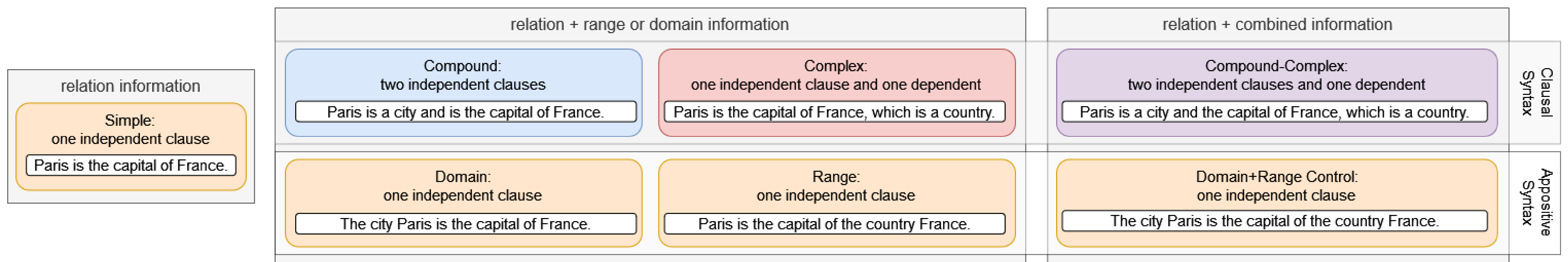


The Impact of Prompt Syntax and Supplementary Information on Knowledge Retrieval from Pretrained Language Models

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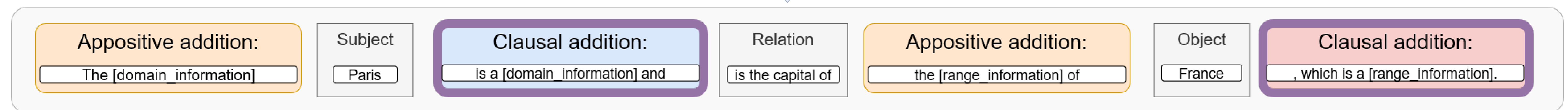


Motivation:

Using pretrained language models (PLMs) to solve knowledge intensive tasks like relational Knowledge Retrieval (rKR) is desirable as they can learn from text in an unsupervised way and offer a natural language interface for queries. One way to query a PLM for rKR is to mask out the object in a prompt that encodes subject and relation. However, small changes in prompts can have big impact on PLMs performance in relational Knowledge Retrieval (rKR). Research already showed that PLMs are not consistent for paraphrases.

ConPare-LAMA Statistics

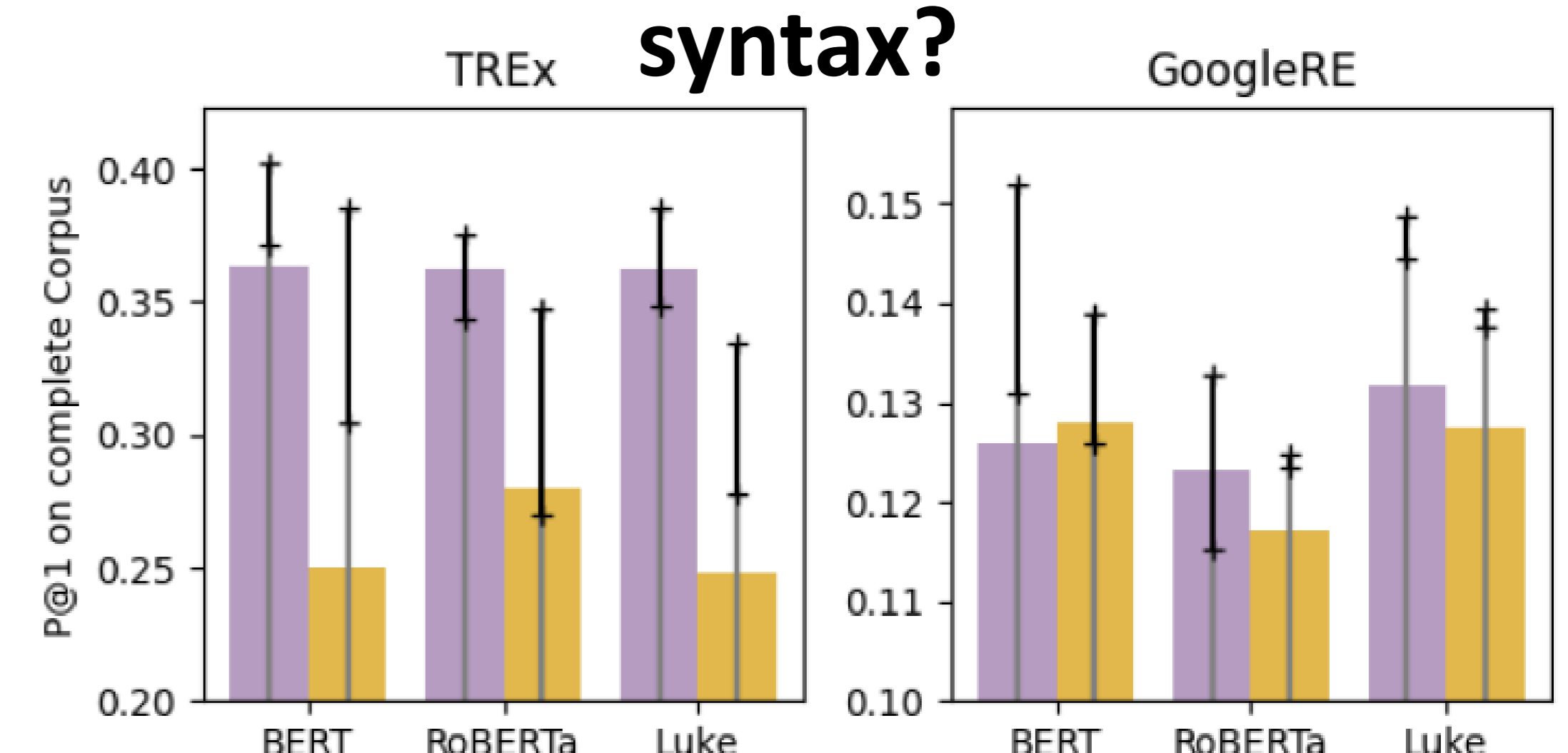
Corpus	Grouping	#Relations	#Facts	Dom	Rng
TREx	1:1	2	651	6.5	5.5
	N:1	23	18682	9.5	6.4
	N:M	16	10190	15.6	10.1
	Total	41	29523	11.6	7.7
GoogleRE	death place	1	649	10	10
	birth place	1	2404	7	8
	birth date	1	1565	16	1
	Total	3	4618	11	6.3
ConceptNet	Total	16	22739	13.2	12.6



Approach:

We want to deepen the insights in the impact of prompt phrasing by proposing ConPare-LAMA, a **Controlled Paraphrasing Probe** for LAMA. This probe is based on a meta-template that helps to isolate syntactical and semantic change in paraphrases. Thus, it enables the independent evaluation of changes in semantic content and syntactic structure in prompts on the rKR performance.

How do PLMs process combined information through different syntax?



What is the impact of prompt syntax and information on rKR performance?

Corpus	Grouping	Relation			Relation + Domain Information						Relation + Range Information					
		BERT	RoB	Luke	BERT		RoBERTa		Luke		BERT		RoBERTa		Luke	
		Simple			Cpnd	Appo	Cpnd	Appo	Cpnd	Appo	Cplx	Appo	Cplx	Appo	Cplx	Appo
TREx	1:1	.4439	.3118	.3394	.6405	.5760	.5238	.6098	.5330	.5944	.6205	.6052	.5775	.5238	.5668	.5176
	N:1	.2876	.1956	.2240	.3329	.3086	.2706	.2316	.2792	.2500	.3656	.2919	.3547	.2722	.3652	.2496
	N:M	.2517	.2205	.2401	.3217	.3261	.2986	.3166	.3168	.3105	.3488	.1871	.2979	.2121	.3015	.1879
	Total	.2786	.2067	.2321	.3358	.3205	.2859	.2693	.2978	.2785	.3654	.2627	.3400	.2570	.3477	.2342
GoogleRE	birth-date	.0	.0012	.0191	.0	.0	.0178	.0364	.0319	.0428	.0044	.0	.0083	.0031	.0031	.0031
	birth-place	.1738	.1156	.0183	.2129	.1855	.0994	.0715	.0590	.0345	.2254	.2029	.1863	.1730	.2104	.1988
	death-place	.1479	.0061	.0015	.1479	.1263	.0061	.0077	.0154	.0077	.1571	.1771	.1587	.1510	.1879	.1448
	Total	.1113	.0614	.0162	.1316	.1143	.0586	.0506	.0437	.0335	.1409	.1305	.1221	.1123	.1370	.1249
ConceptNet	Total	.0229	.0226	.0230	.0455	.0390	.0512	.0463	.0494	.0507	.0495	.0084	.0586	.0098	.0484	.0088

Findings:

1. Prompt syntax is an important factor in information processing of PLMs.
2. Knowledge retrieval can be more performant when we add range information.
3. Knowledge retrieval is more performant and consistent when done via clausal prompts.
4. No syntax guarantees efficient combination of information.
5. PLM representation is fragile regarding appositive syntax.