a place of mind
THE UNIVERSITY OF BRITISH COLUMBIA

BeDiscovER: The Benchmark of Discourse Understanding in the Era of Reasoning Language Models

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A broader range of discourse study with LLMs

Lexical

“recently”

My brother ***just*** flew in to town.

I ***just*** won’t stand for this injustice.

“simply”

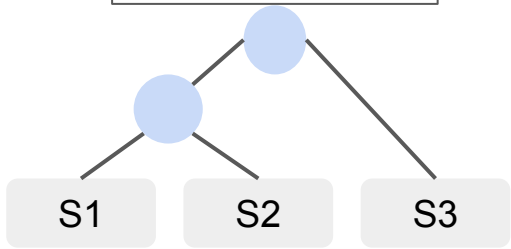
What is the sense of *just* in these contexts?

(Multi-)Sentence

E1 happens **before/after** E2?

E2 **explains/contradicts** E1?

Document



Correct **ordering** of S1, S2, S3?

How do S1, S2, S3 **interact** with each other?

A broader range of discourse study with LLMs

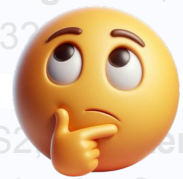
Lexical

(Multi-)Sentence

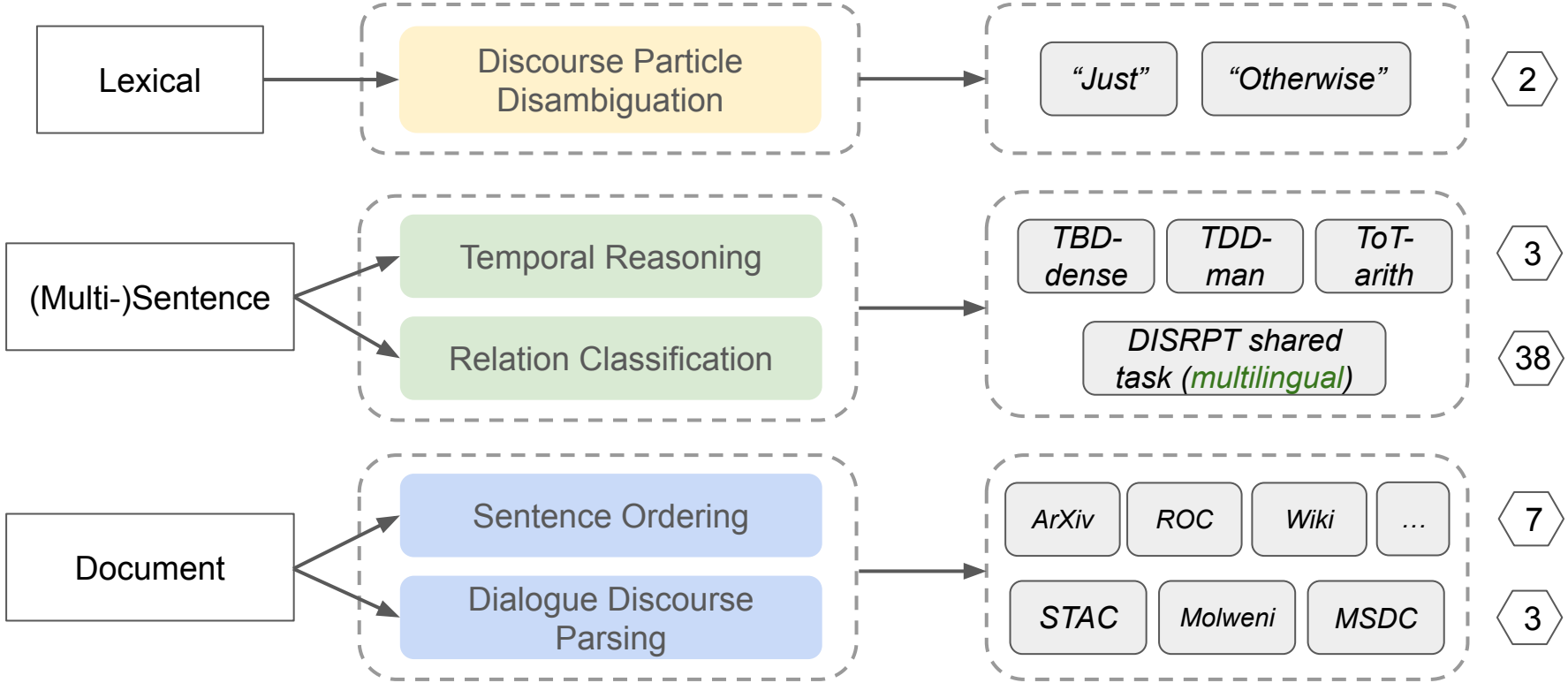
Document

*Discourse understanding requires **lexical & semantic, temporal, rhetorical, commonsense**… knowledge.*

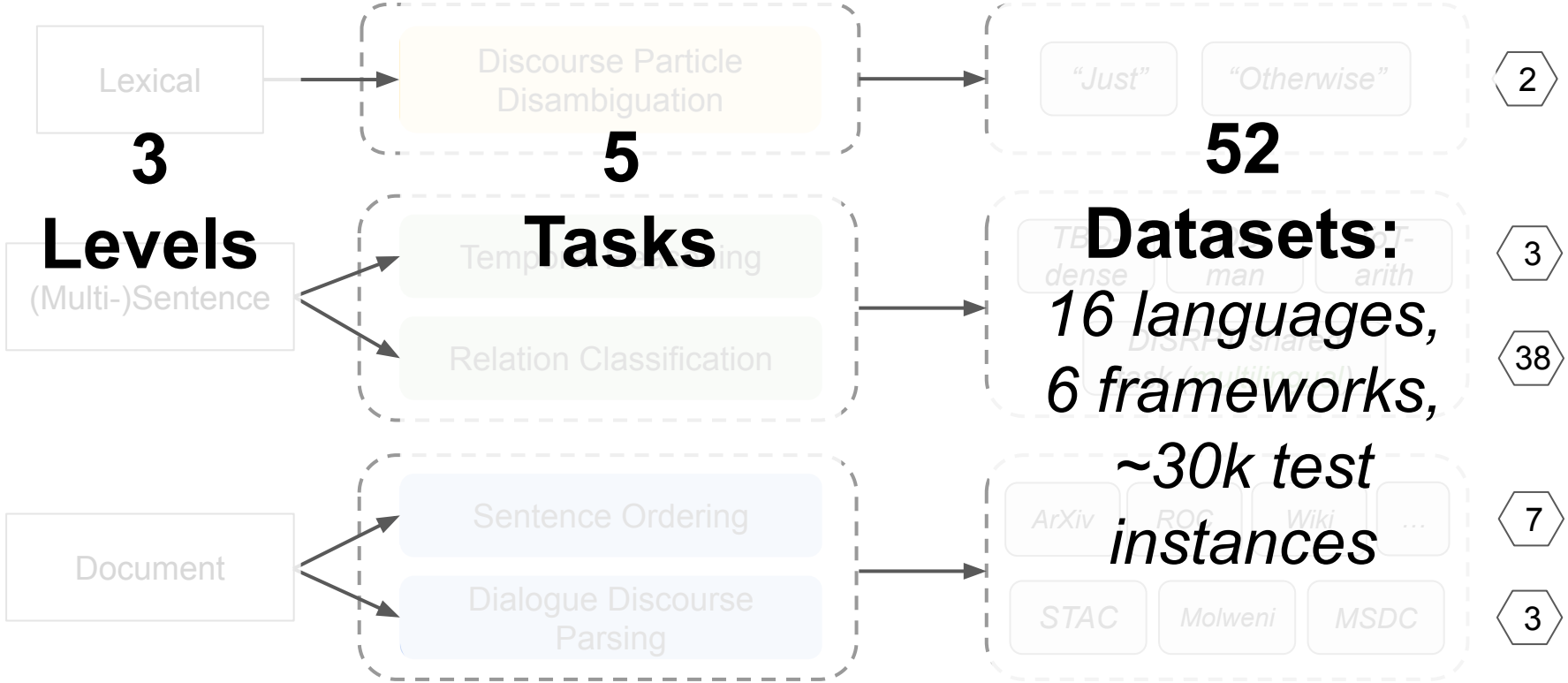
How well do modern LLMs understand discourse?



BeDiscovER: Level – Task – Dataset



BeDiscovER: Level – Task – Dataset



Evaluation Setting

Open-ended Question-Answer Formatting

- Unified evaluation pipeline
- Classification tasks (1 2 3): fixed label space
- Parsing task (5): incremental generation task

Reasoning-oriented LLMs

GPT-5 Qwen3 DeepSeek-r1

Non reasoning-oriented LLMs

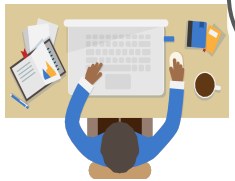
Llama-4

Evaluation Setting

System prompt:
… Choose one of the following six labels: [Exclusionary, Unelaboratory, Unexplanatory, Emphatic, Temporal, Adjective].

User prompt:
My brother ***just*** flew in to town.

Question: What is the function of the discourse marker “just” in the sentence above?

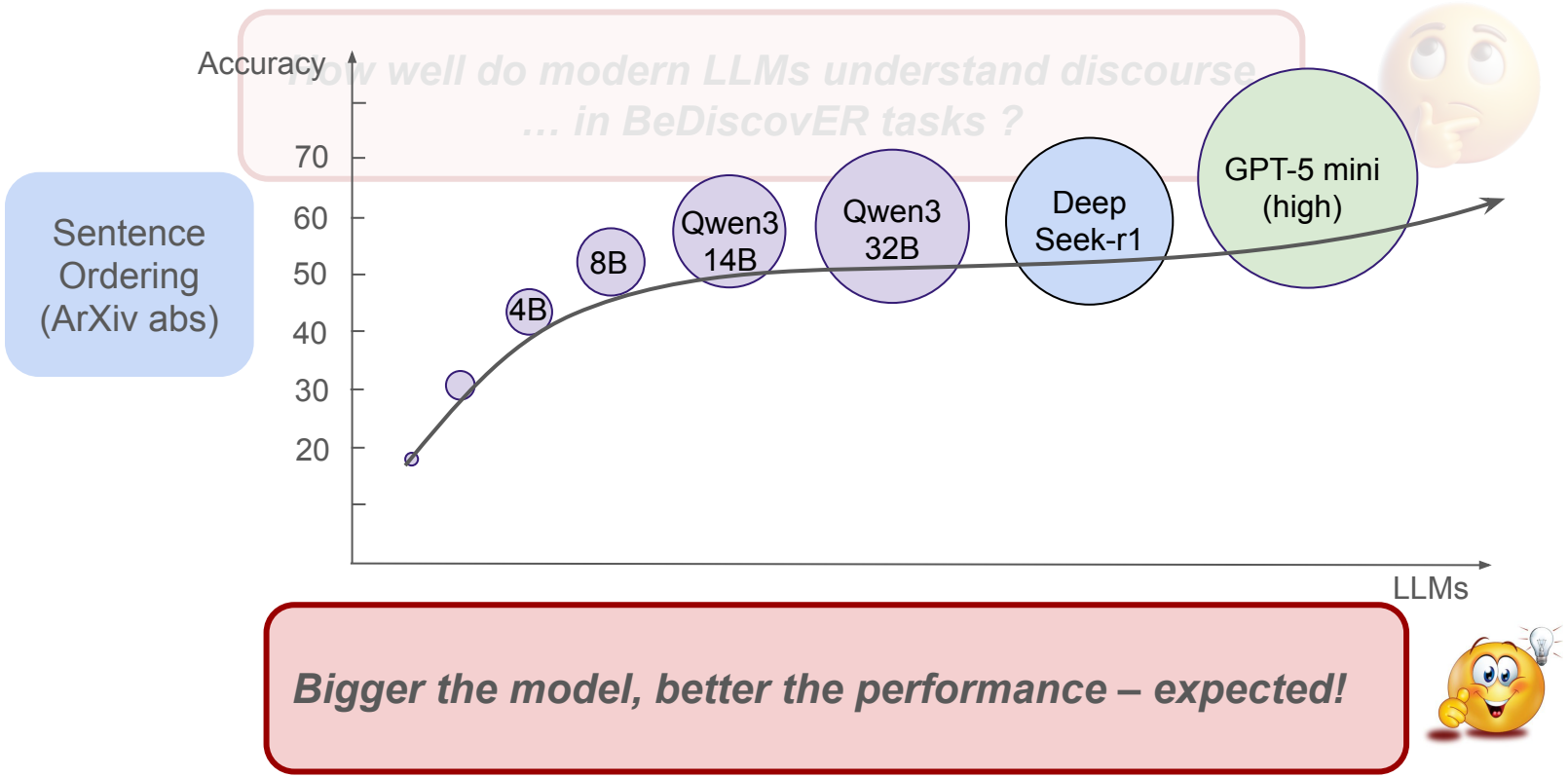


Temporal

GPT-5 Qwen3 DeepSeek-r1

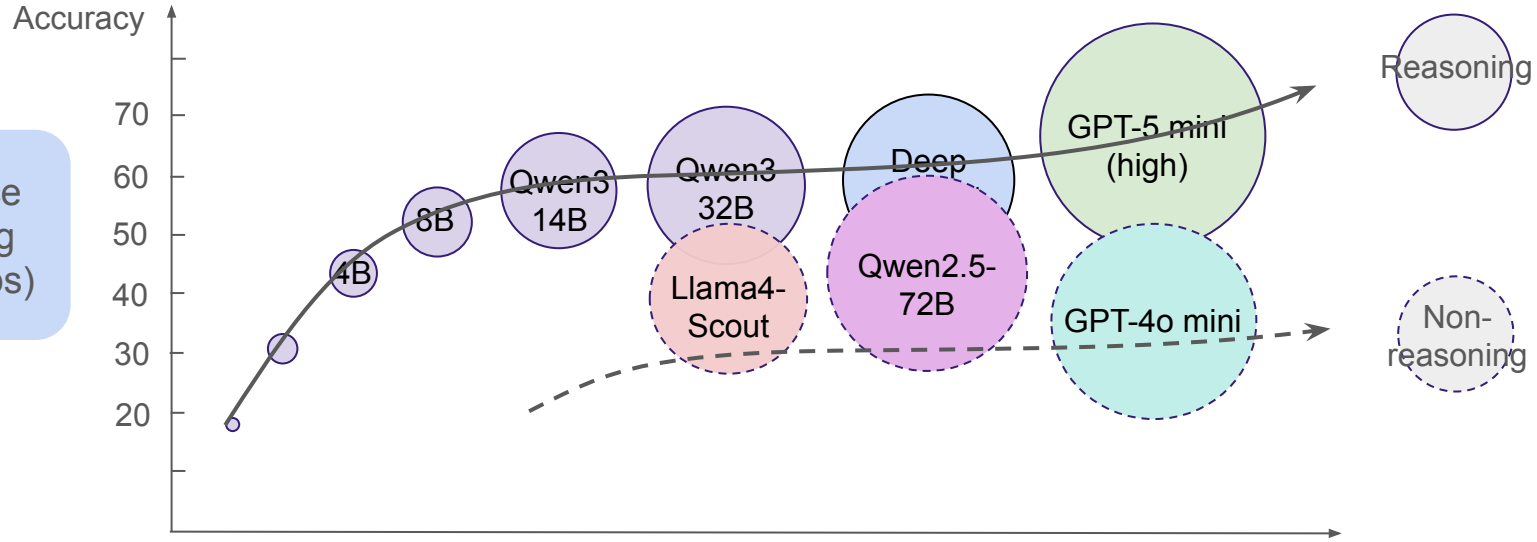
Llama-4

Performance: model scaling



Performance: reasoning-oriented vs. non-reasoning LLMs

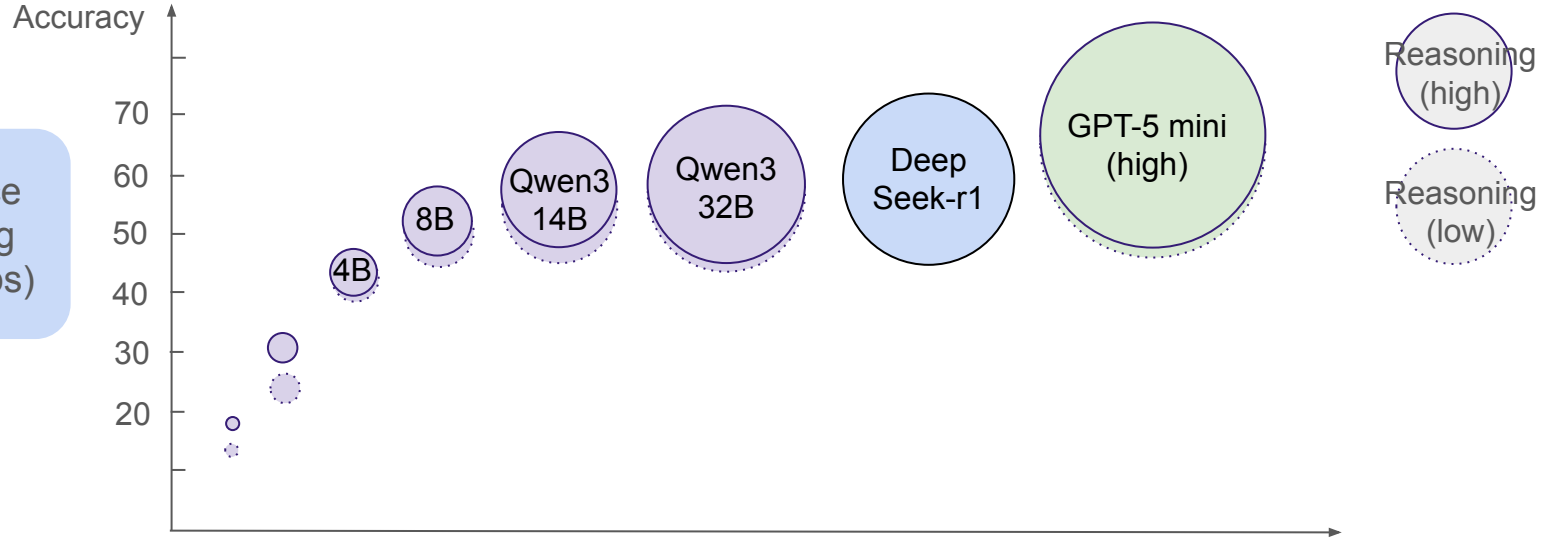
Sentence Ordering (ArXiv abs)



Reasoning-oriented LLMs outperform non-reasoning optimized LLMs.

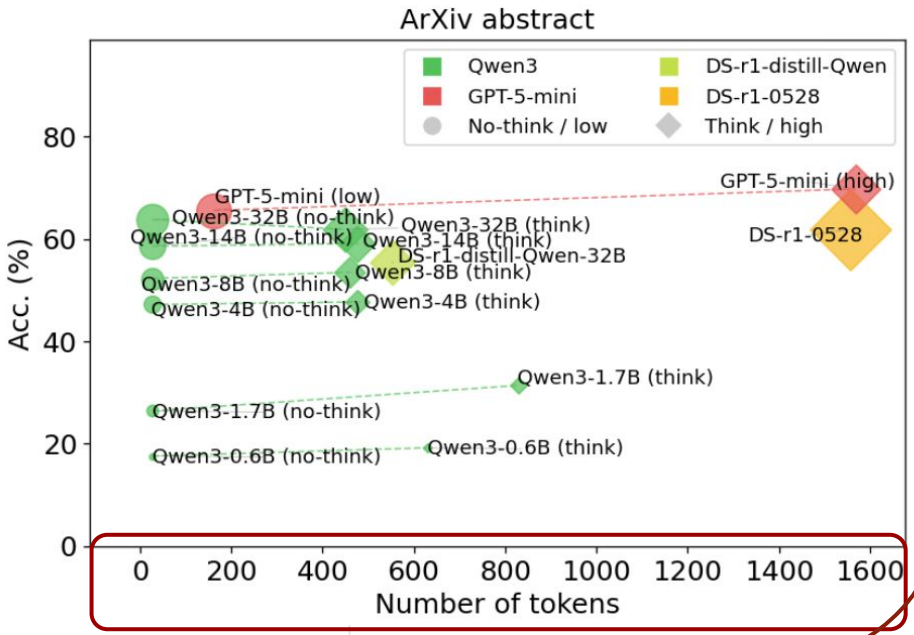
Performance: higher reasoning effort, better result?

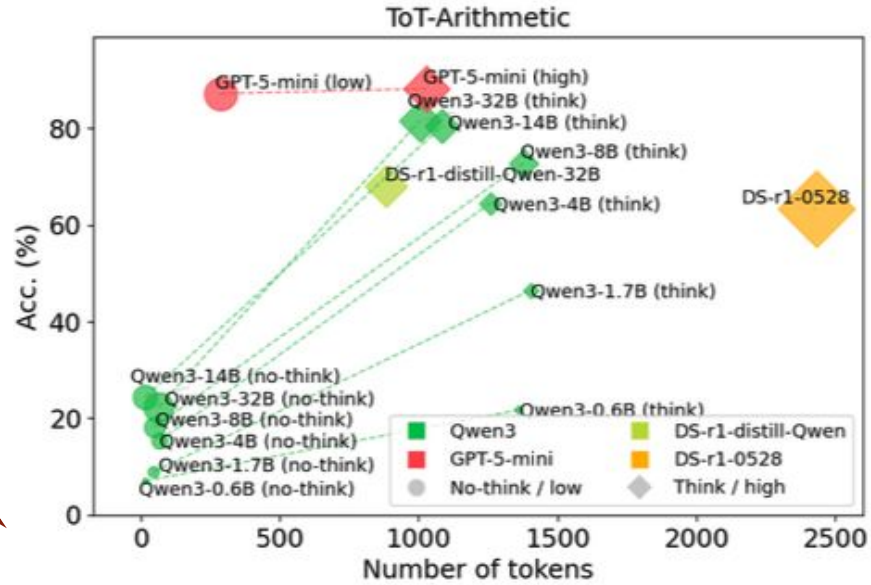
Sentence Ordering (ArXiv abs)



Higher thinking effort does not yield better outcome

Performance: higher reasoning effort, better result?

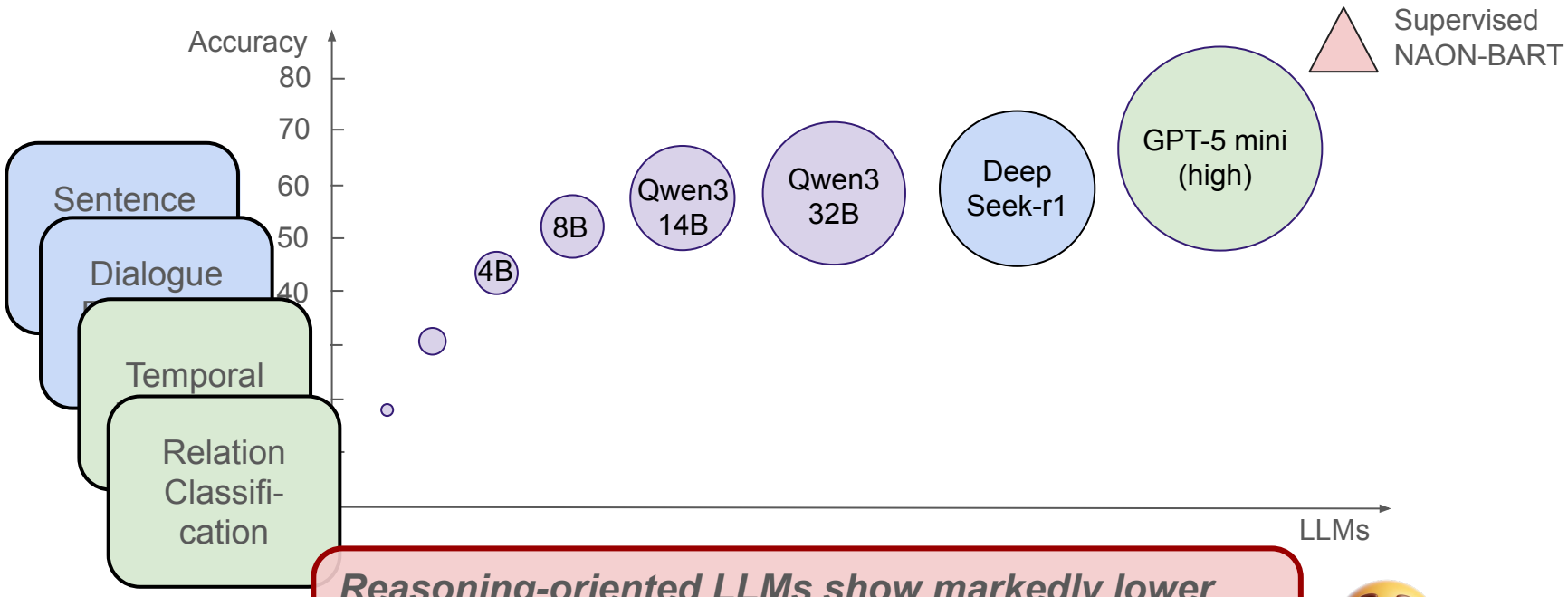




Models become more verbose without producing more meaningful reasoning…

… except for arithmetic temporal reasoning: longer reasoning lead to substantial gains!

Performance: LLMs vs. supervised

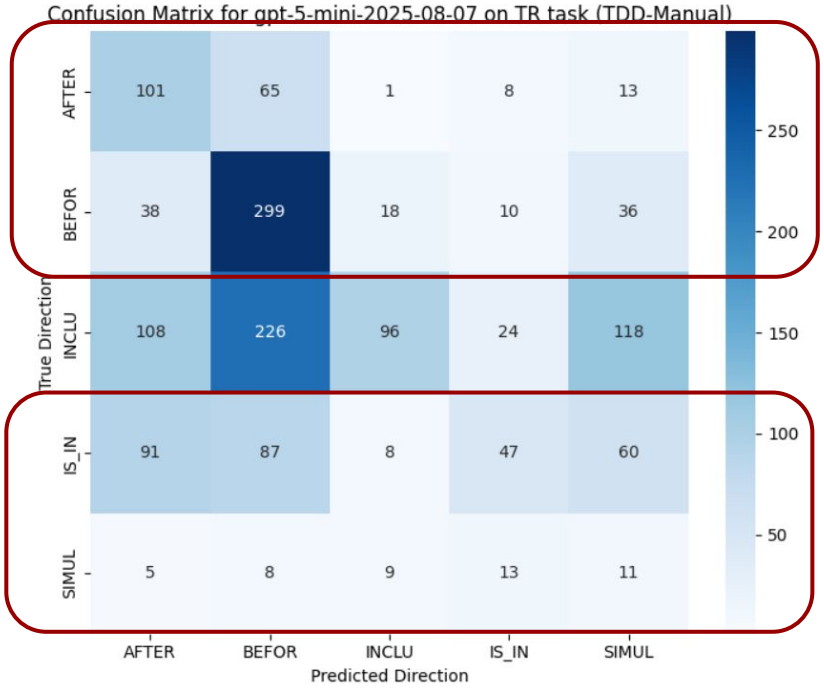


Reasoning-oriented LLMs show markedly lower performance (~10–30%) compared to supervised models, despite their larger size.

Performance: fine-grained sense disambiguation

Temporal Reasoning

Relation Classifi-cation

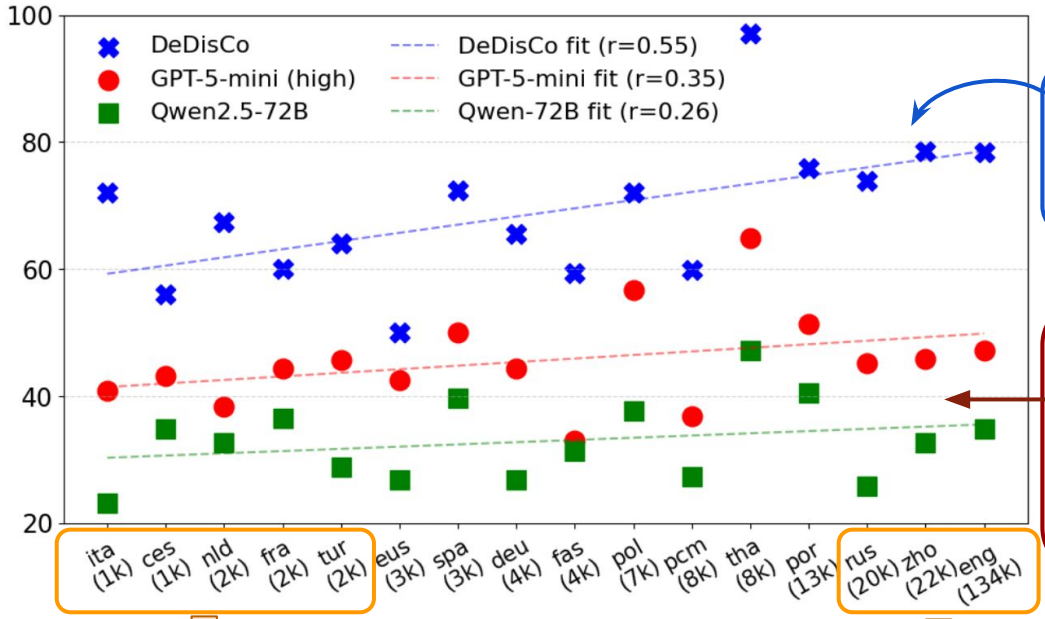


Identifies ***before/after*** relations

but fails to capture ***overlap*** or **containment**.

Performance: multilingual performance

Relation Classification



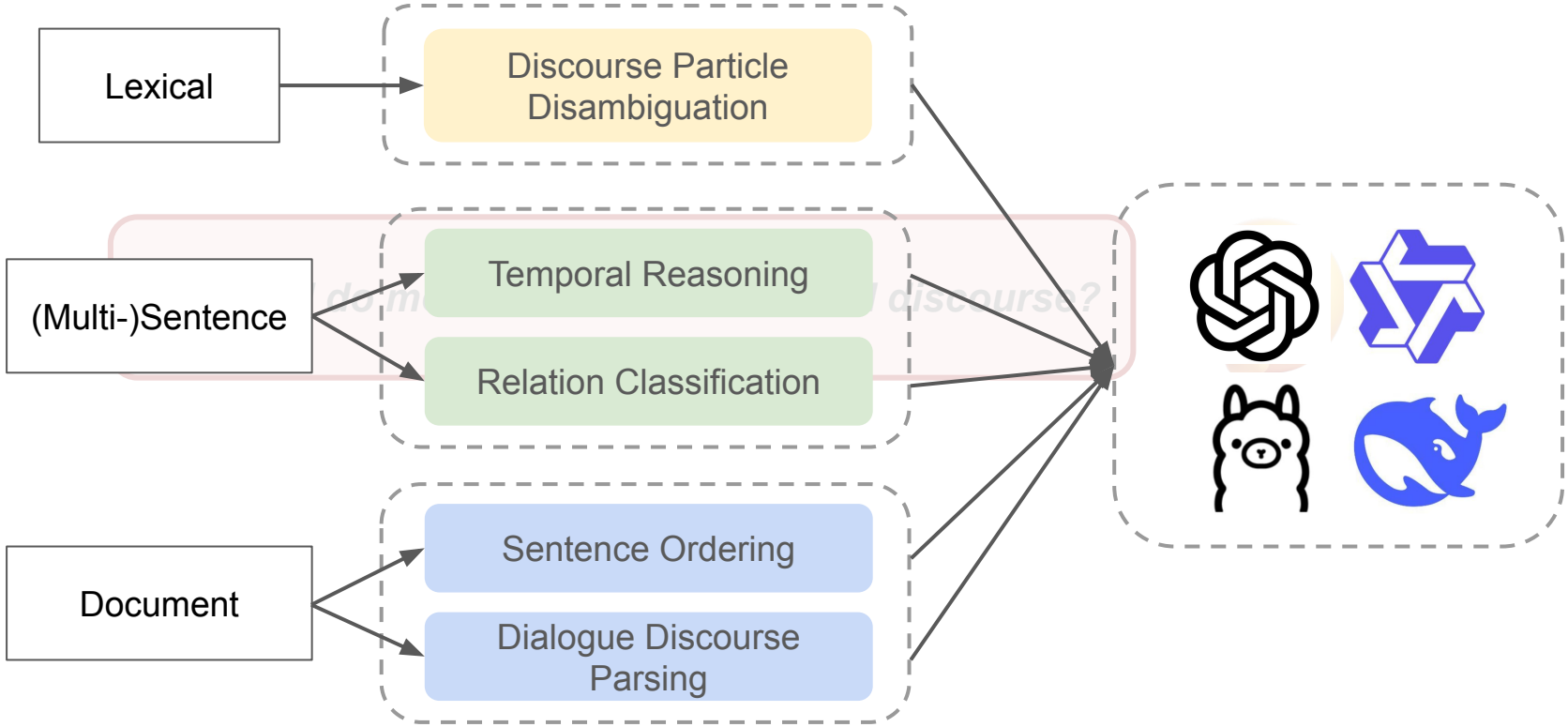
Supervised model show clear perform disparities

LLMs perform nearly flat → some generalizability & lack of robust relation representation

low-resource languages

high-resource languages

Summary: benchmark and evaluation baseline



Summary: benchmark and evaluation baseline

- Reasoning-oriented LLMs capture some discourse-level knowledge, especially **good in arithmetic aspect** of temporal reasoning.
- But they **struggle with subtle semantic and discourse phenomena** (like rhetorical relation classification) and long-dependency reasoning (dialogue parsing).
- Longer reasoning traces do not necessarily yield better outcomes in reasoning models.

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Thank you and welcome to our Oral Presentation at Salle Le LIXUS,
Wednesday March 25 at 14:30-16:00 if you have any question or would like to chat more!