



BabelNet Meaning Representation: A Fully Semantic Formalism to Overcome Language Barriers

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ELEXIS project
No. 731015



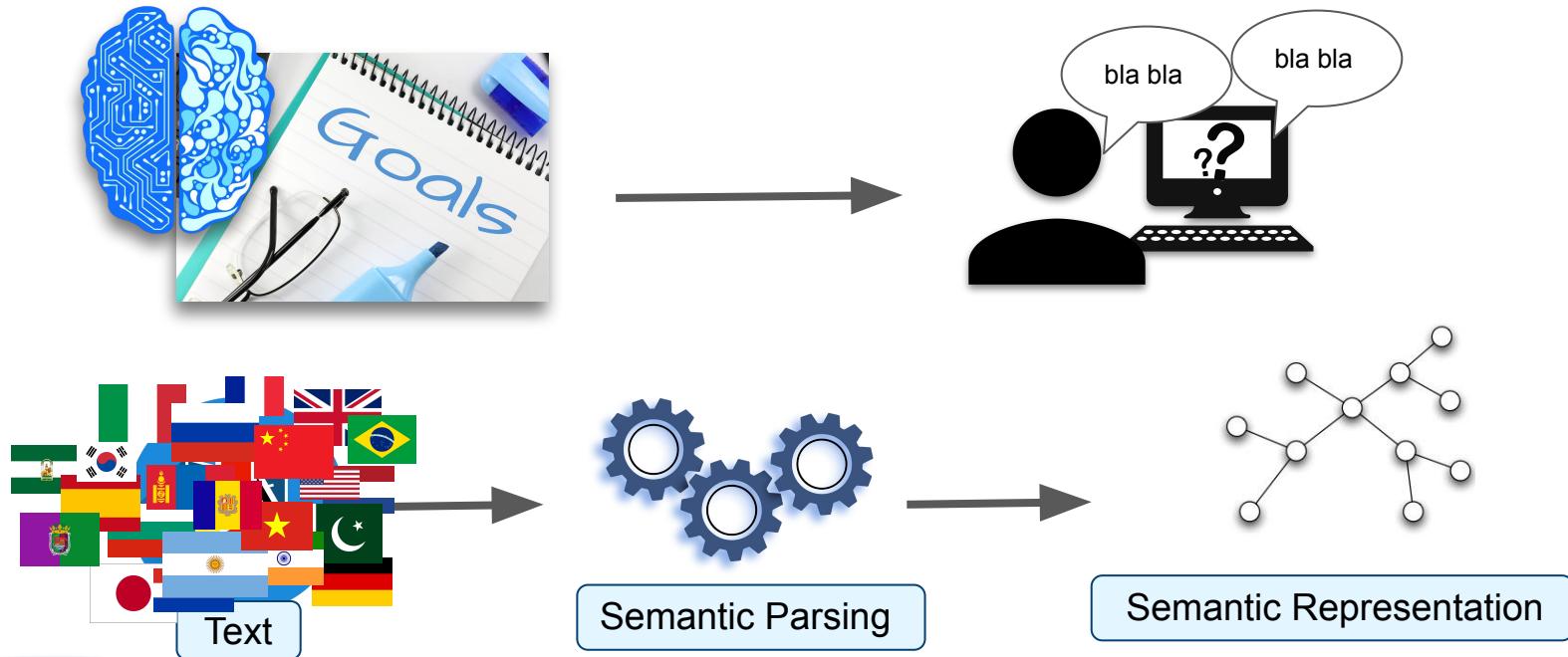
EU H2020 Project
KnowGraphs No. 860801



Semantic Representations

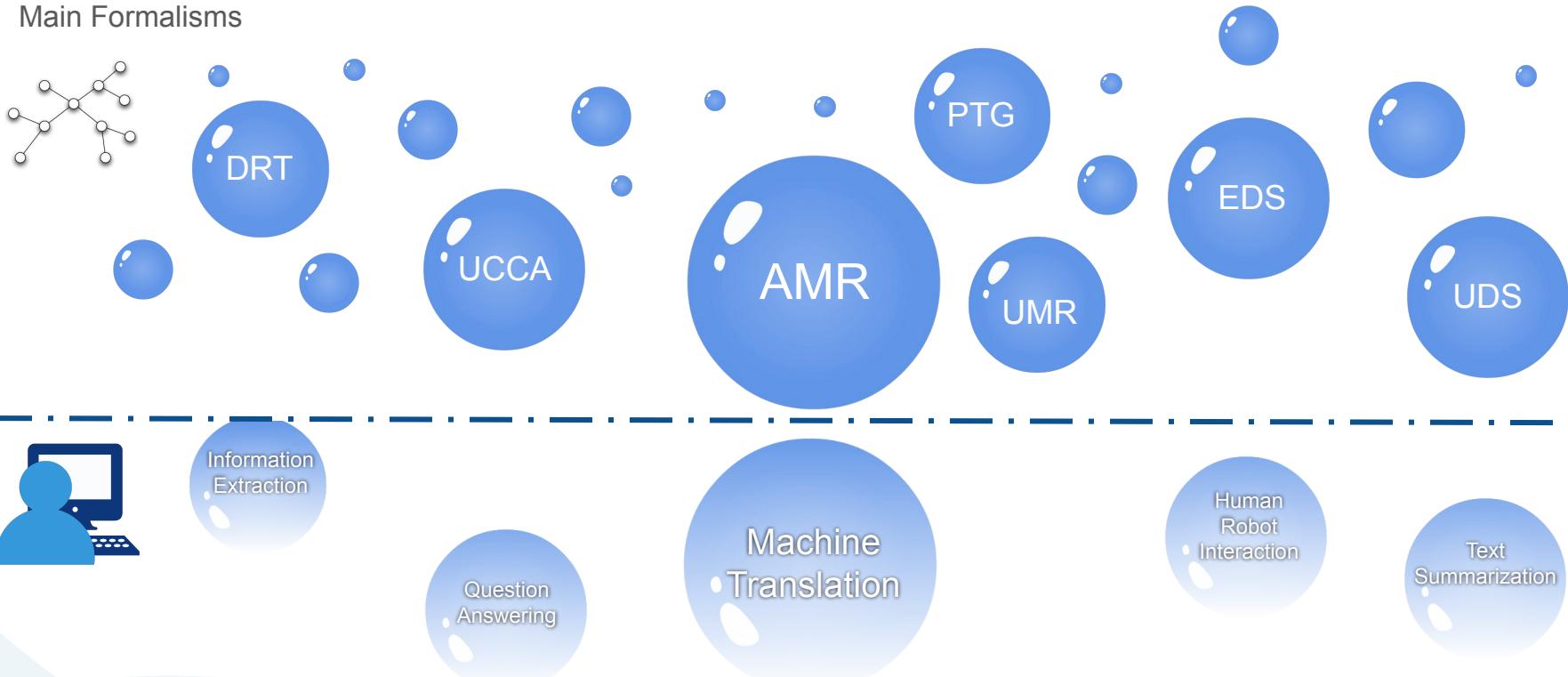
Semantic Representations

A way to represent the meaning of human language



Semantic Representations

Main Formalisms





Abstract Meaning Representation

Abstract Meaning Representation

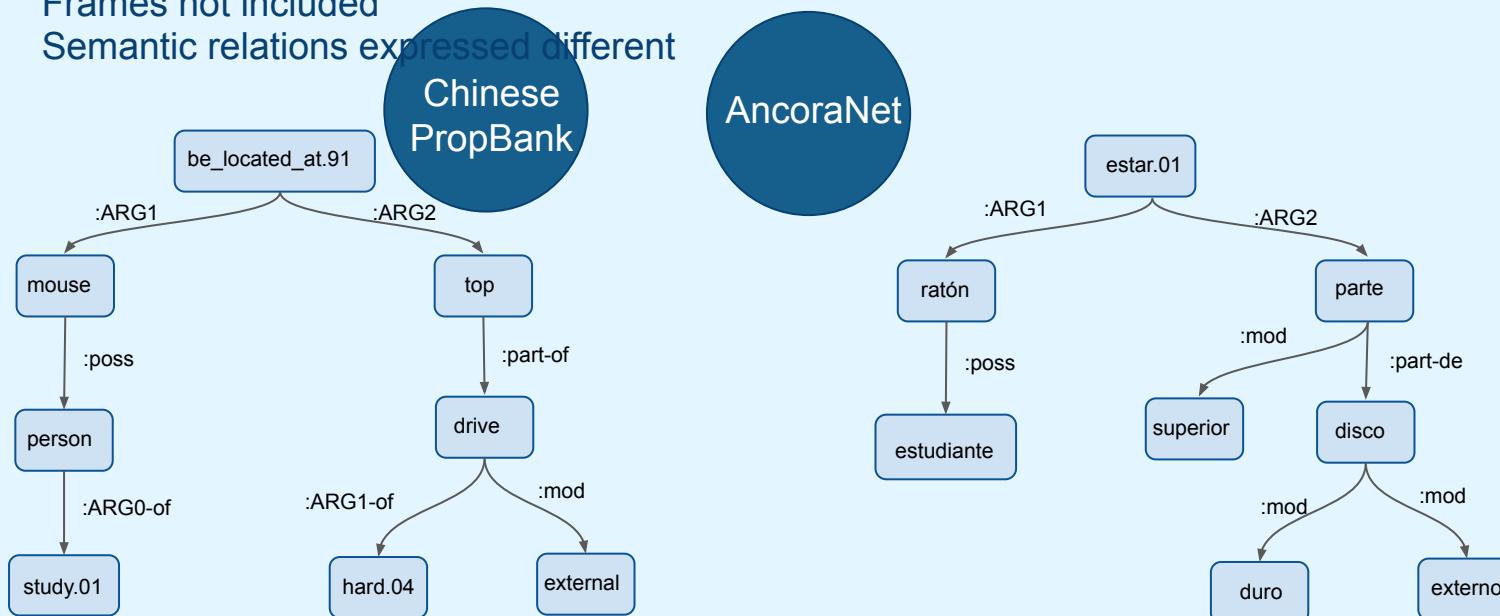
AMR as an interlingua

Abstract Meaning Representation

AMR as an interlingua

Could we go cross-lingual using language-specific PropBank-like ontologies?

- Frames not included
- Semantic relations expressed different





BabelNet Meaning Representation

BabelNet Meaning Representation

BMR Ingredients

Interlingua Representation:

- No more lexicon
- No more language-specific frame repositories



BabelNet



VerbAtlas

BabelNet Meaning Representation

BMR Ingredients - Babelnet

Interlingua Representation:

- No more lexicon
- No more language-specific frame re



BabelNet



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WordNet

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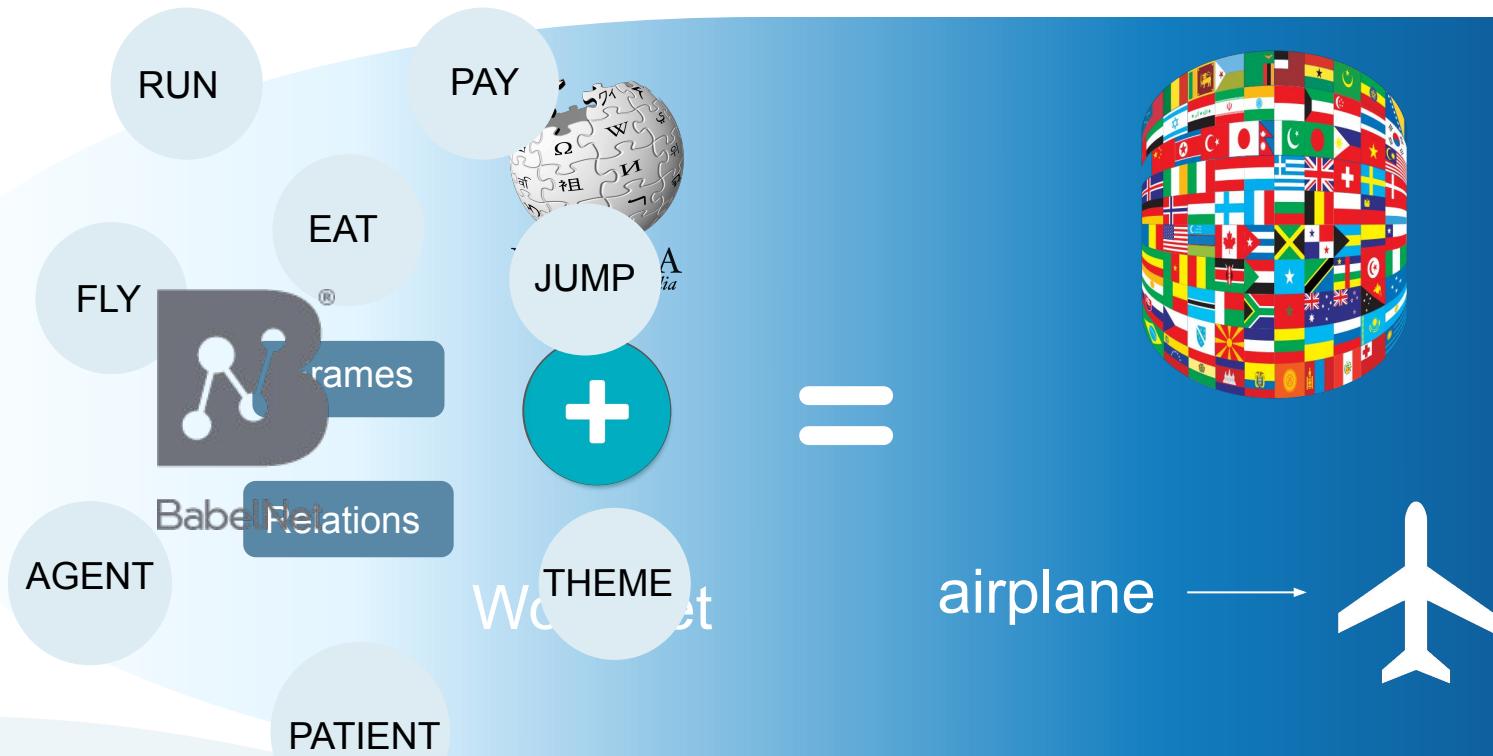
airplane

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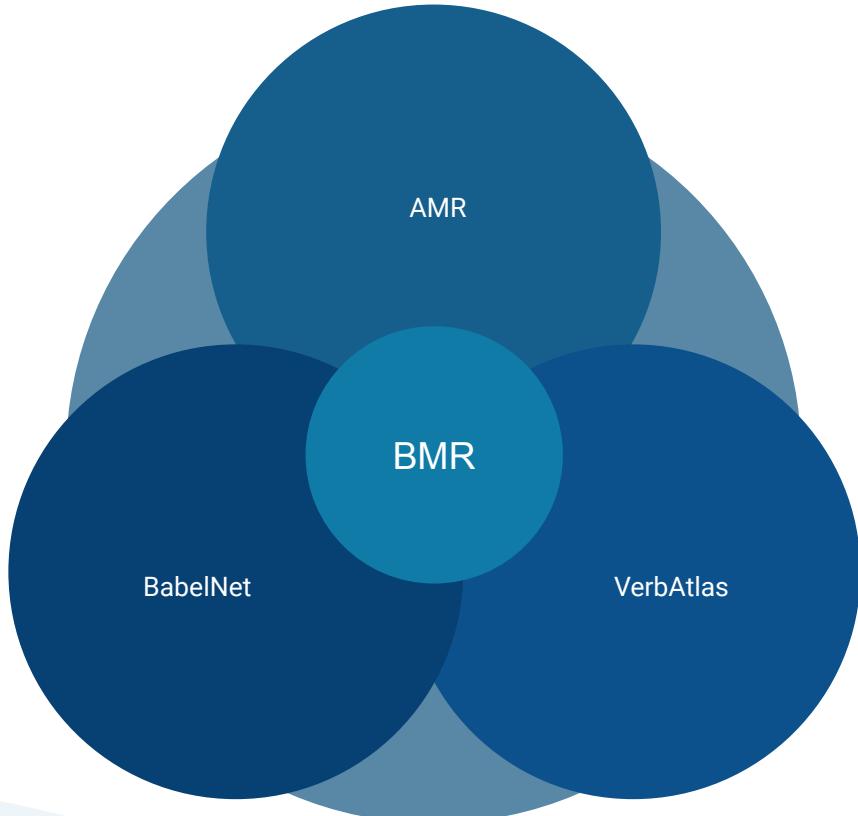


BabelNet Meaning Representation

BMR Ingredients - VerbAtlas



BabelNet Meaning Representation



BMR Graph

Example

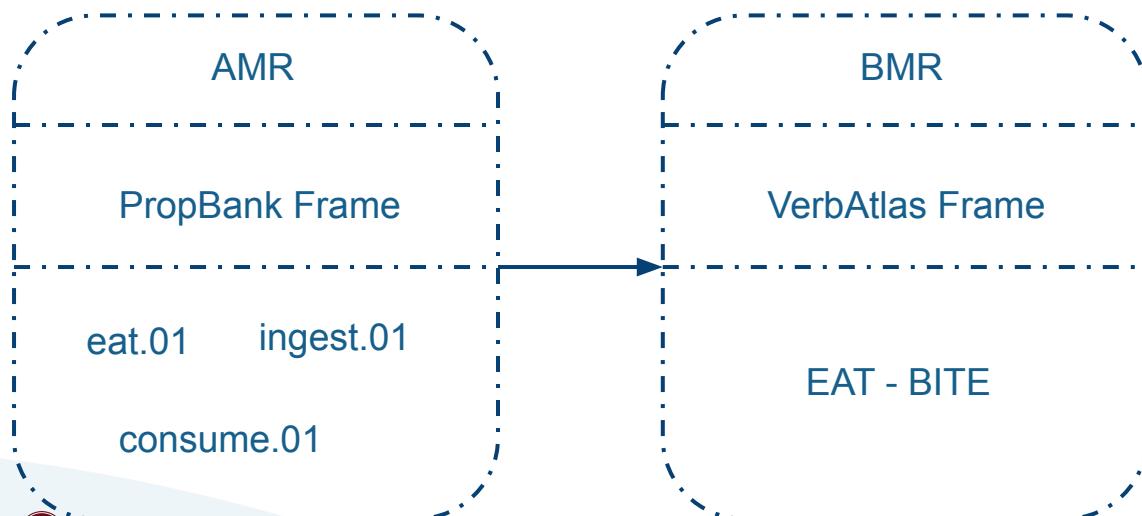
BMR structure:

- Directed acyclic graph
- Concepts connected by semantic relations

From AMR to BMR

Concepts

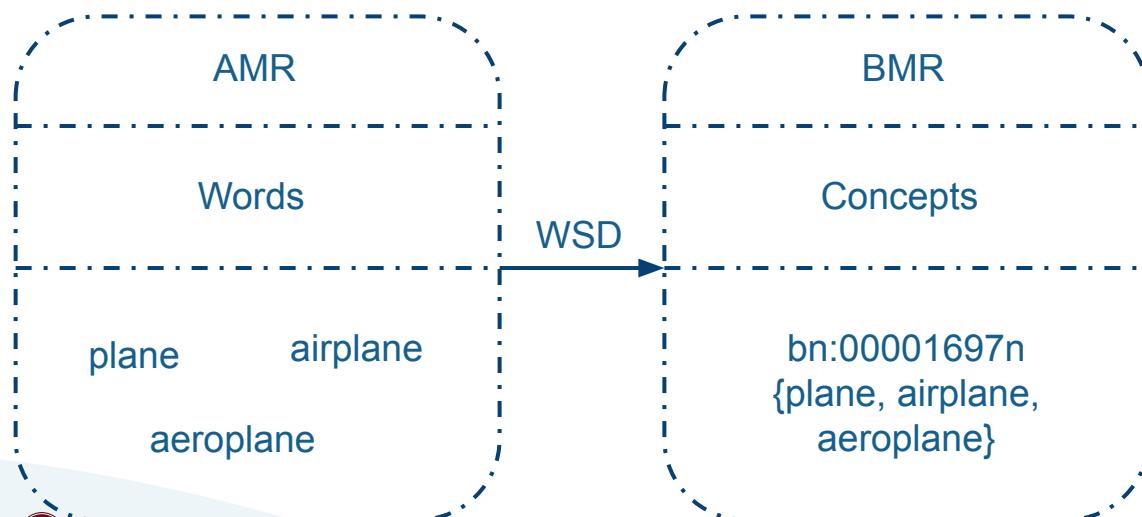
Replace lexical, language-specific symbols with fully semantic symbols nodes



From AMR to BMR

Concepts

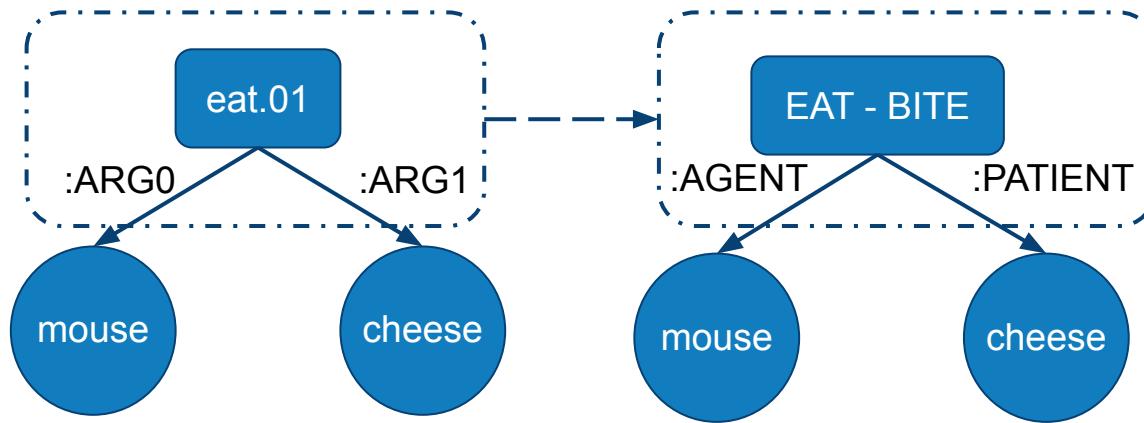
Replace lexical, language-specific symbols with fully semantic symbols nodes



From AMR to BMR

Semantic Relations

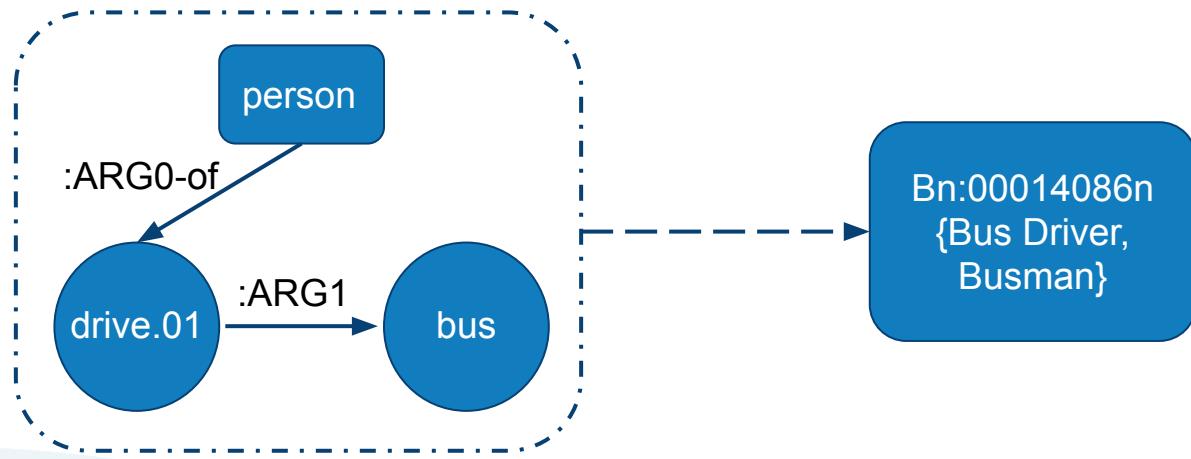
From resource- and language-specific lexical-semantic relations to cross-frame and language-independent semantic relations.



From AMR to BMR

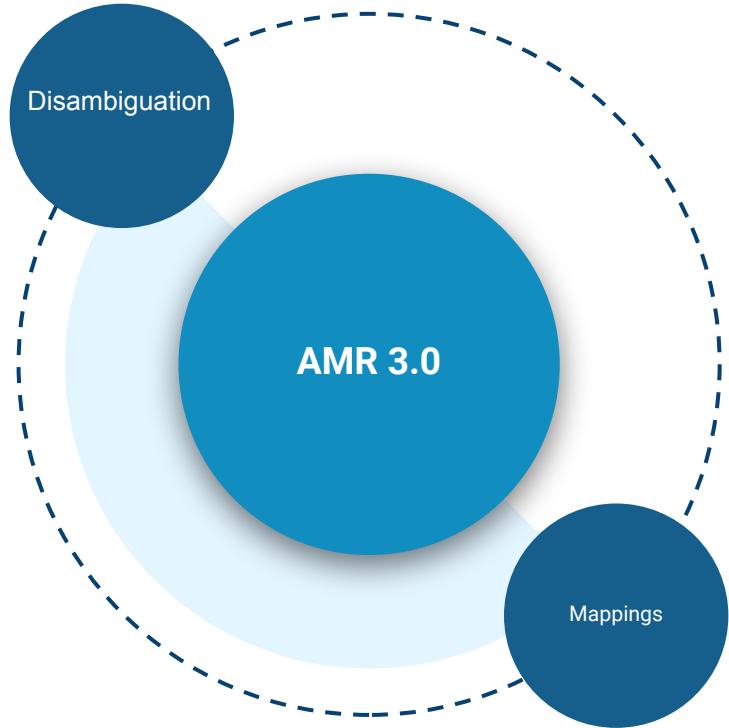
Semantic Relations

Replace such subgraphs with simpler, non-compositional meaning representations from BabelNet whenever these are available



Creating a training corpus

From AMR 3.0 to the BMR dataset



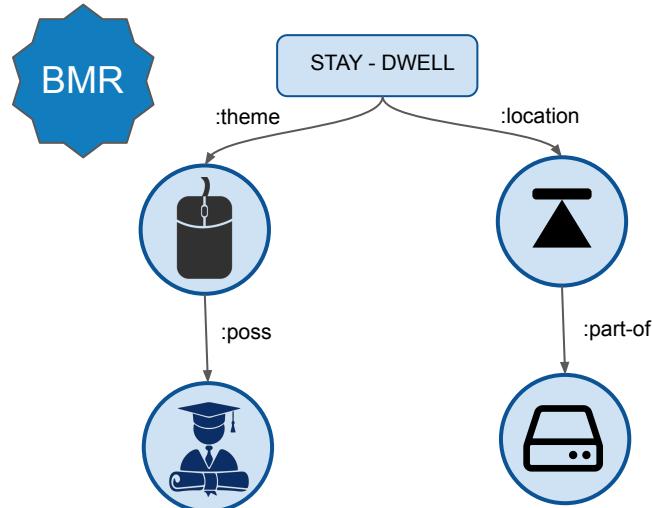
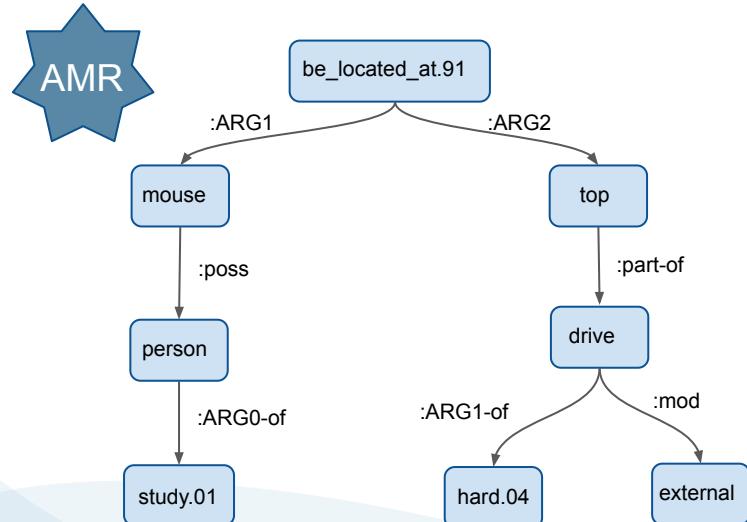
From AMR to BMR

Example

BMR structure:

- Directed acyclic graph
- Concepts connected by semantic relations

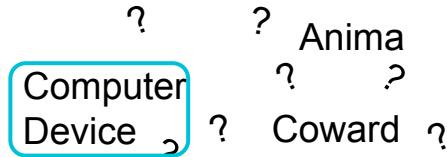
The student's mouse is on top of the external hard drive



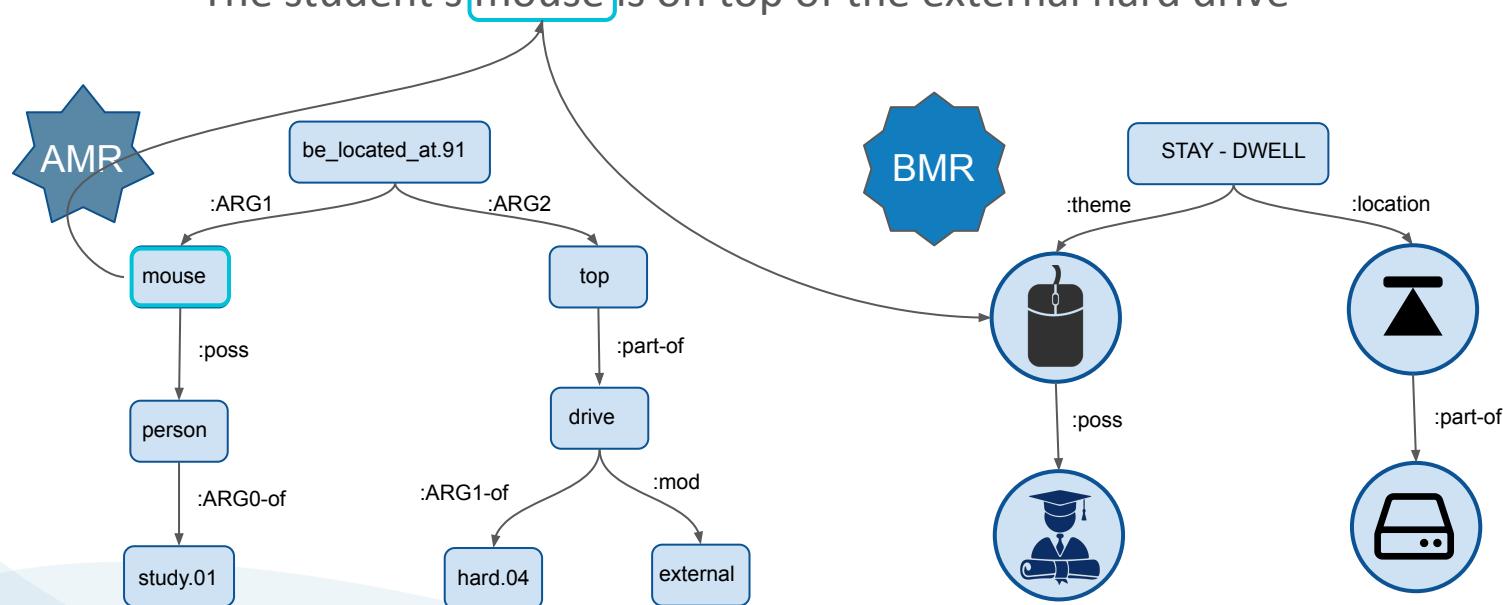
From AMR to BMR

From words to Concepts

- Lexico (WSD)



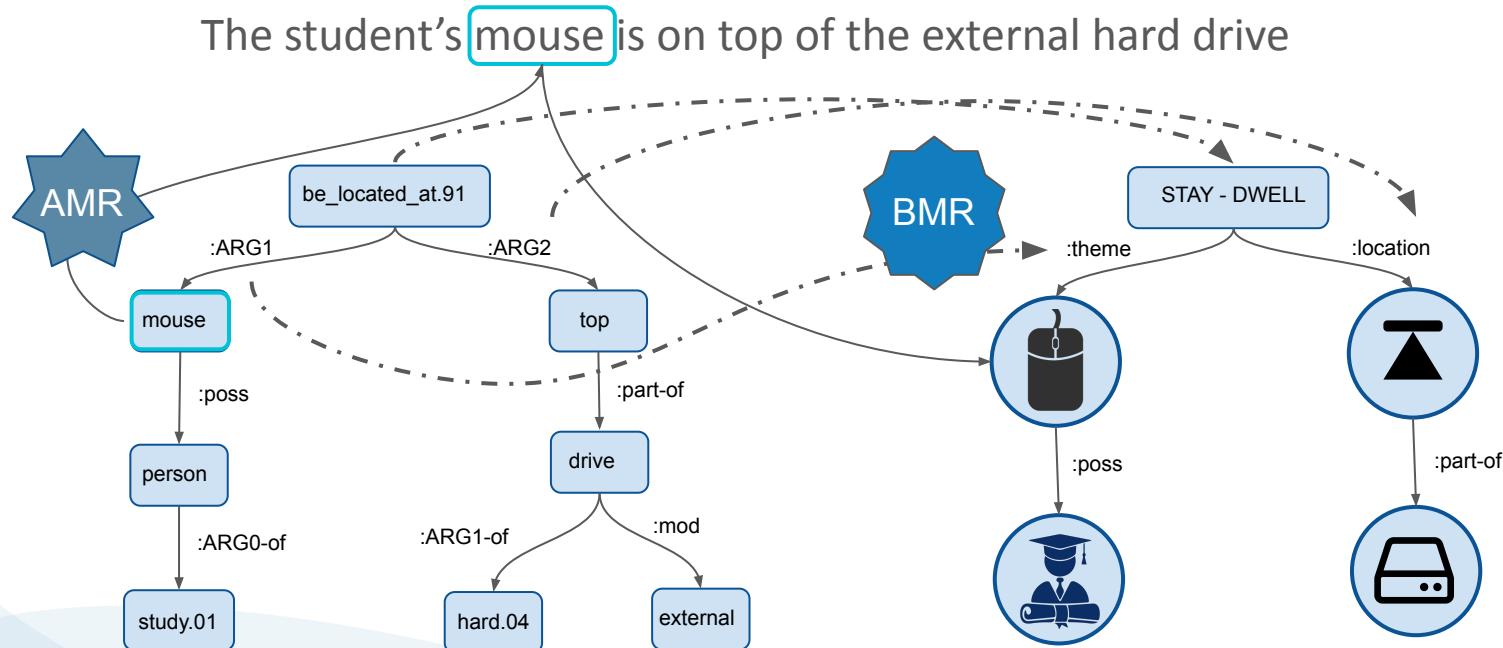
The student's mouse is on top of the external hard drive



From AMR to BMR

From PropBank to VerbAtlas

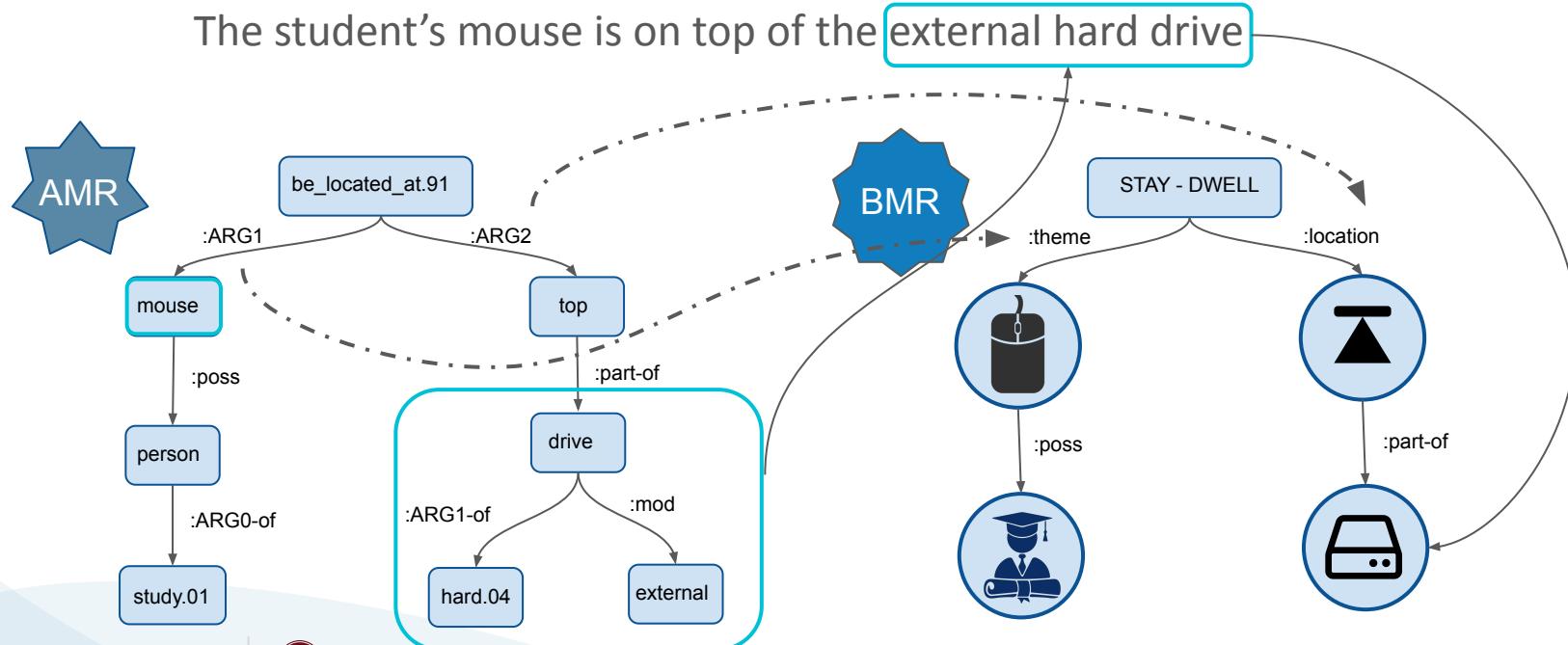
- Moved from language-specific relations to cross-lingual semantic relations



From AMR to BMR

Multiword expressions

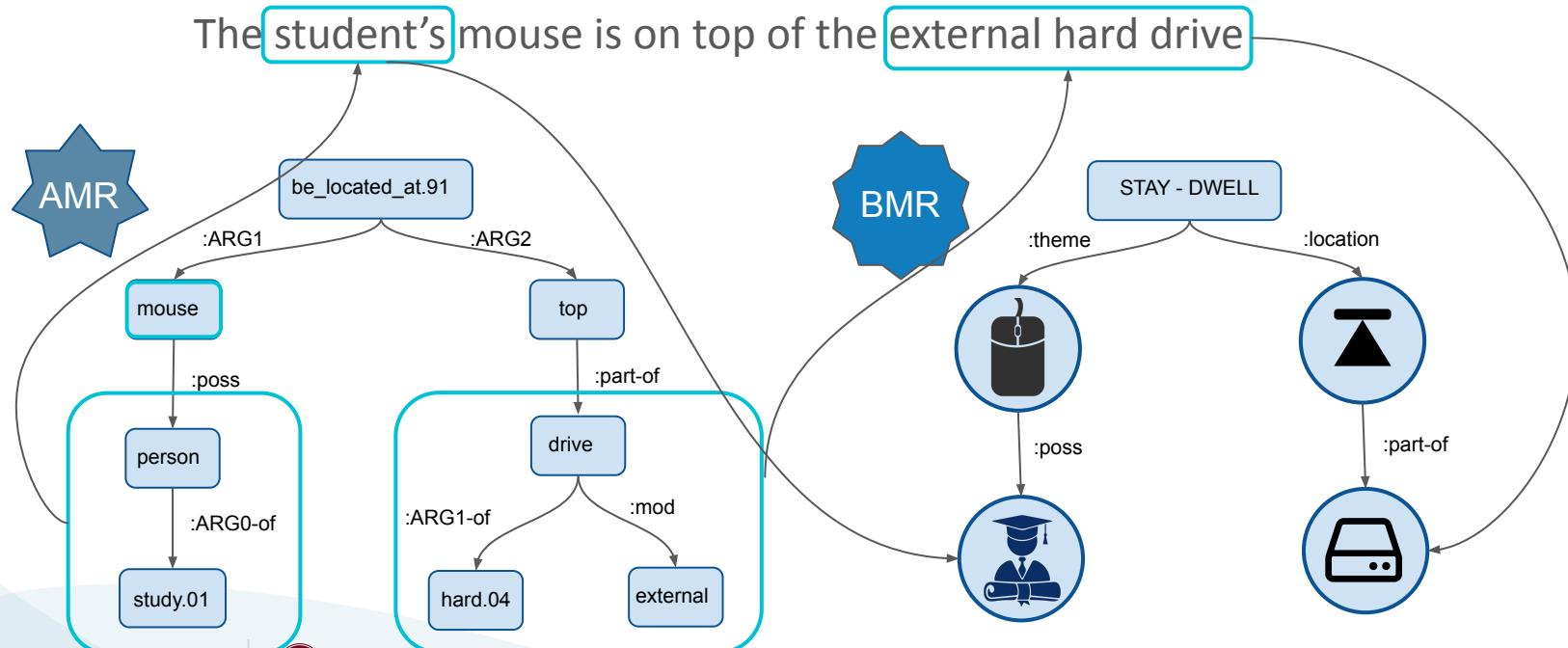
- Move from composite/agglomerative expressions to single absent relations



From AMR to BMR

Miscellanea

- ~~Exploiting positions that have different expression to one single concept~~



BMR

An interlingual abstraction

EN: English

the student's mouse is on top of the external hard drive

DE: German

die Maus des Schülers befindet sich oben auf der externen Festplatte

ES: Spanish

el ratón del estudiante está en la parte superior del disco duro portátil

IT: Italian

il mouse dello studente si trova sopra il disco rigido esterno

ZH: Chinese

学生的鼠标在外部硬盘的顶部。

EN: English

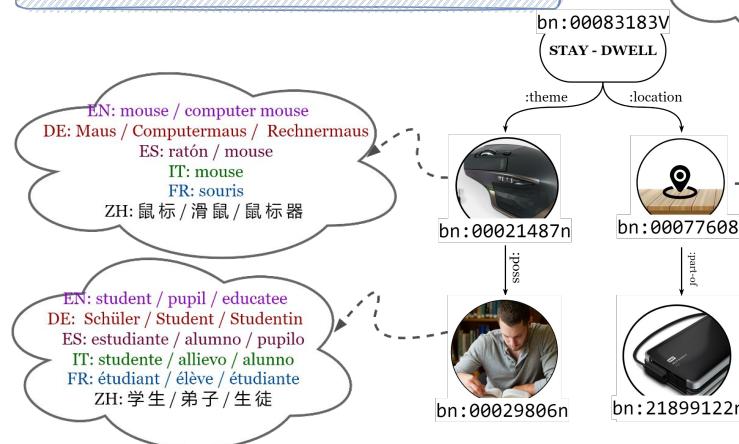
the student's computer mouse is on the upper side of the external HDD

FR: French

la souris de l'élève est dessus le disque dur externe

EN: mouse / computer mouse
DE: Maus / Computermaus / Rechnermaus
ES: ratón / mouse
IT: mouse
FR: souris
ZH: 鼠标 / 滑鼠 / 鼠标器

EN: student / pupil / educatee
DE: Schüler / Student / Studentin
ES: estudiante / alumno / pupilo
IT: studente / allievo / alumno
FR: étudiant / élève / étudiante
ZH: 学生 / 弟子 / 生徒



EN: be
DE: sein / befinden
ES: estar / haber / ser
IT: essere / stare / trovarsi
FR: être
ZH: 在 / 有

EN: top / upper side / top side
DE: obersseite / gipfel / oben
ES: cima / parte superior
IT: alto / cima / di sopra
FR: dessus / sommet
ZH: 頂 / 顶方 / 的顶部

EN: external hard drive / external HDD
DE: externe festplatte
ES: disco duro portátil / disco duro externo
IT: disco rigido esterno
FR: disque dur externe
ZH: 硬盘盒 / 硬碟盒 / 外部硬盘



Scope of BMR

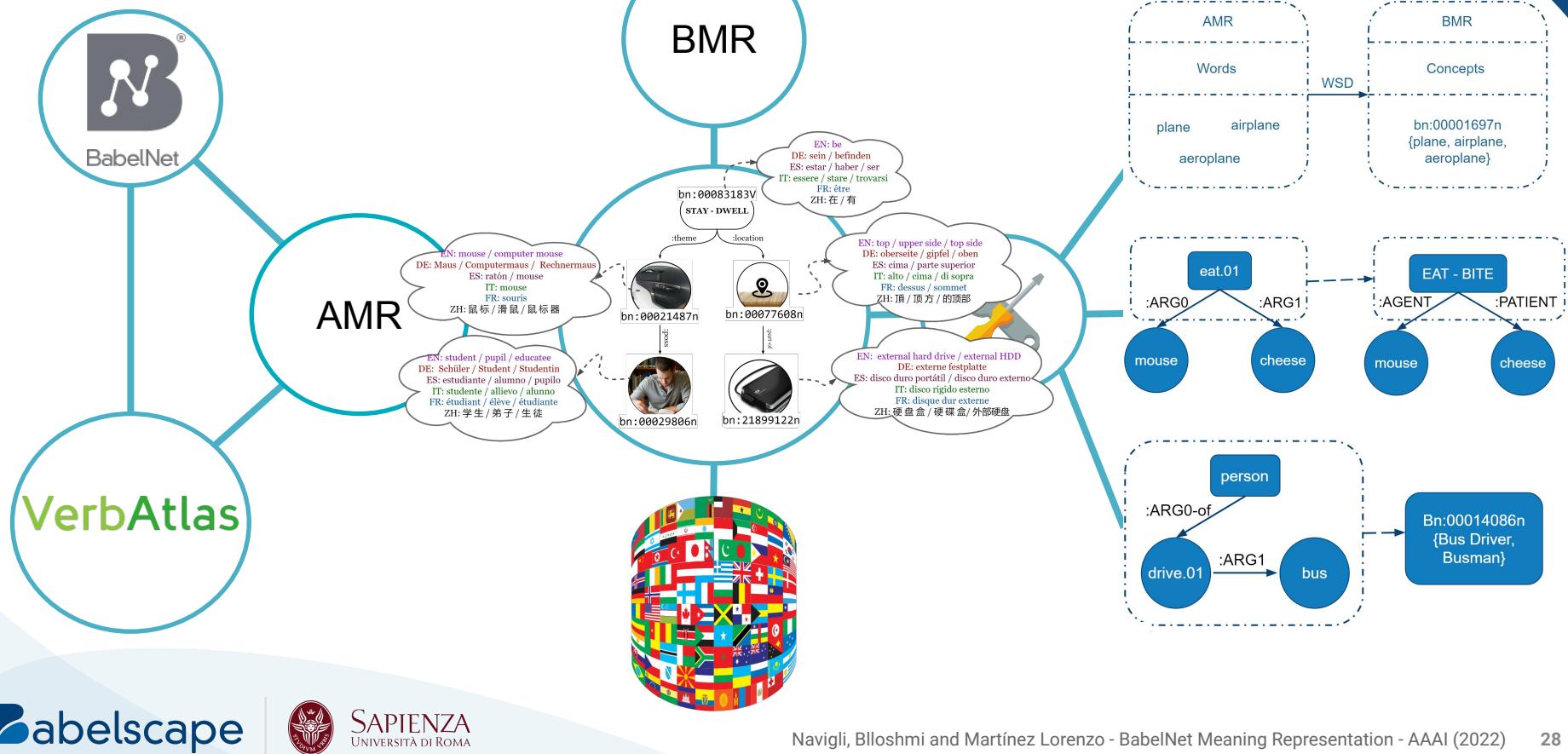
Scope of BMR

- Machine Translation (MT)
- Question Answering (QA)
- Dialogue
- Vision, Speech, and more
- Knowledge Representation



Conclusion

Conclusion





Thank you for your attention!

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Babelscape: <https://babelscape.com> • **Sapienza NLP:** <http://nlp.uniroma1.it>



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