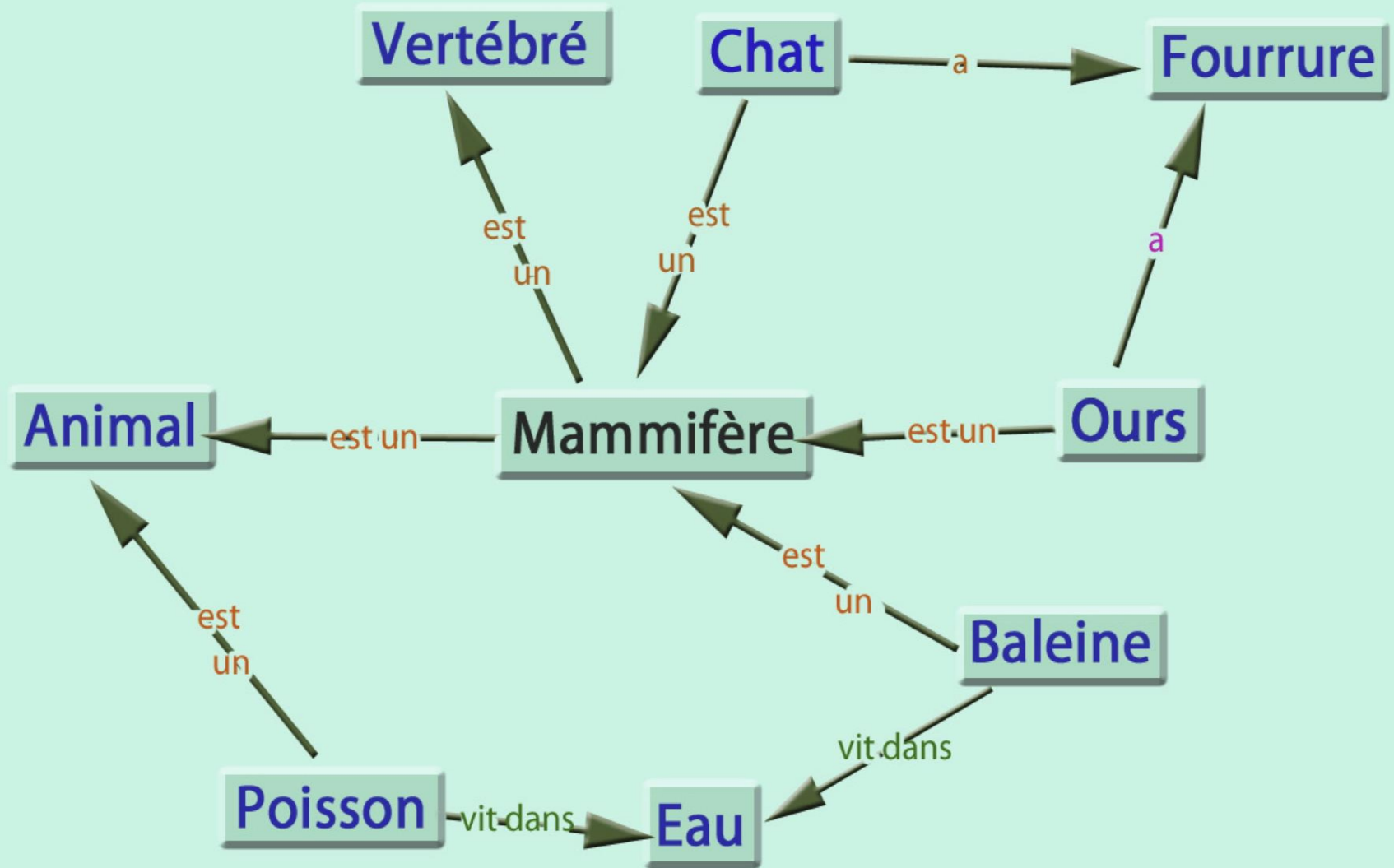


A concept map

# 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 semantic 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>

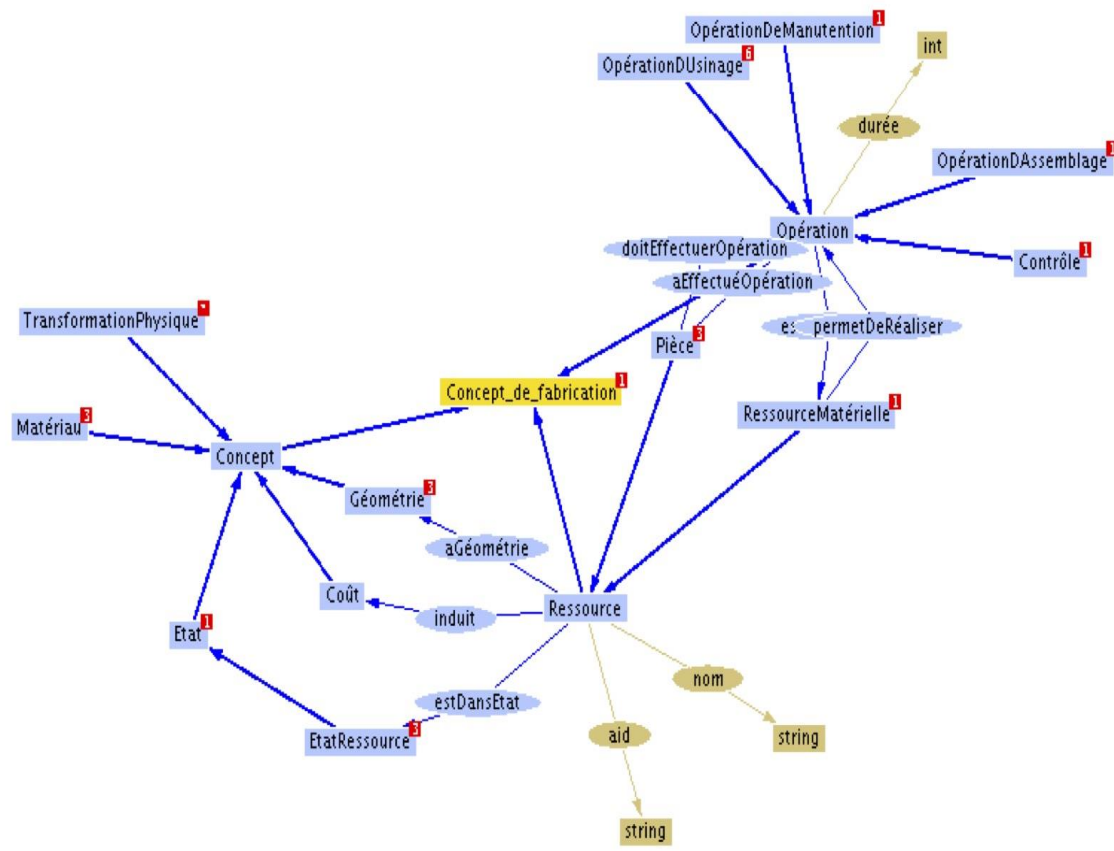


A semantic network

# 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>



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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