Register Always Matters: Analysis of LLM Pretraining Data Through the Lens of Language Variation

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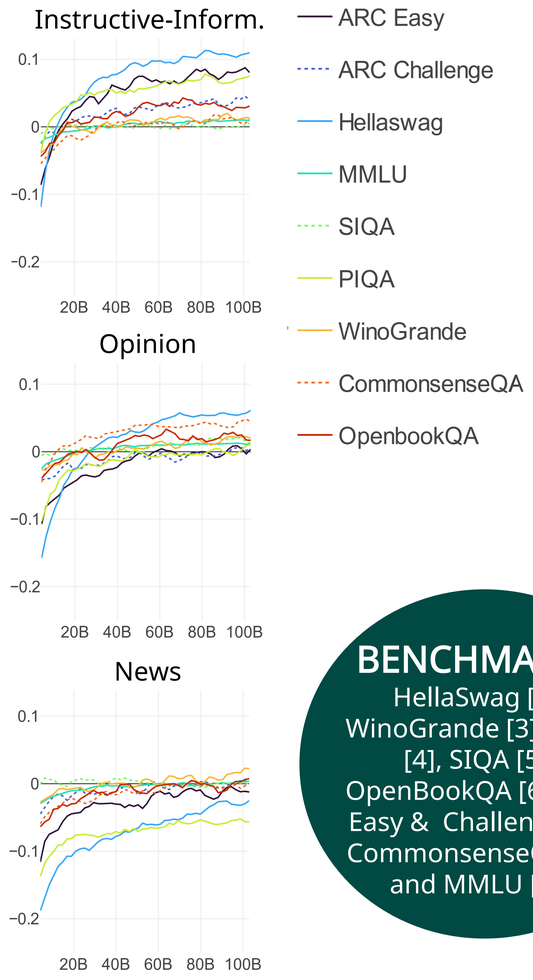
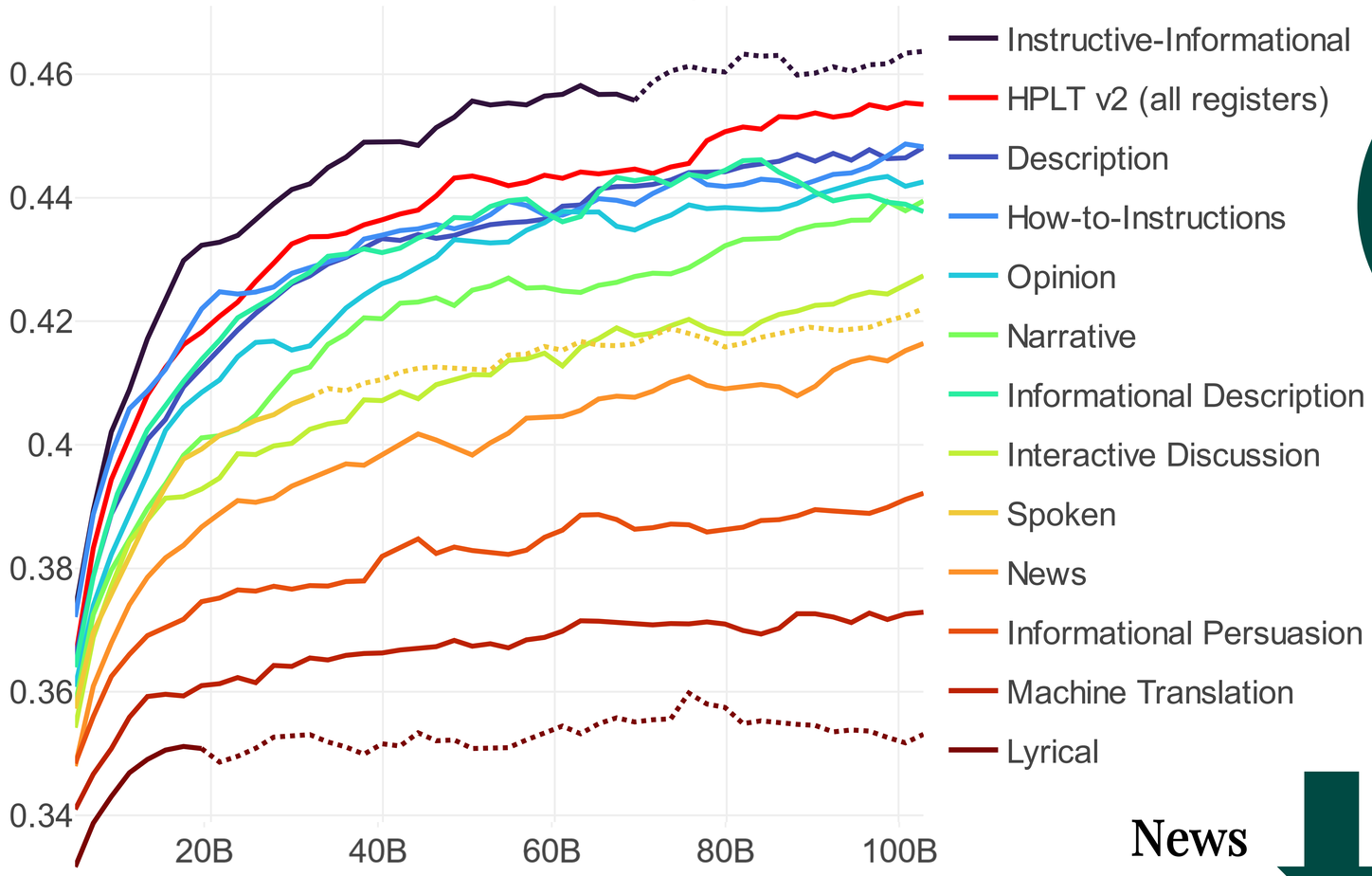
We evaluate the effects of the linguistic register (or genre) on LLM performance by training identical generative models with register-filtered datasets. We then evaluate and compare these models using well-known benchmarks, revealing how each register impacts model capabilities.





REGISTERS
Situationally characterised text varieties, including categories such as *news*, *reviews* and *song lyrics*

DATA
Register classified HPLT v2 [1]

MODELS
Llama 1.71B, trained up to 100B tokens

BENCHMARKS
HellaSwag [2], WinoGrande [3], PIQA [4], SIQA [5], OpenBookQA [6], ARC Easy & Challenge [7], CommonsenseQA [8], and MMLU [9].

We additionally evaluate combination of registers! See our full paper

News ↓ Instructive, Descriptive, Opinionated ↑

Full paper

This poster

[1] Burchell et al. (2025) An Expanded Massive Multilingual Dataset for High-Performance Language Technologies (HPLT)
[2] Zellers et al. (2025) HellaSwag: Can a Machine Really Finish Your Sentence?
[3] Sakaguchi et al. (2021) WinoGrande: an adversarial winograd schema challenge at scale
[4] Bisk et al. (2019) PIQA: Reasoning about Physical Commonsense in Natural Language
[5] Sap et al. (2019) Social IQa: Commonsense Reasoning about Social Interactions
[6] Mihaylov et al. (2018) Can a Suit of Armor Conduct Electricity? A New Dataset for Open Book Question Answering
[7] Clark et al. (2018) Think you have Solved Question Answering? Try ARC, the AI2 Reasoning Challenge
[8] Talmor et al. (2019) CommonsenseQA: A Question Answering Challenge Targeting Commonsense Knowledge
[9] Hendrycks et al. (2020) Measuring Massive Multitask Language Understanding
Methodology inspired by Penedo et al. (2024) The FineWeb Datasets: Decanting the Web for the Finest Text Data at Scale

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HPLT High Performance Language Technologies

OPEN EURO LLM