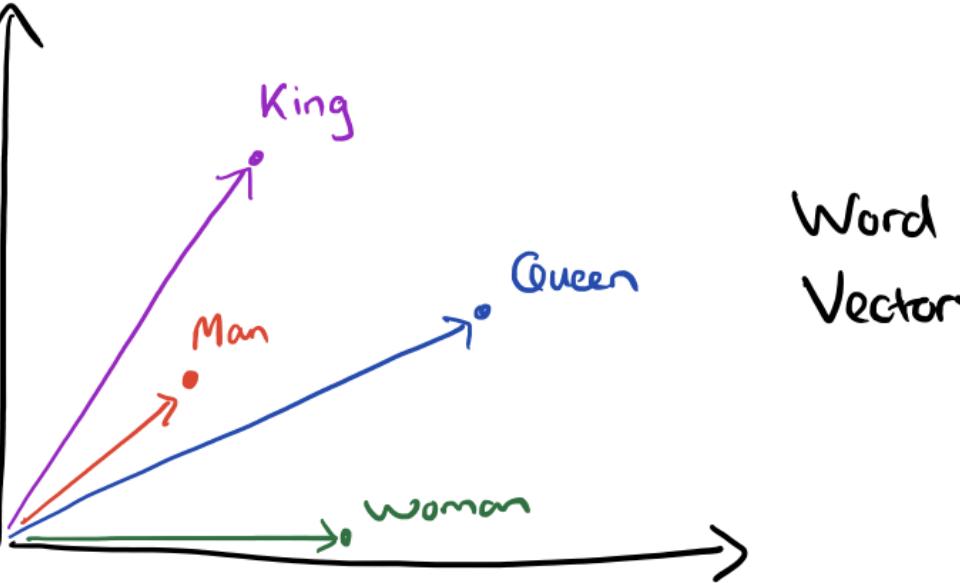
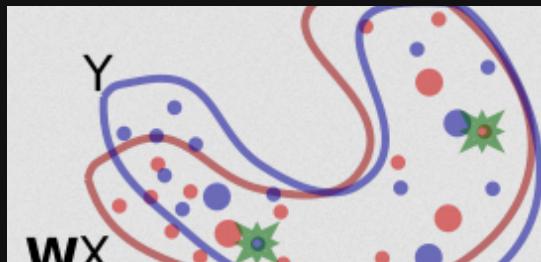


# { LLM, grec et latin }

*Constructions et usages de modèles multilingues pour le  
latin et le grec ancien*



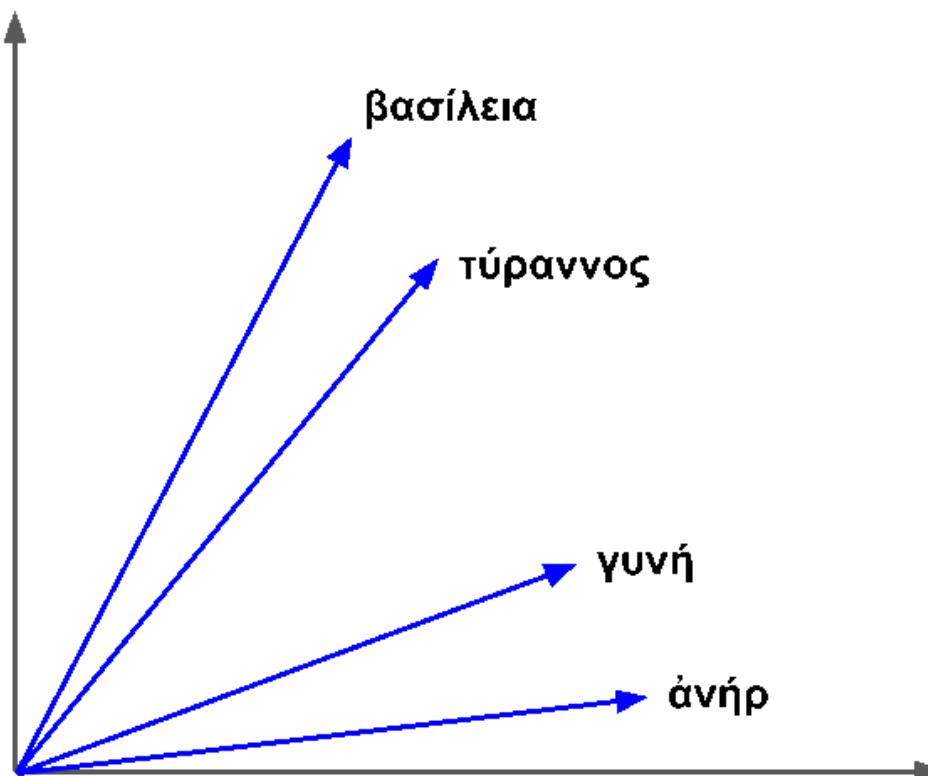
Word  
Vector



# Les bases

Vecteurs de mots statiques,  
contextuels...

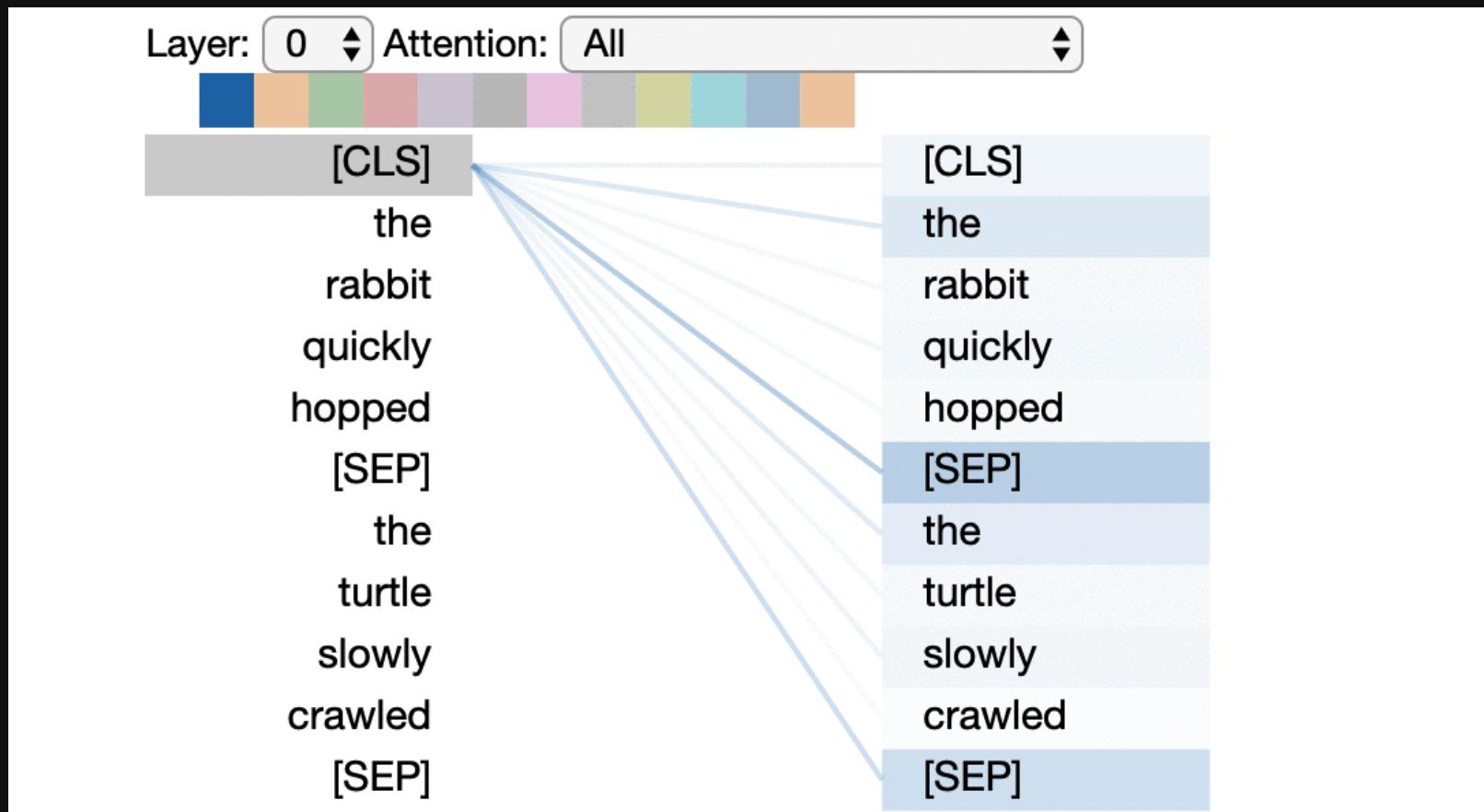
# Les vecteurs de mots



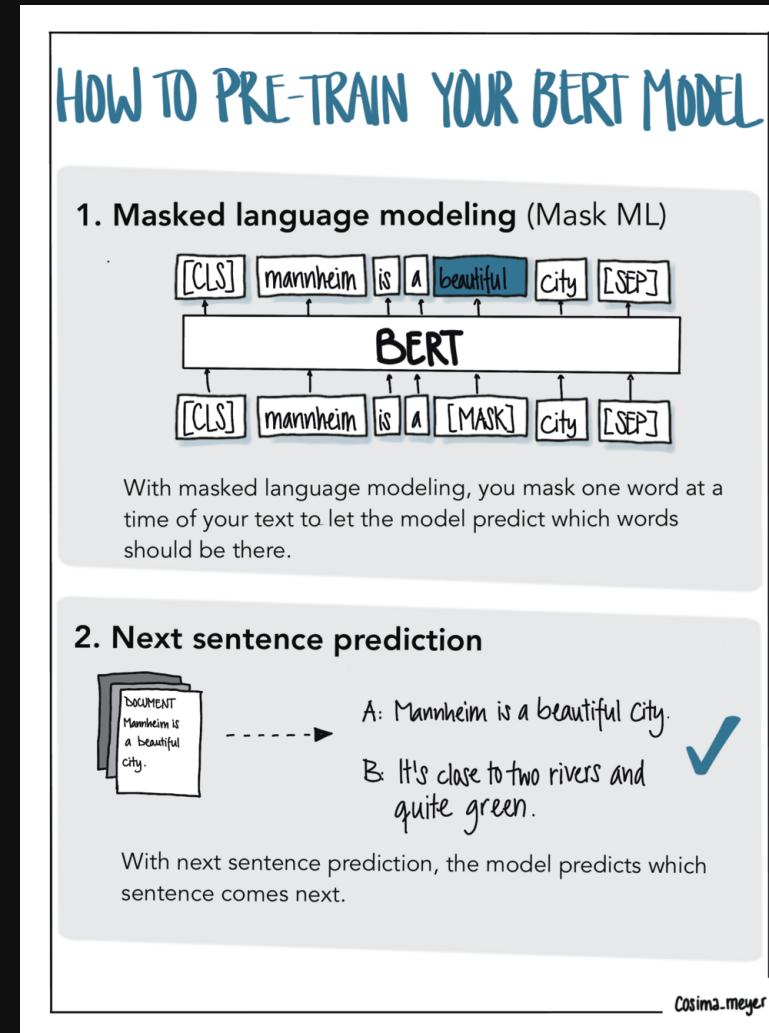
# Exemple sur un corpus conséquent

<https://projector.tensorflow.org/>

# Qu'est-ce qu'un grand modèle de langue (LLM) ?



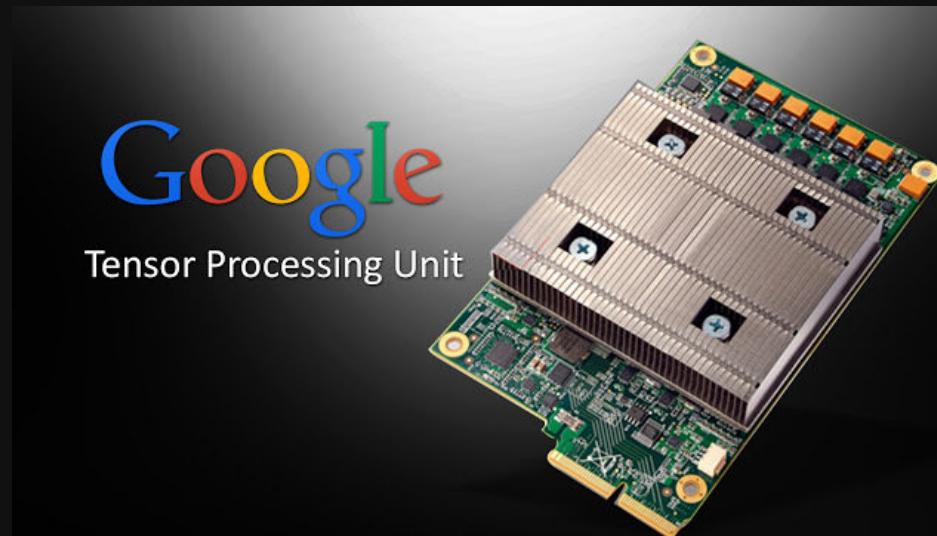
# Entraînement



<https://www.mzes.uni-mannheim.de/socialsciencedatalab/article/bert-explainable-ai/#bert>

# Problèmes ?

Petit problème matériel d'abord : les LLMs,  
ça n'est pas pour tout le monde.



# Problèmes ?

Mais le problème principal :

- le très faible nombre de données
- le très faible nombre de données représentatives (hors âge classique)

	Class	Frequency	3 Classes	Frequency	# MONOLINGUE
ysssey	Person	2.469	PER	2	
	Place	698	LOC		
pnosophists	Person	12.424	PER	12	
	Place	2.305	LOC	2	
	Ethnic	3.548	MISC		
	NoClass	2.263	MISC		
	Group	681	MISC		
	Title	206	MISC		
	Festival	20	MISC		
	Month	8	MISC		
	Language	7	MISC		
	Constellation	2	MISC		
cal				24	

Table 1: An overview of the training data set.

## Ancient Greek BER1

Note: The Morphological Analysis Tag due to an issue with the FLAIR Toolkit help!



τελεστός	σε λέμε
Ἀχιλῆος	d ' Achille
Δαρδανίδαο ἥγε λαβών δ'	pris
έρινεὸν	à un figuier sauvage
φεύγοντι	qui s ' échappe
Λυκάονι	Lycaon
τόν	qu
ποτ'	naguère
αὐτὸς	lui - même
πατρός	de père
ἀλωῆς	verger

VM DE BELLO CIVILI LIBER PRIMVS

Word lookup  Lookup (Latin) Change Language

46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73

bis contentione, ut in senatu recitarentur; ut vero ex illi  
publicae se non defuturum pollicetur, si audacter ac fortiter sententias dicere velint; sin Caesarem  
capturum neque senatus auctoritati obtemperaturum: habere se quoque ad Caesaris gratiam  
non deesse.

Incitat

incito , incitare , incitavi , incitatus (lesser)  
verb; 1st conjugation  
incito: enrage; urge on; inspire; arouse;  
incit-ant  
3rd person plur. pres. ind. act.

M. Marcellus, ingressus in urbem, decernere auderet, ut M. Iulium reservare et retinere vell. Lentulus sententiam Caium impie plerique compulsi invenerunt. Antonius, Q. Cassius, trecenti miles collaudatur.

Log in to save your words to your wordlist. Log In

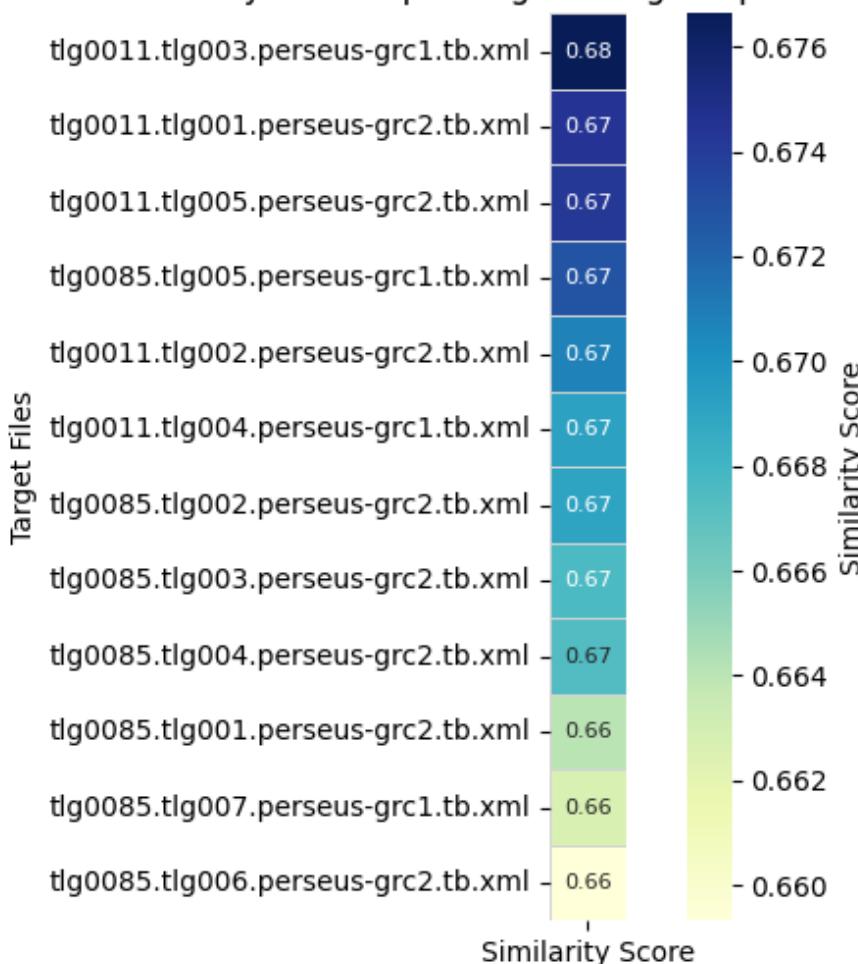
atque incitat. Multi undique ex his et ipsum comitium tribunis, vocibus et concursu terrentur de his rebus eum doceant: sex

# Utilisation de LLMs monolingues

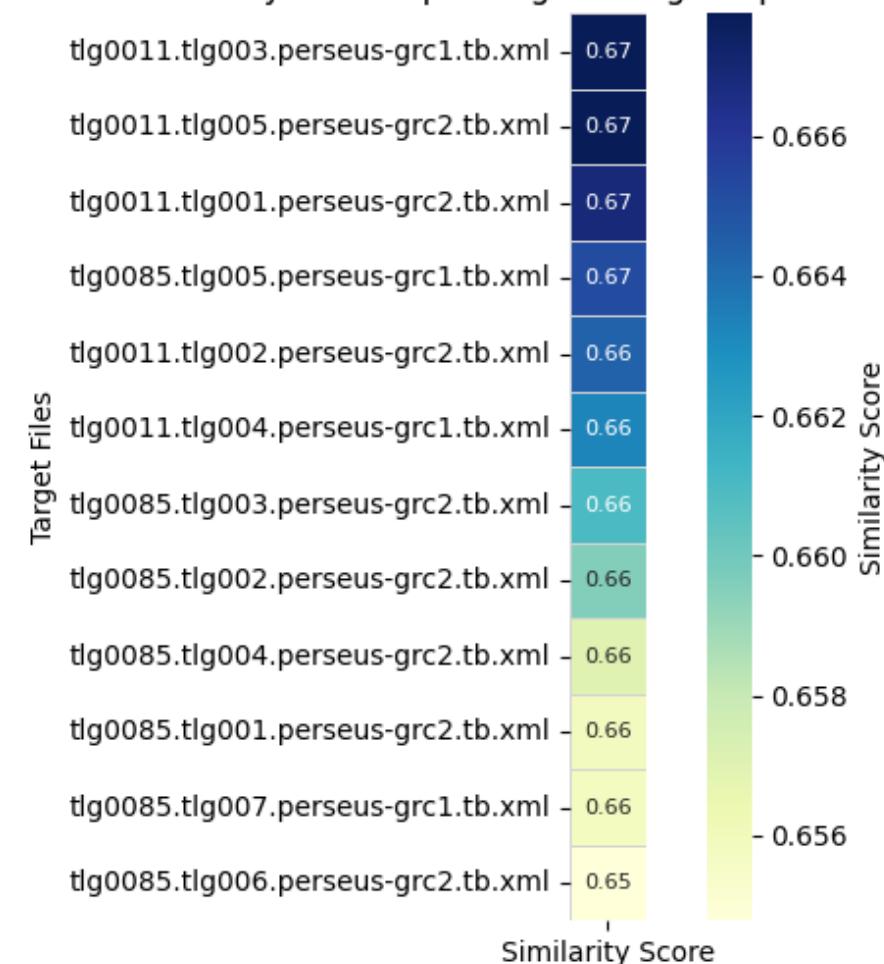
## À quoi cela peut servir ?

# Exemple 1 : similarité sémantique

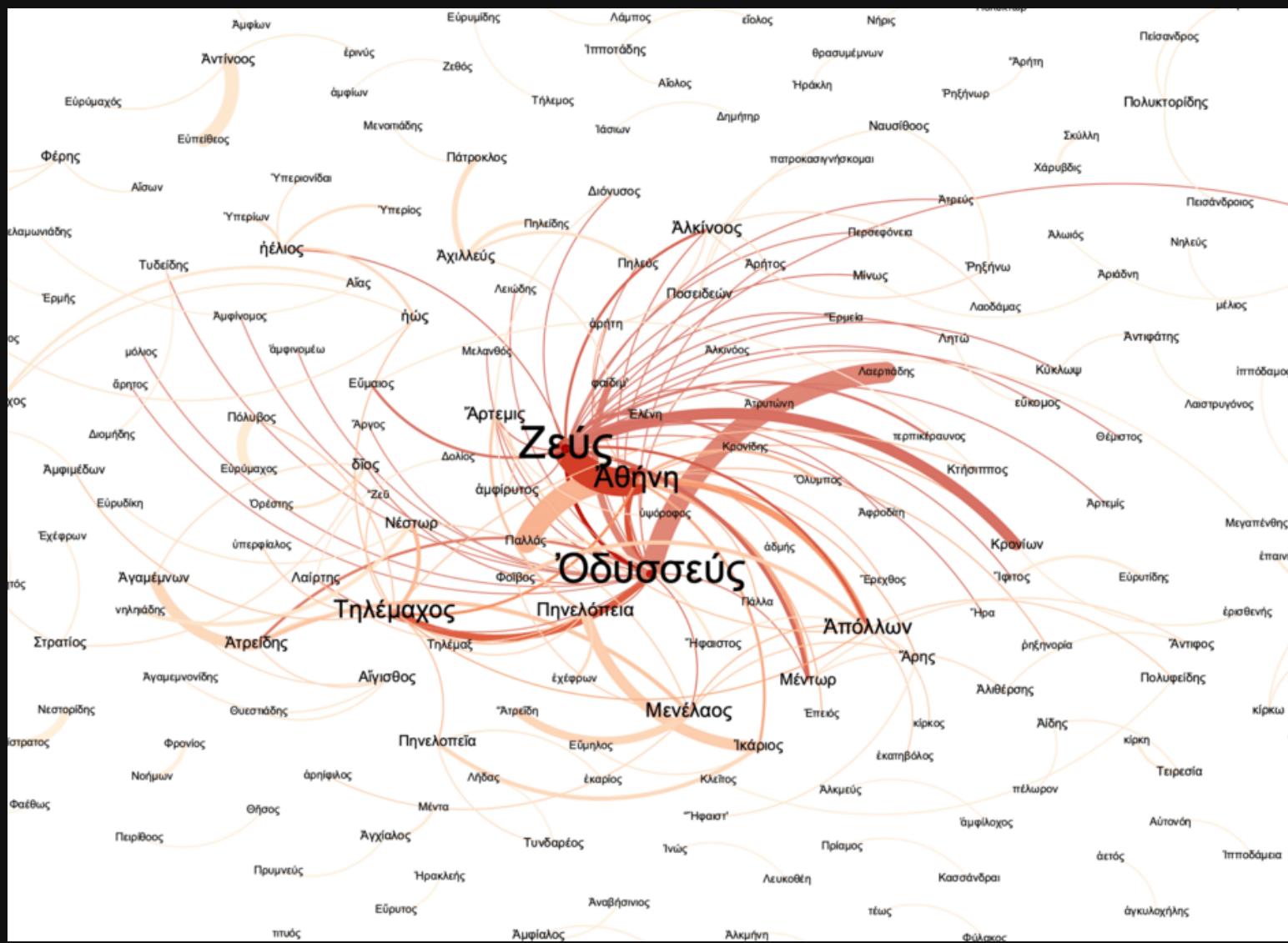
Similarity Heatmap for tlg0012.tlg001.perseus-grc1.tb.

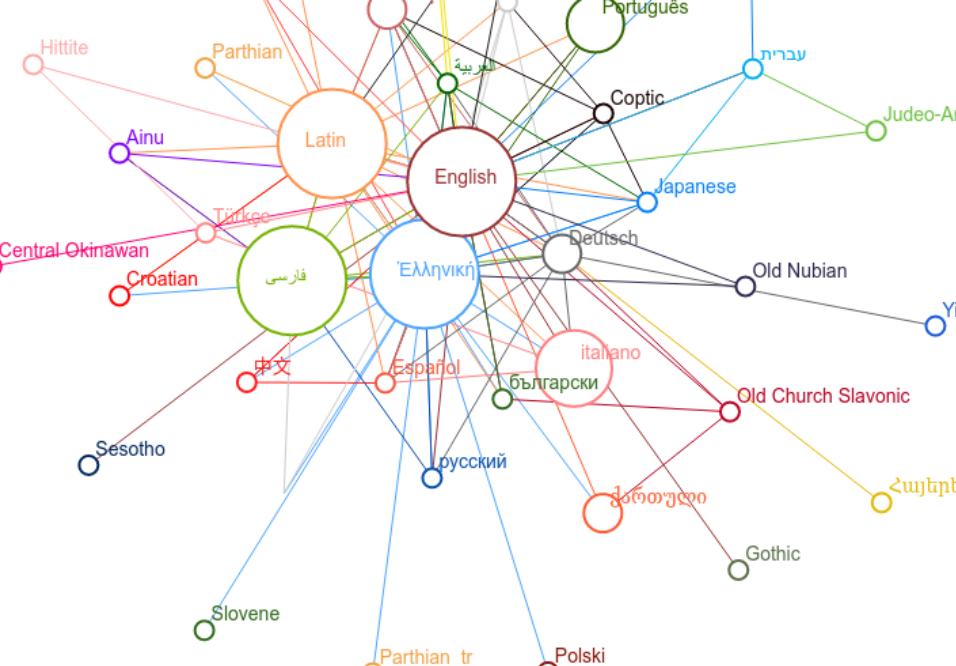


Similarity Heatmap for tlg0012.tlg002.perseus-g

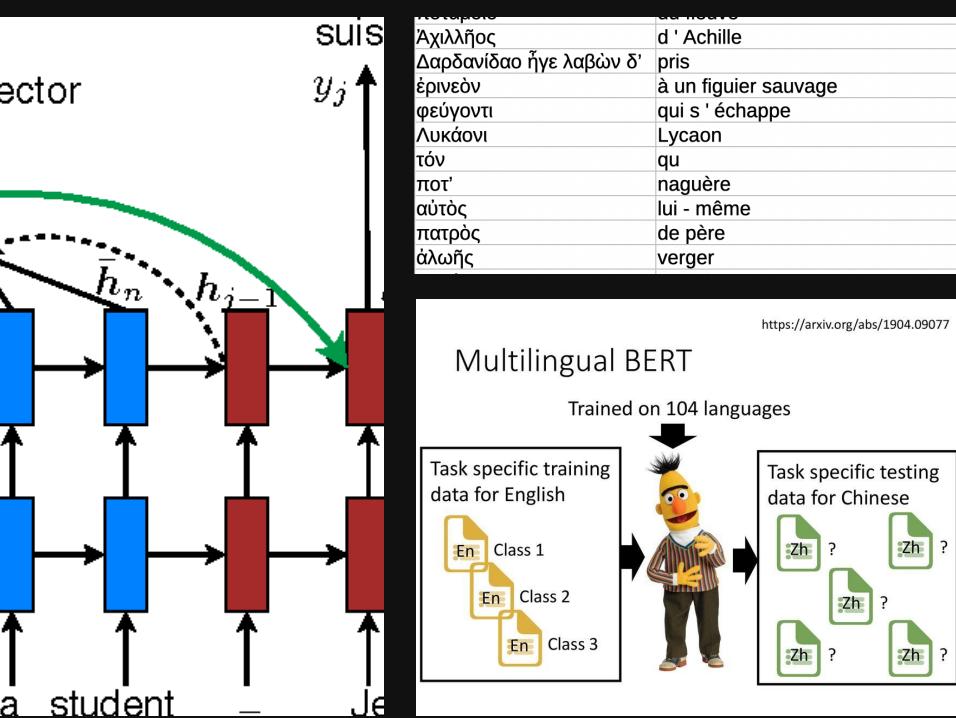


## Exemple 2 : NER





# MULTILINGUE



# Utilisation de LLMs multilingues

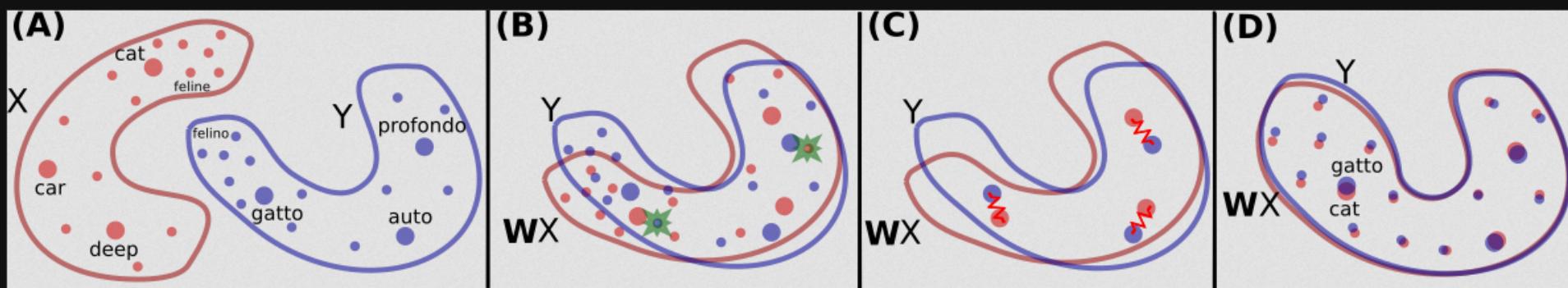
D'encore plus gros problèmes

# Pourquoi c'est encore plus compliqué

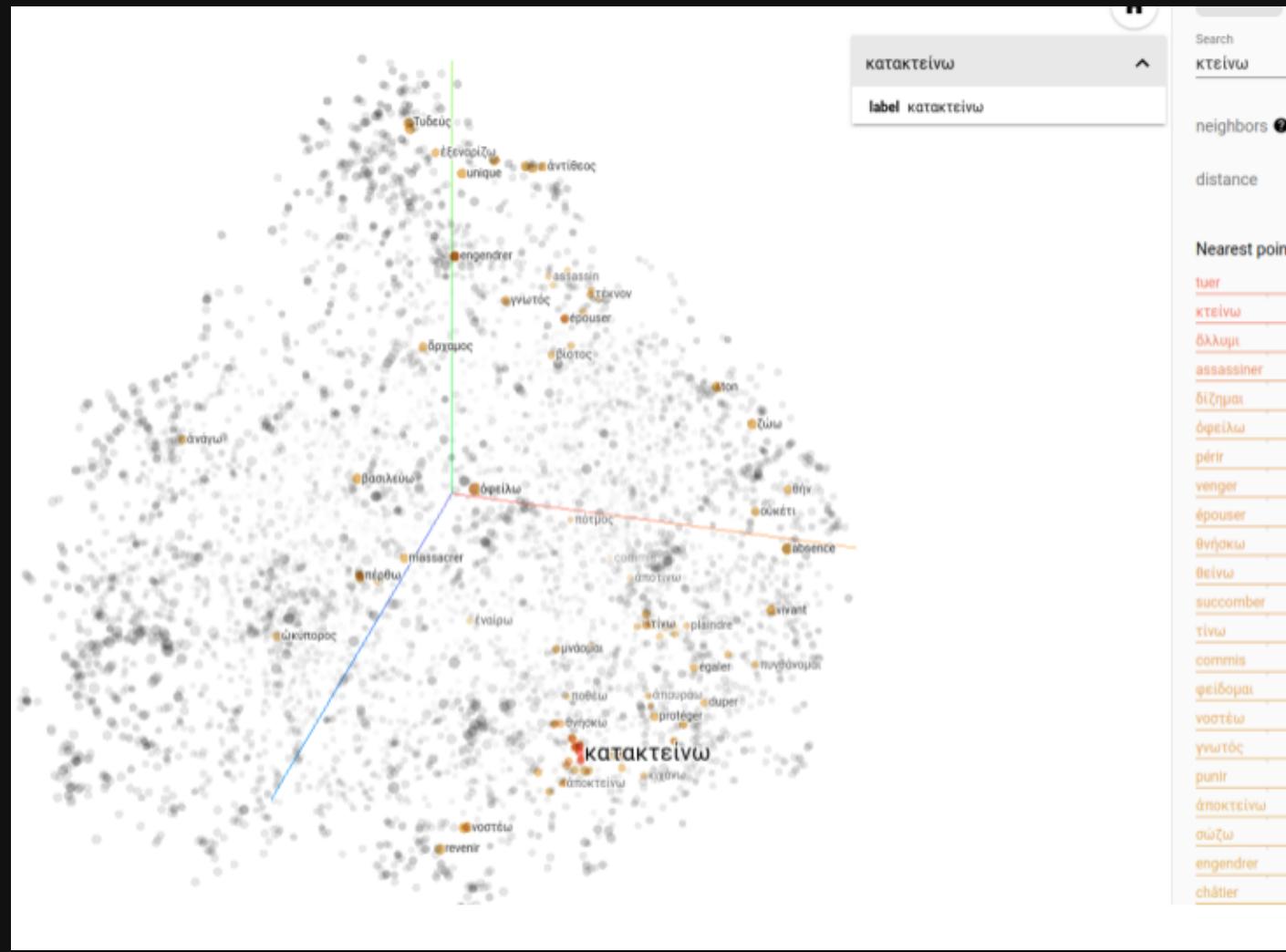
wmt19\_translate/de-fr

- **Description** de la configuration : ensemble de données de tâche de traduction de-en WMT 2019.
- **Taille du téléchargement** : 9.71 GiB

# Solution 1 : mapping d'espaces monolingues



# Solution 1 : mapping d'espaces monolingues



# Similarité sémantique au token avec Multilingual BERT



```
greek_word = "λόγος"
greek_embedding = greek_filtered_embeddings[greek_word]

top_latin_words_with_scores = find_most_similar(greek_embedding, latin_filtered_embeddings)

for word, score in top_latin_words_with_scores:
    print(f"{word}: {score:.4f}")

oratio: 0.9894
τῷ: 0.9892
narratio: 0.9885
καὶ: 0.9878
liber: 0.9877
finis: 0.9877
scribo: 0.9877
loquor: 0.9875
ratio: 0.9875
argumentum: 0.9872
```

# Alignement de séquences et détection d'intertexte

Greek File: tlg0086.tlg025.perseus-grc1.xml, Latin File: phi0550.phi001.perseus-lat1.xml

Greek Phrase: δῆλον δ' ἔσται τὸ λεγόμενον ἐκ τῶν ὕστερον μᾶλλον.

Latin Phrase: id licet hinc quamvis hebeti cognoscere corde.

Similarity Score: 0.9741785526275635

Greek Phrase: δῆλον δ' ἔσται τὸ λεγόμενον ἐκ τῶν ὕστερον μᾶλλον.

Latin Phrase: id licet hinc quamvis hebeti cognoscere corde.

Similarity Score: 0.9741785526275635

Greek Phrase: περὶ μὲν οὖν τούτων δεδήλωται καὶ πρότερον·

Latin Phrase: id quod iam supra tibi paulo ostendimus ante.

Similarity Score: 0.9737507104873657

Greek Phrase: δῆλον δ' ἔσται τὸ λεγόμενον ἐκ τῶν ὕστερον μᾶλλον.

Latin Phrase: quae tibi posterius largo sermone probabo.

Similarity Score: 0.9700868129730225

Greek Phrase: περὶ μὲν οὖν τούτων δεδήλωται καὶ πρότερον·

Latin Phrase: id quod iam supera tibi saepe ostendimus ante.

Similarity Score: 0.9692978858947754

Greek Phrase: περὶ μὲν οὖν τούτων δεδήλωται καὶ πρότερον·

Latin Phrase: id quod iam supera tibi paulo ostendimus ante.

Similarity Score: 0.9681644439697266

# Contact

Je vous remercie.

<https://github.com/OdysseusPolymetis/ganes>  
hs\_ia\_02\_04\_24

marianne.reboul@ens-lyon.fr

github : OdysseusPolymetis

# Bibliographie

- Yousef, T., Palladino, C., & Jänicke, S. (2022). Transformer-based named entity recognition for ancient greek.
- Yousef, T., Palladino, C., Shamsian, F., Ferreira, A. D. O., & dos Reis, M. F. (2022, June). An automatic model and Gold Standard for translation alignment of Ancient Greek. In *Proceedings of the Thirteenth Language Resources and Evaluation Conference* (pp. 5894-5905).
- Riemenschneider, F., & Frank, A. (2023). Exploring large language models for classical philology. *arXiv preprint arXiv:2305.13698*.
- Artetxe, M., Labaka, G., & Agirre, E. (2018). A robust self-learning method for fully unsupervised cross-lingual mappings of word embeddings. *arXiv preprint arXiv:1805.06297*.
- Devlin, J., Chang, M. W., Lee, K., & Toutanova, K. (2018). Bert: Pre-training of deep bidirectional transformers for language understanding. *arXiv preprint arXiv:1810.04805*.