BLUCK: A Benchmark Dataset for Bengali Linguistic Understanding and Cultural Knowledge

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Abstract

In this work, we introduce **BLUCK**, a new dataset designed to measure the performance of Large Language Models (LLMs) in Bengali linguistic understanding and cultural knowledge. Our dataset comprises 2366 multiple-choice questions (MCQs) carefully curated from compiled collections of several college and job level examinations and spans 23 categories covering knowledge on Bangladesh's culture and history and Bengali linguistics. We benchmarked BLUCK using 6 proprietary and 3 open-source LLMs - including GPT-4o, Claude-3.5-Sonnet, Gemini-1.5-Pro, Llama-3.3-70B-Instruct, and DeepSeekV3. Our results show that while these models perform reasonably well overall, they, however, struggles in some areas of Bengali phonetics. Although current LLMs' performance on Bengali cultural and linguistic contexts is still not comparable to that of mainstream languages like English, our results indicate Bengali's status as a mid-resource language. Importantly, BLUCK is also the first MCQ-based evaluation benchmark that is centered around native Bengali culture, history, and linguistics.

Categories		No. of Questions
History	Ancient Bengal	99
	British Bengal	40
	Pakistan Era	106
Culture	Indigenous People	31
	Arts, Heritage & Media	69
	National Issues	15
	Constitution	31
	Resources	36
	Geography	87
	Law	284
Phonetics	Alphabet	10
	Pronunciation	69
	Conjunct Letters	23
	Sound & Letters	48
	Sound Changes	54
	Phonetic Combining Rules	184
	Miscellaneous Phonetics	80
Semantics	Synonyms	364
	Antonyms	165
	One Word Expressions	180
	Idioms	198
	Proverbs	47
	Miscellaneous	146
Total		2366

Table 1: Statistics of BLUCK

1 Introduction

Recently, Large Language Models (LLMs) have demonstrated remarkable success in multilingual capabilities. In the case of Bengali, OpenAI's O1 model achieved an impressive score of 0.873 (OpenAI et al., 2024b) on the MMLU benchmark. However, most evaluations of Bengali, including MMLU, rely on translated English datasets assessing general knowledge skills or focus exclusively on STEM fields, such as math and science (Shafayat et al., 2024). Despite the growing emphasis on evaluations that capture cultural and linguistic contexts for LLMs, the performance of models in Bengali-specific cultural knowledge or reasoning skills remains unexplored.

Given that Bengali is the 7th most spoken language in the world, with over 237 million native speakers, it is crucial to address the lack of high-quality Bengali-specific evaluation datasets. To this end, we introduce **BLUCK**[1],

a Benchmark Dataset for Bengali Linguistic Understanding and Cultural Knowledge. Through a rigorous curation process—encompassing careful annotation, multiple rounds of cross-inspection, and digitization—we have compiled a dataset of 2,366 multiple-choice questions (MCQs) that encompass extensive knowledge of the culture, his-

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[1]Dataset link: BLUCK

tory, and language of Bangladesh, organized into 23 subcategories. Table 1 presents the overall statistics and categories of BLUCK.

Our evaluation of 9 LLMs using BLUCK offers valuable insights into the current status of LLMs in understanding Bengali language and cultural knowledge. Specifically, GPT-4o and Claude-3.5-Sonnet achieve the highest scores, around 73% in a 0-shot setting—approximately 7% lower than their performance on the MMLU benchmark. Overall, the models tend to perform well in the history category but show weaker results in the culture category, particularly on national issues. Similarly, in the phonetics category, their performance is generally low, with GPT-4o scores of 0.377 in pronunciation and 0.407 in sound changes. The lower performance in specific categories, such as culture and phonetics, highlights the current models' limitations in Bengali-specific knowledge. These findings underscore the potential for improvement in these areas, providing valuable insights for the future development of Bengali language models.

2 Related Works

2.1 Cultural Sensitive Dataset

There has been a growing effort to create culturally sensitive benchmarks for evaluating LLMs across different languages and regions. Datasets like CULTURALBENCH (Chiu et al., 2024), CLIcK (Kim et al., 2024) for Korean cultural knowledge RoCulturaBench (Masala et al., 2024) for Romanian culture are designed to assess LLMs' ability to understand cultural context beyond linguistic fluency. Similarly, BLEnD (Myung et al., 2024) provides a multilingual cultural dataset from more 13 different languages.

Despite these advances, Bengali remains significantly underrepresented in cultural-sensitive datasets. Most cultural evaluation benchmarks focus on high-resource languages or specific regional cultures, leaving a major gap in Bengali cultural and linguistic understanding. BLUCK is introduced to address this gap.

2.2 Bengali Dataset

Several benchmarks have been developed to evaluate LLMs in general and multilingual tasks, but only a few focus on specific Bengali knowledge. M-MMLU (OpenAI, 2024) and Global-MMLU (Singh et al., 2024) are some of the few well-known benchmarks that include Bengali in their multilingual evaluation settings. Nevertheless, their Bengali questions are mostly translated from English, limiting their effectiveness in assessing native-level linguistic understanding.

For Bengali-specific reasoning tasks, MGSM (Shi et al., 2022) provided the Bengali translations of GSM8K (Cobbe et al., 2021), one of the prominent datasets for grade school math problems along with other languages, although its scope remains limited. Later, BEnQA (Shafayat et al., 2024) provided multiple choice questions as official English-Bengali corpus, sourced from Bangladesh's national board exams, focusing primarily on STEM subjects. Bengali Identity Bias Evaluation Dataset (BIBED) (Das et al., 2023) aims at identifying cultural-centric biases, which however, is limited to gender, religion, and nationality. There is barely a dataset in Bengali that encapsulates its history, culture, or linguistic intricacies.

To the best of our knowledge, BLUCK is the first comprehensive benchmark to include Bengali-related reasoning and knowledge questions, focusing on Bengali history, culture, and language. BLUCK is specifically designed to evaluate LLMs in native Bengali contexts, complementing existing multilingual and subject-specific benchmarks.

3 BLUCK: A Benchmark Dataset for Bengali Linguistic Understanding and Cultural Knowledge

BLUCK contains immersive knowledge organized into these four major domains: Bangladesh's history, Bangladeshi culture, Bengali phonetics, and Bengali semantics. A summary of these categories, along with the corresponding number of questions is provided in Table 1.

3.1 Data Collection

Data is collected from publicly available printed copies of previous examination papers from the following sources: a) Bangladesh Civil Service (BCS) Examinations, b) university entrance examinations in Bangladesh, c) Bangladesh Bar Council Preliminary Examinations, d) bank job examinations, and e) several public job examinations. These official examinations are selected for their reliability and authoritative assessment of general knowledge in Bangladesh. These exams consist of extensive native knowledge on Bangladesh's history, culture, law, language, and various other academic disciplines. For BLUCK's creation, we

select only the MCQs and follow a question selection criterion, based on which we omit these types of questions: a) fact-based questions loosely representing Bangladesh's history, culture, and language b) questions on contemporary issues in Bangladesh (to ensure long-term relevance), c) insignificant date-related or 'number-based answer option' questions (to avoid arbitrary or trivial answers).

3.2 Dataset Curation

(1) Categorization After data collection, we categorize by utilizing general knowledge and Bengali language guidebooks that organize questions similar to the ones in our dataset. This approach ensures proper categorization for some of the categories in the culture domain, and allows us to group similar categories into the four main domains of our dataset.

(2) Two Round Inspection The preliminary question selection task is distributed among the authors. First, two rounds of inspection are conducted; in each round different two authors individually checks the question selection based on the aforementioned criteria, and then cross-checks with each other. This process ensures that our dataset contains high-quality questions representing the history and culture of Bangladesh, and its rich linguistic knowledge.

(3) Digitization After inspection, professional annotators, proficient in Bengali, digitize the MCQs for easier access and manipulation of the data. This is done to minimize the errors when digitized. To finalize our dataset, we conduct refinement: a) cleaning duplicate and inconsistent entries, b) correcting existing typing errors, and c) final checking to remove erroneous questions. This extensive approach ensures reliability and proper representation of the categories in our dataset.

4 Experiment

4.1 Experimental Setup

In order to evaluate LLMs' performance on the history and culture of Bangladesh, and Bengali phonetics and semantics, we conduct experiments on the BLUCK dataset using both proprietary and open-source models. We utilized the following LLMs:

- **Proprietary models**: GPT-4o, GPT-4o-mini (OpenAI et al., 2024a) [2], Claude-3.5-Sonnet, Claude-3.5-Haiku [3], Gemini-1.5-Pro, Gemini-1.5-Flash (Team et al., 2024) [4]
- **Open-source models**: Llama-3.1-8B-Instruct, Llama-3.3-70B-Instruct (Grattafiori et al., 2024), DeepSeekV3 (DeepSeek-AI et al., 2024)

Since BLUCK consists largely of factual-knowledge based questions, we conduct evaluation without any chain-of-thought (CoT) reasoning, using both zero-shot and five-shot settings. As shown in Figure 1 in Appendix 7, for prompt, we utilize system and user prompts, explicitly instructing the model to output only the option 'letter' in order to save API computational cost (Petrov et al., 2023). Following the criteria in KoBBQ (Jin et al., 2024), we only accept generated responses based on: a) response with only the alphabet as answer, b) response mentioning term corresponding to one of the options, iii) response convey the answer in the form 'answer:', or 'answer is', etc. Responses showing signs of hallucination, or producing bizarre outputs such as single Bengali letter as response are omitted.

4.2 Result

Our evaluation results are summarized in Table 2, which highlights the performance scores for all 23 categories of our dataset for the major models. Table 3 in Appendix 7 shows the same for the small-sized language models. Our results indicate that Claude-3.5-Sonnet, GPT-4o, Gemini-1.5-pro, and DeepSeekV3 demonstrate considerable knowledge of Bangladeshi history and the semantics of Bengali language. However, all the models struggle with phonetics, especially in areas such as pronunciation and sound changes. Claude-3.5-Sonnet emerges as the best overall model with consistent performance across all categories in both settings. It's performance in Bengali phonetics, which is the most difficult category, is 10% better than the 2nd best model in this domain. GPT-4o closely follows, performing the best in history, culture, and semantics, while Claude-3.5-Sonnet achieves best performance in culture and phonetics. The

[2]We use GPT-4o-2024-08-06 and GPT-4o-mini-2024-07-18 version using OPENAI API.

[3]We use Claude-3.5-Sonnet-20241022 and Claude-3.5-Haiku-20241022 version using Anthropic API.

[4]We use gemini-1.5-pro-Latest, gemini-1.5-flash-latest using Gemini API key in Google AI Studio.

Categories		GPT-4o		Claude-3.5-Sonnet		Gemini-1.5-Pro		Llama-3.3-70B		DeepSeekV3	
		0-shot	5-shot	0-shot	5-shot	0-shot	5-shot	0-shot	5-shot	0-shot	5-shot
History	Ancient Bengal	0.899	**0.919**	0.879	0.889	0.758	0.758	0.687	0.677	0.859	0.889
	British Bengal	0.925	**0.975**	0.875	0.9	0.675	0.95	0.8	0.85	0.9	0.95
	Pakistan Era	0.745	**0.783**	0.67	0.764	0.481	0.613	0.5	0.509	0.717	0.726
	Average	0.837	**0.869**	0.788	0.837	0.624	0.727	0.624	0.633	0.804	0.829
Culture	Indigenous People	0.806	0.839	0.871	**0.935**	0.516	0.71	0.516	0.742	0.774	0.871
	Arts, Heritage & Media	0.739	**0.768**	0.725	0.696	0.58	0.594	0.58	0.551	0.725	**0.768**
	National Issues	0.467	0.467	0.733	**0.8**	0.6	0.733	0.2	0.6	0.467	0.6
	Constitution	0.806	0.871	0.871	0.935	0.806	0.903	0.677	0.71	0.935	**0.968**
	Resources	0.778	0.778	0.722	0.778	0.5	0.639	0.528	0.583	0.694	**0.806**
	Geography	0.828	**0.862**	0.759	0.793	0.598	0.724	0.655	0.621	0.701	0.77
	Law	0.68	0.715	0.648	**0.718**	0.613	0.715	0.496	0.588	0.588	0.641
	Average	0.725	**0.758**	0.707	**0.758**	0.604	0.707	0.537	0.604	0.656	0.718
Phonetics	Alphabet	0.6	0.7	0.6	**0.9**	0.2	**0.9**	0.6	**0.9**	0.6	**0.9**
	Pronunciation	0.377	0.406	0.348	**0.507**	0.246	0.391	0.217	0.333	0.29	0.348
	Conjunct Letters	0.652	0.739	0.826	**0.957**	0.652	0.826	0.739	0.826	0.696	0.826
	Sound & Letters	0.771	0.729	0.708	**0.792**	0.625	0.771	0.542	0.688	0.688	0.75
	Sound Changes	0.407	0.611	0.5	**0.667**	0.463	0.63	0.352	0.537	0.407	0.574
	Phonetic Combining Rules	0.516	0.603	0.663	**0.761**	0.533	0.609	0.446	0.473	0.609	0.63
	Miscellaneous Phonetics	0.638	0.675	0.588	**0.7**	0.5	0.588	0.463	0.575	0.575	0.675
	Average	0.538	0.609	0.596	**0.718**	0.485	0.609	0.432	0.526	0.545	0.618
Semantics	Synonyms	0.874	0.912	0.893	**0.923**	0.769	0.835	0.676	0.772	0.852	0.907
	Antonyms	0.782	**0.891**	0.855	0.879	0.733	0.812	0.685	0.739	0.77	0.848
	One Word Expressions	0.717	0.811	0.778	0.806	0.589	0.661	0.556	0.6	0.717	**0.828**
	Idioms	0.722	**0.808**	0.652	0.747	0.606	0.662	0.495	0.505	0.626	0.697
	Proverbs	0.787	0.83	0.83	**0.894**	0.723	0.809	0.638	0.745	0.766	0.787
	Miscellaneous	**0.733**	0.712	0.692	0.719	0.575	0.589	0.486	0.514	0.678	0.719
	Average	0.785	**0.844**	0.795	0.837	0.677	0.738	0.598	0.655	0.750	0.817
Overall Average		0.727	0.780	0.735	**0.795**	0.617	0.704	0.554	0.615	0.693	0.756

Table 2: BLUCK benchmark comparison by subcategories and major categories across major models in 0-shot and 5-shot settings. The highest accuracy(s) for each category are boldy marked.

smaller models exhibit surprisingly reasonable performance, with Gemini-1.5-Flash and Claude-3.5-Haiku surpassing even Llama-3.3-70B-Instruct in 5-shot setting. Llama-3.1-8B-Instruct, on the other hand, lags behind all other smaller models, showing very limited performance overall.

5 Discussions

The benchmark results reveal significant variations in model performance across different categories and shot settings. Firstly, it is visible that 5-shot prompting leads to notable performance improvements (between 5% to 10%) across all models, which aligns with the findings that large language models pick up categorical cues from the examples and reduce the 'search space' for MCQ solution under few-shot settings (Brown et al., 2020).

Secondly, proprietary models like GPT-4o and Claude-3.5-Sonnet consistently outperform open-source models for most of the categories, suggesting that the former have a stronger contextual understanding of Bengali.

In addition, 'Pronunciation', and 'Sound Changes' are notable categories in which models exhibit poor performance. This strongly suggests that phonetic nuances in Bengali still remain underrepresented in existing LLMs, even with few-shot prompting.

The findings, overall, reinforce the need for more robust culture sensitive Bengali resources in LLM pretraining and evaluation benchmarks to improve performance in underrepresented Bengali linguistic and cultural areas.

6 Conclusion

In this work we introduced BLUCK, a linguistic and culture-sensitive Bengali dataset, locally sourcing from official college and job-level examinations in Bangladesh. BLUCK provides a diverse set of 2366 multiple-choice questions that fall under 23 subcategories organized across four domains. Our evaluation using state-of-the-art LLMs showcases their knowledge in historical and semantics aspects of Bengali, while exposes their weakness in linguistically nuanced areas. Future research should expand BLUCK and improve LLMs' understand-

ing of Bengali linguistic and cultural nuances.

Limitations

We acknowledge certain limitations in our work. Since our dataset consists solely of text-based questions, we cannot determine whether the models arrived at their answers through reasoning processes different from those of humans. Moreover, given the richness of Bengali culture, history, and linguistic diversity, as well as the growing importance of M-MMLU, Global-MMLU and other large-scale multilingual benchmarks, our contribution remains relatively small in comparison. However, we hope that BLUCK serves as a stepping stone to improve Bengali culture-sensitive LLM research.

Ethical Considerations

The BLUCK dataset is fully available and has been manually curated and reviewed to mitigate any chance of having harmful contents. This dataset will be publicly accessible and distributed under the CC BY-SA 4.0 license. Our work has been reviewed and received approval from the Institutional Review Board (IRB) at our institution. All annotators involved in this project were compensated above the minimum wage and standards. Finally, AI-assisted tools were used solely for grammar and language refinement. They were not used for writing, analysis, or coding in any capacity.

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Horgan, Joe Stanton, Moran Ambar, Fei Xia, Alejandro Lince, Mingqiu Wang, Basil Mustafa, Albert Webson, Hyo Lee, Rohan Anil, Martin Wicke, Timothy Dozat, Abhishek Sinha, Enrique Piqueras, Elahe Dabir, Shyam Upadhyay, Anudhyan Boral, Lisa Anne Hendricks, Corey Fry, Josip Djolonga, Yi Su, Jake Walker, Jane Labanowski, Ronny Huang, Vedant Misra, Jeremy Chen, RJ Skerry-Ryan, Avi Singh, Shruti Rijhwani, Dian Yu, Alex Castro-Ros, Beer Changpinyo, Romina Datta, Sumit Bagri, Arnar Mar Hrafnkelsson, Marcello Maggioni, Daniel Zheng, Yury Sulsky, Shaobo Hou, Tom Le Paine, Antoine Yang, Jason Riesa, Dominika Rogozinska, Dror Marcus, Dalia El Badawy, Qiao Zhang, Luyu Wang, Helen Miller, Jeremy Greer, Lars Lowe Sjos, Azade Nova, Heiga Zen, Rahma Chaabouni, Mihaela Rosca, Jiepu Jiang, Charlie Chen, Ruibo Liu, Tara Sainath, Maxim Krikun, Alex Polozov, Jean-Baptiste Lespiau, Josh Newlan, Zeyncep Cankara, Soo Kwak, Yunhan Xu, Phil Chen, Andy Coenen, Clemens Meyer, Katerina Tsihlas, Ada Ma, Juraj Gottweis, Jinwei Xing, Chenjie Gu, Jin Miao, Christian Frank, Zeynep Cankara, Sanjay Ganapathy, Ishita Dasgupta, Steph Hughes-Fitt, Heng Chen, David Reid, Keran Rong, Hongmin Fan, Joost van Amersfoort, Vincent Zhuang, Aaron Cohen, Shixiang Shane Gu, Anhad Mohananey, Anastasija Ilic, Taylor Tobin, John Wieting, Anna Bortsova, Phoebe Thacker, Emma Wang, Emily Caveness, Justin Chiu, Eren Sezener, Alex Kaskasoli, Steven Baker, Katie Millican, Mohamed Elhawaty, Kostas Aisopos, Carl Lebsack, Nathan Byrd, Hanjun Dai, Wenhao Jia, Matthew Wiethoff, Elnaz Davoodi, Albert Weston, Lakshman Yagati, Arun Ahuja, Isabel Gao, Golan Pundak, Susan Zhang, Michael Azzam, Khe Chai Sim, Sergi Caelles, James Keeling, Abhanshu Sharma, Andy Swing, YaGuang Li, Chenxi Liu, Carrie Grimes Bostock, Yamini Bansal, Zachary Nado, Ankesh Anand, Josh Lipschultz, Abhijit Karmarkar, Lev Proleev, Abe Ittycheriah, Soheil Hassas Yeganeh, George Polovets, Aleksandra Faust, Jiao Sun, Alban Rrustemi, Pen Li, Rakesh Shivanna, Jeremiah Liu, Chris Welty, Federico Lebron, Anirudh Baddepudi, Sebastian Krause, Emilio Parisotto, Radu Soricut, Zheng Xu, Dawn Bloxwich, Melvin Johnson, Behnam Neyshabur, Justin Mao-Jones, Renshen Wang, Vinay Ramasesh, Zaheer Abbas, Arthur Guez, Constant Segal, Duc Dung Nguyen, James Svensson, Le Hou, Sarah York, Kieran Milan, Sophie Bridgers, Wiktor Gworek, Marco Tagliasacchi, James Lee-Thorp, Michael Chang, Alexey Guseynov, Ale Jakse Hartman, Michael Kwong, Ruizhe Zhao, Sheleem Kashem, Elizabeth Cole, Antoine Miech, Richard Tanburn, Mary Phuong, Filip Pavetic, Sebastien Cevey, Ramona Comanescu, Richard Ives, Sherry Yang, Cosmo Du, Bo Li, Zizhao Zhang, Mariko Iinuma, Clara Huiyi Hu, Aurko Roy, Shaan Bijwadia, Zhenkai Zhu, Danilo Martins, Rachel Saputro, Anita Gergely, Steven Zheng, Dawei Jia, Ioannis Antonoglou, Adam Sadovsky, Shane Gu, Yingying Bi, Alek Andreev, Sina Samangooei, Mina Khan, Tomas Kocisky, Angelos Filos, Chintu Kumar, Colton Bishop, Adams Yu, Sarah Hodkinson, Sid Mittal, Premal Shah, Alexandre Moufarek, Yong Cheng, Adam Bloniarz, Jaehoon Lee, Pedram Pejman, Paul Michel, Stephen Spencer, Vladimir Feinberg, Xuehan Xiong, Nikolay Savinov, Charlotte Smith, Siamak Shakeri, Dustin Tran, Mary Chesus, Bernd Bohnet, George Tucker, Tamara von Glehn, Carrie Muir, Yiran Mao, Hideto Kazawa, Ambrose Slone, Kedar Soparkar, Disha Shrivastava, James Cobon-Kerr, Michael Sharman, Jay Pavagadhi, Carlos Araya, Karolis Misiunas, Nimesh Ghelani, Michael Laskin, David Barker, Qiujia Li, Anton Briukhov, Neil Houlsby, Mia Glaese, Balaji Lakshminarayanan, Nathan Schucher, Yunhao Tang, Eli Collins, Hyeontaek Lim, Fangxiaoyu Feng, Adria Recasens, Guangda Lai, Alberto Magni, Nicola De Cao, Aditya Siddhant, Zoe Ashwood, Jordi Orbay, Mostafa Dehghani, Jenny Brennan, Yifan He, Kelvin Xu, Yang Gao, Carl Saroufim, James Molloy, Xinyi Wu, Seb Arnold, Solomon Chang, Julian Schrittwieser, Elena Buchatskaya, Soroush Radpour, Martin Polacek, Skye Giordano, Ankur Bapna, Simon Tokumine, Vincent Hellendoorn, Thibault Sottiaux, Sarah Cogan, Aliaksei Severyn, Mohammad Saleh, Shantanu Thakoor, Laurent Shefey, Siyuan Qiao,

Meenu Gaba, Shuo yiin Chang, Craig Swanson, Biao Zhang, Benjamin Lee, Paul Kishan Rubenstein, Gan Song, Tom Kwiatkowski, Anna Koop, Ajay Kannan, David Kao, Parker Schuh, Axel Stjerngren, Golnaz Ghiasi, Gena Gibson, Luke Vilnis, Ye Yuan, Felipe Tiengo Ferreira, Aishwarya Kamath, Ted Klimenko, Ken Franko, Kefan Xiao, Indro Bhattacharya, Miteyan Patel, Rui Wang, Alex Morris, Robin Strudel, Vivek Sharma, Peter Choy, Sayed Hadi Hashemi, Jessica Landon, Mara Finkelstein, Priya Jhakra, Justin Frye, Megan Barnes, Matthew Mauger, Dennis Daun, Khuslen Baatarsukh, Matthew Tung, Wael Farhan, Henryk Michalewski, Fabio Viola, Felix de Chaumont Quitry, Charline Le Lan, Tom Hudson, Qingze Wang, Felix Fischer, Ivy Zheng, Elspeth White, Anca Dragan, Jean baptiste Alayrac, Eric Ni, Alexander Pritzel, Adam Iwanicki, Michael Isard, Anna Bulanova, Lukas Zilka, Ethan Dyer, Devendra Sachan, Srivatsan Srinivasan, Hannah Muckenhirn, Honglong Cai, Amol Mandhane, Mukarram Tariq, Jack W. Rae, Gary Wang, Kareem Ayoub, Nicholas FitzGerald, Yao Zhao, Woohyun Han, Chris Alberti, Dan Garrette, Kashyap Krishnakumar, Mai Gimenez, Anselm Levskaya, Daniel Sohn, Josip Matak, Inaki Iturrate, Michael B. Chang, Jackie Xiang, Yuan Cao, Nishant Ranka, Geoff Brown, Adrian Hutter, Vahab Mirrokni, Nanxin Chen, Kaisheng Yao, Zoltan Egyed, Francois Galilee, Tyler Liechty, Praveen Kallakuri, Evan Palmer, Sanjay Ghemawat, Jasmine Liu, David Tao, Chloe Thornton, Tim Green, Mimi Jasarevic, Sharon Lin, Victor Cotruta, Yi-Xuan Tan, Noah Fiedel, Hongkun Yu, Ed Chi, Alexander Neitz, Jens Heitkaemper, Anu Sinha, Denny Zhou, Yi Sun, Charbel Kaed, Brice Hulse, Swaroop Mishra, Maria Georgaki, Sneha Kudugunta, Clement Farabet, Izhak Shafran, Daniel Vlasic, Anton Tsitsulin, Rajagopal Ananthanarayanan, Alen Carin, Guolong Su, Pei Sun, Shashank V, Gabriel Carvajal, Josef Broder, Iulia Comsa, Alena Repina, William Wong, Warren Weilun Chen, Peter Hawkins, Egor Filonov, Lucia Loher, Christoph Hirnschall, Weiyi Wang, Jingchen Ye, Andrea Burns, Hardie Cate, Diana Gage Wright, Federico Piccinini, Lei Zhang, Chu-Cheng Lin, Ionel Gog, Yana Kulizhskaya, Ashwin Sreevatsa, Shuang Song, Luis C. Cobo, Anand Iyer, Chetan Tekur, Guillermo Garrido, Zhuyun Xiao, Rupert Kemp, Huaixiu Steven Zheng, Hui Li, Ananth Agarwal, Christel Ngani, Kati Goshvadi, Rebeca Santamaria-Fernandez, Wojciech Fica, Xinyun Chen, Chris Gorgolewski, Sean Sun, Roopal Garg, Xinyu Ye, S. M. Ali Eslami, Nan Hua, Jon Simon, Pratik Joshi, Yelin Kim, Ian Tenney, Sahitya Potluri, Lam Nguyen Thiet, Quan Yuan, Florian Luisier, Alexandra Chronopoulou, Salvatore Scellato, Praveen Srinivasan, Minmin Chen, Vinod Koverkathu, Valentin Dalibard, Yaming Xu, Brennan Saeta, Keith Anderson, Thibault Sellam, Nick Fernando, Fantine Huot, Junehyuk Jung, Mani Varadarajan, Michael Quinn, Amit Raul, Maigo Le, Ruslan Habalov, Jon Clark, Komal Jalan, Kalesha Bullard, Achintya Singhal, Thang Luong, Boyu Wang, Sujeevan Rajayogam, Julian Eisenschlos, Johnson Jia, Daniel Finchelstein, Alex Yakubovich, Daniel Balle, Michael Fink, Sameer Agarwal, Jing Li, Dj Dvijotham, Shalini Pal, Kai Kang, Jaclyn Konzelmann, Jennifer Beattie, Olivier Dousse, Diane Wu, Remi Crocker, Chen Elkind, Siddhartha Reddy Jonnalagadda, Jong Lee, Dan Holtmann-Rice, Krystal Kallarackal, Rosanne Liu, Denis Vnukov, Neera Vats, Luca Invernizzi, Mohsen Jafari, Huanjie Zhou, Lilly Taylor, Jennifer Prendki, Marcus Wu, Tom Eccles, Tianqi Liu, Kavya Kopparapu, Francoise Beaufays, Christof Angermueller, Andreea Marzoca, Shourya Sarcar, Hilal Dib, Jeff Stanway, Frank Perbet, Nejc Trdin, Rachel Sterneck, Andrey Khorlin, Dinghua Li, Xihui Wu, Sonam Goenka, David Madras, Sasha Goldshtein, Willi Gierke, Tong Zhou, Yaxin Liu, Yannie Liang, Anais White, Yunjie Li, Shreya Singh, Sanaz Bahargam, Mark Epstein, Sujoy Basu, Li Lao, Adnan Ozturel, Carl Crous, Alex Zhai, Han Lu, Zora Tung, Neeraj Gaur, Alanna Walton, Lucas Dixon, Ming Zhang, Amir Globerson, Grant Uy, Andrew Bolt, Olivia Wiles, Milad Nasr, Ilia Shumailov, Marco Selvi, Francesco Piccinno, Ricardo Aguilar, Sara McCarthy, Misha Khalman, Mrinal Shukla, Vlado Galic, John Carpenter, Kevin Villela, Haibin Zhang, Harry Richardson, James Martens, Matko Bosnjak, Shreyas Rammohan Belle, Jeff Seibert, Mahmoud Alnahlawi, Brian McWilliams, Sankalp Singh, Annie Louis, Wen Ding, Dan Popovici, Lenin Simicich, Laura Knight, Pulkit Mehta, Nishesh Gupta, Chongyang Shi, Saaber Fatehi, Jovana Mitrovic, Alex Grills, Joseph Pagadora, Tsendsuren Munkhdalai, Dessie Petrova, Danielle Eisenbud, Zhishuai Zhang, Damion Yates, Bhavishya Mittal, Nilesh Tripuraneni, Yannis Assael, Thomas Brovelli, Prateek Jain, Mihajlo Velimirovic, Canfer Akbulut, Jiaqi Mu, Wolfgang Macherey, Ravin Kumar, Jun Xu, Haroon Qureshi, Gheorghe Comanici, Jeremy Wiesner, Zhitao Gong, Anton Ruddock, Matthias Bauer, Nick Felt, Anirudh GP, Anurag Arnab, Dustin Zelle, Jonas Rothfuss, Bill Rosgen, Ashish Shenoy, Bryan Seybold, Xinjian Li, Jayaram Mudigonda, Goker Erdogan, Jiawei Xia, Jiri Simsa, Andrea Michi, Yi Yao, Christopher Yew, Steven Kan, Isaac Caswell, Carey Radebaugh, Andre Elisseeff, Pedro Valenzuela, Kay McKinney, Kim Paterson, Albert Cui, Eri Latorre-Chimoto, Solomon Kim, William Zeng, Ken Durden, Priya Ponnapalli, Tiberiu Sosea, Christopher A. 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Kumar, Wei Chen, Courtney Biles, Garrett Bingham, Evan Rosen, Lisa Wang, Qijun Tan, David Engel, Francesco Pongetti, Dario de Cesare, Dongseong Hwang, Lily Yu, Jennifer Pullman, Srini Narayanan, Kyle Levin, Siddharth Gopal, Megan Li, Asaf Aharoni, Trieu Trinh, Jessica Lo, Norman Casagrande, Roopali Vij, Loic Matthey, Bramandia Ramadhana, Austin Matthews, CJ Carey, Matthew Johnson, Kremena Goranova, Rohin Shah, Shereen Ashraf, Kingshuk Dasgupta, Rasmus Larsen, Yicheng Wang, Manish Reddy Vuyyuru, Chong Jiang, Joana Ijazi, Kazuki Osawa, Celine Smith, Ramya Sree Boppana, Taylan Bilal, Yuma Koizumi, Ying Xu, Yasemin Altun, Nir Shabat, Ben Bariach, Alex Korchemniy, Kiam Choo, Olaf Ronneberger, Chimezie Iwuanyanwu, Shubin Zhao, David Soergel, Cho-Jui Hsieh, Irene Cai, Shariq Iqbal, Martin Sundermeyer, Zhe Chen, Elie Bursztein, Chaitanya Malaviya, Fadi Biadsy, Prakash Shroff, Inderjit Dhillon, Tejasi Latkar, Chris Dyer, Hannah Forbes, Massimo Nicosia, Vitaly Nikolaev, Somer Greene, Marin Georgiev, Pidong Wang, Nina Martin, Hanie Sedghi, John Zhang, Praseem Banzal, Doug Fritz, Vikram Rao, Xuezhi Wang, Jiageng Zhang, Viorica Patraucean, Dayou Du, Igor Mordatch, Ivan Jurin, Lewis Liu, Ayush Dubey, Abhi Mohan, Janek Nowakowski, Vlad-Doru Ion, Nan Wei, Reiko Tojo, Maria Abi Raad, Drew A. Hudson, Vaishakh Keshava, Shubham Agrawal, Kevin Ramirez, Zhichun Wu, Hoang Nguyen, Ji Liu, Madhavi Sewak, Bryce Petrini, DongHyun Choi, Ivan Philips, Ziyue Wang, Ioana Bica, Ankush Garg, Jarek Wilkiewicz, Priyanka Agrawal, Xiaowei Li, Danhao Guo, Emily Xue, Naseer Shaik, Andrew Leach, Sadh MNM Khan, Julia Wiesinger, Sammy Jerome, Abhishek Chakladar, Alek Wenjiao Wang, Tina Ornduff, Folake Abu, Alireza Ghaffarkhah, Marcus Wainwright, Mario Cortes, Frederick Liu, Joshua Maynez, Andreas Terzis, Pouya Samangouei, Riham Mansour, Tomasz Kępa, François-Xavier Aubet, Anton Algymr, Dan Banica, Agoston Weisz, Andras Orban, Alexandre Senges, Ewa Andrejczuk, Mark Geller, Niccolo Dal Santo, Valentin Anklin, Majd Al Merey, Martin Baeuml, Trevor Strohman, Junwen Bai, Slav Petrov, Yonghui Wu, Demis Hassabis, Koray Kavukcuoglu, Jeff Dean, and Oriol Vinyals. 2024. Gemini 1.5: Unlocking multimodal understanding across millions of tokens of context. *Preprint*, arXiv:2403.05530.

7 Appendix

7.1 Evaluation Details

Since our MCQ questions are largely factual-based and do not require reasoning for most cases, we set the maximum output token length is set to 1024 for all experiments. This allows use to analyze responses from models during cases where models produce verbose responses, primarily in 0-shot setting, due to lack of guiding examples in 5-shot setting, despite being instructed in the prompt to produce only option ID as output. We set the decoding temperature to 0.2 to reduce randomness, however, as shown in (Renze and Guven, 2024), changing temperature from 0 to 1 do not have a significant performance change in LLMs.

For 5-shot setting, we randomly pick 5 questions from each category. Since we perform a meticulous categorization and double-inspection process, our randomly selected samples are generally good representations of the category.

System Prompt: "You are an AI assistant tasked with answering MCQ questions. Your goal is to select the correct answer as a single letter inside angle bracket, without outputting any explanation for your answer."

User Prompt:
'''
<Question>
গারোদের সবচেয়ে বড় ধর্মীয় ও সামাজিক উৎসবের নাম কী?
(English Translation: What is the biggest religious and social festival of the "Garo" ethnic group?)

(a) বিঝু (Bijhu)
(b) ওয়ানগালা (Wangala)
(c) সান্দ্রে (Sandre)
(d) সাংগ্রাই (Sangrai)
</Question>

<Instruction>Give the final answer as a single letter inside angle bracket (<a>, <b>, <c>, or <d>). Do not output any additional text or explanation for the answer. </Instruction>

Answer:
'''

Figure 1: Illustration of our prompt.

Prompting Strategies

```
<k-shot examples>
You are an AI assistant tasked with answering MCQ questions. Your goal is to select the
correct answer as a single letter inside angle bracket, without outputting any explanation for
your answer.
        Here are some example problems to help you understand the task:
        <Question>
            'যে সহে সে রহে' - এর সমর্থক প্রবাদ কোনটি?
            Options:
                (a) সবুরে মেওয়া ফলে
                (b) যার লাঠি তার মাটি
                (c) জোর যার মুল্লুক তার
                (d) বুদ্ধি যার বল তার
        </Question>
        <Instruction>Give the final answer as a single letter inside angle bracket (<a>, <b>,
        <c>, or <d>). Do not output any additional text or explanation for the  answer.
        <Instruction>

        Answer:
         <a>
         ...
         ...
         ...
         ...
<k-shot examples>
```

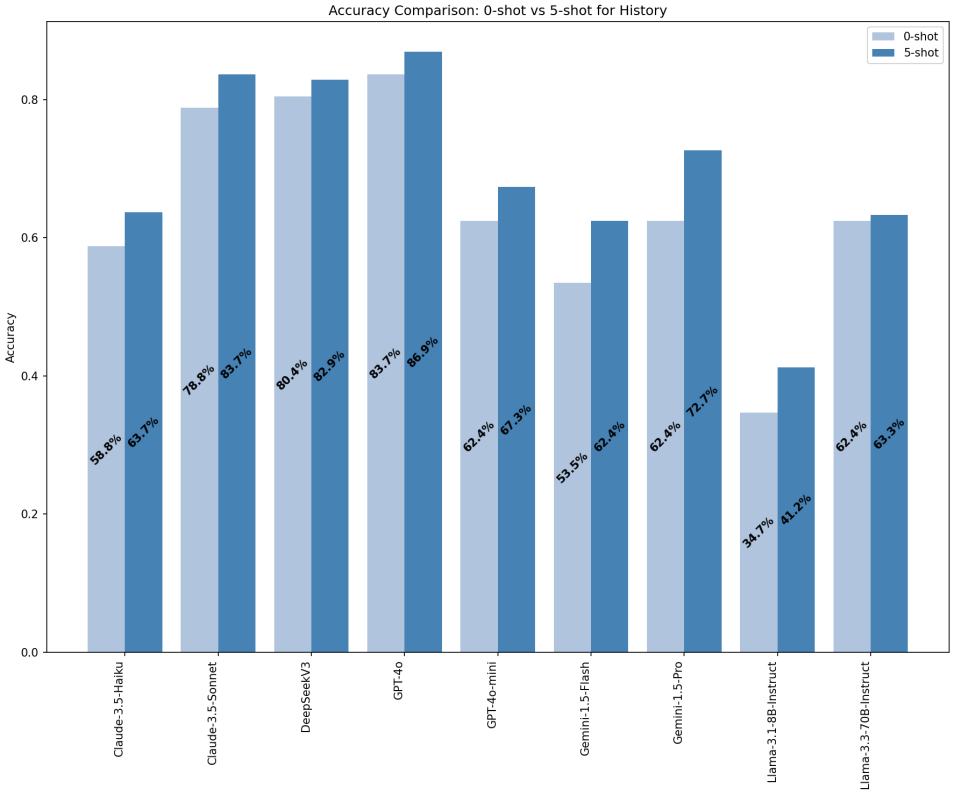
```
[{"role": "system", "content": "You are an AI assistant tasked with answering MCQ questions. Your
goal is to select the correct answer as a single letter inside angle bracket, without outputting any
explanation for your answer. Here are some example problems to help you understand the task." },
    {"role": "user", "content":
      "<Question>
            'যে সহে সে রহে' - এর সমর্থক প্রবাদ কোনটি?
            Options:
                (a) সবুরে মেওয়া ফলে
                (b) যার লাঠি তার মাটি
                (c) জোর যার মুল্লুক তার
                (d) বুদ্ধি যার বল তার
        </Question>
        <Instruction>Give the final answer as a single letter inside angle bracket (<a>,
        <b>, <c>, or <d>). Do not output any additional text or explanation for the
answer.<Instruction>

        Answer:"
    },

   {"role": "system", "content": "<a>"},
     ...
     ...
     ...
]
```

Figure 2: Prompt Structure for 5-shot setting using GPT model.

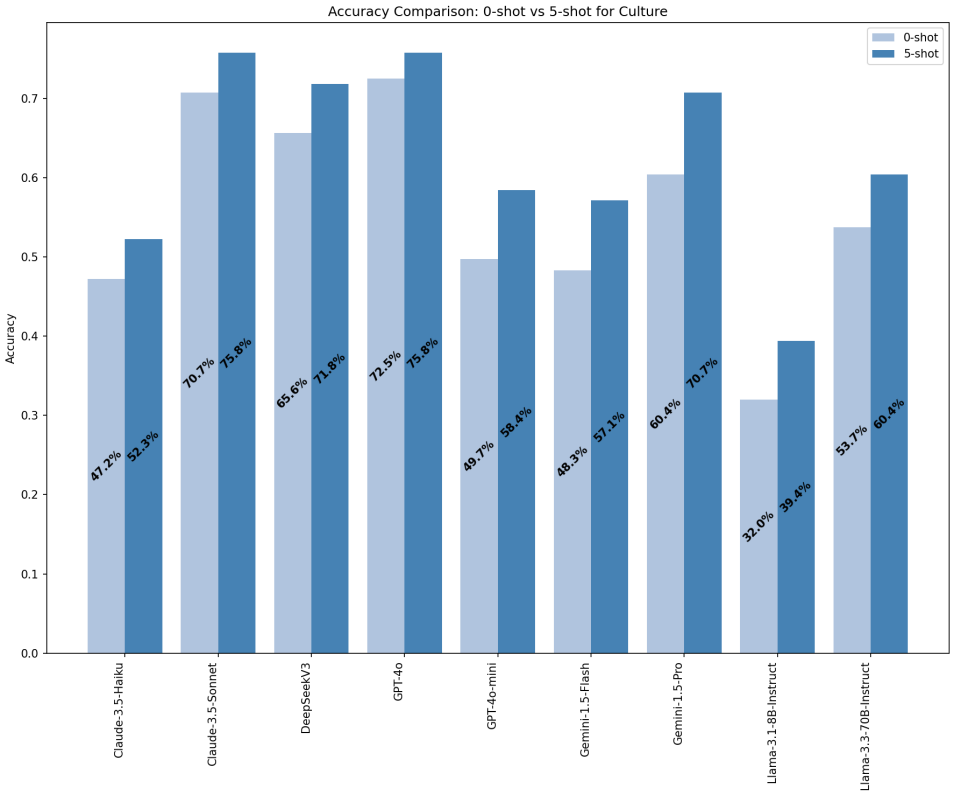
7.2 Additional BLUCK Results

Categories		GPT-4o-mini		Claude-3.5-Haiku		Gemini-1.5-Flash		Llama-3.1-8B	
		0-shot	5-shot	0-shot	5-shot	0-shot	5-shot	0-shot	5-shot
History	Ancient Bengal	0.667	**0.737**	0.687	0.717	0.646	0.697	0.394	0.404
	British Bengal	0.775	0.8	0.7	**0.825**	0.675	0.8	0.35	0.475
	Pakistan Era	0.528	**0.566**	0.453	0.491	0.377	0.491	0.302	0.396
	Average	0.624	**0.673**	0.588	0.637	0.535	0.624	0.347	0.412
Culture	Indigenous People	0.484	**0.677**	0.452	0.645	0.355	0.581	0.355	0.452
	Arts, Heritage & Media	0.478	**0.536**	0.42	0.478	0.449	0.449	0.29	0.377
	National Issues	0.4	0.533	0.267	0.4	0.467	**0.667**	0.133	0.533
	Constitution	0.677	0.774	0.581	0.71	0.645	**0.839**	0.355	0.387
	Resources	0.472	**0.722**	0.417	0.5	0.472	0.583	0.25	0.389
	Geography	0.563	**0.598**	0.46	0.506	0.471	0.529	0.299	0.333
	Law	0.472	0.546	0.496	0.514	0.493	**0.577**	0.345	0.405
	Average	0.497	**0.584**	0.472	0.523	0.483	0.571	0.320	0.394
Phonetics	Alphabet	0.2	0.8	0.7	0.8	0.7	**0.9**	0.2	0.7
	Pronunciation	0.159	0.275	0.261	0.275	0.203	**0.319**	0.217	0.29
	Conjunct Letters	0.478	0.652	0.783	**0.957**	0.609	0.783	0.478	0.522
	Sound & Letters	0.5	0.625	0.438	0.646	0.625	**0.667**	0.25	0.292
	Sound Changes	0.278	0.333	0.315	0.444	0.278	**0.481**	0.296	0.352
	Phonetic Combining Rules	0.402	0.418	0.435	**0.505**	0.457	0.478	0.31	0.359
	Miscellaneous Phonetics	0.55	0.6	0.525	**0.613**	0.575	0.575	0.4	0.363
	Average	0.387	0.459	0.434	**0.526**	0.449	0.515	0.310	0.357
Semantics	Synonyms	0.681	0.747	0.761	**0.843**	0.687	0.775	0.385	0.426
	Antonyms	0.642	0.691	0.679	**0.77**	0.691	0.758	0.412	0.527
	One Word Expressions	0.506	0.567	0.589	**0.661**	0.522	0.606	0.433	0.406
	Idioms	0.515	0.5	0.444	0.495	0.48	**0.581**	0.354	0.333
	Proverbs	0.66	0.66	0.638	0.723	0.66	**0.787**	0.404	0.426
	Miscellaneous	**0.616**	0.589	0.521	0.568	0.514	0.555	0.363	0.39
	Average	0.607	0.640	0.626	**0.698**	0.599	0.681	0.389	0.416
Overall Average		0.540	0.595	0.548	**0.617**	0.536	**0.617**	0.353	0.399

Table 3: BLUCK benchmark comparison by subcategories and major categories across smaller models in 0-shot and 5-shot settings. The highest accuracy(s) for each category are boldy marked.

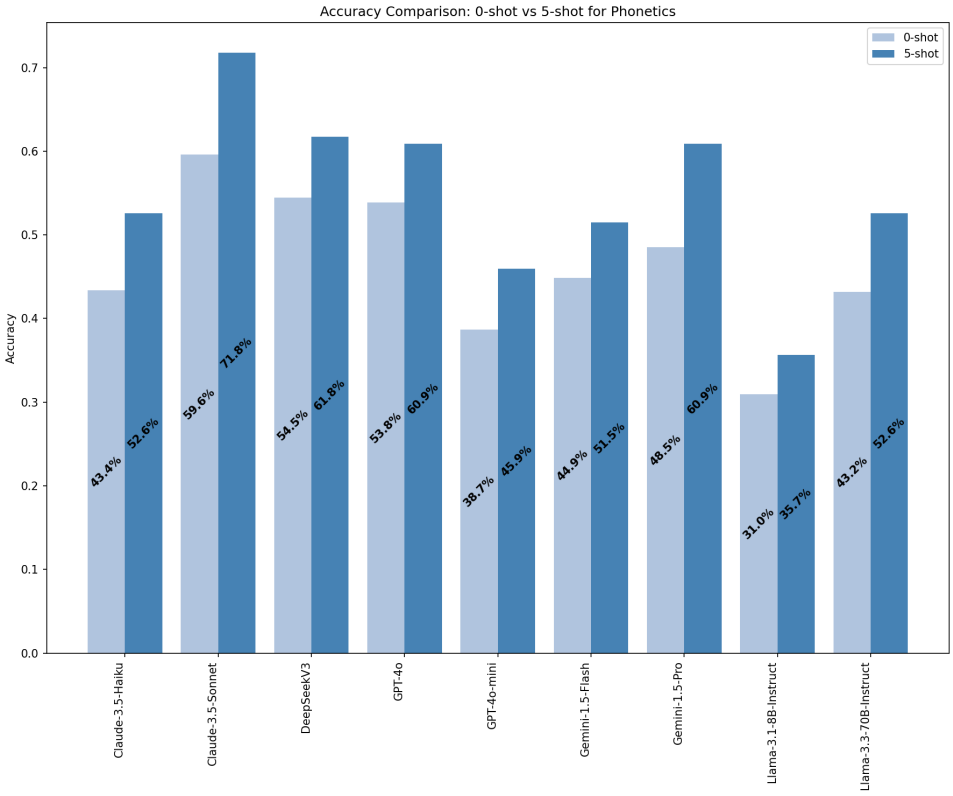


(a) Accuracy for the history domain (0-shot and 5-shot).

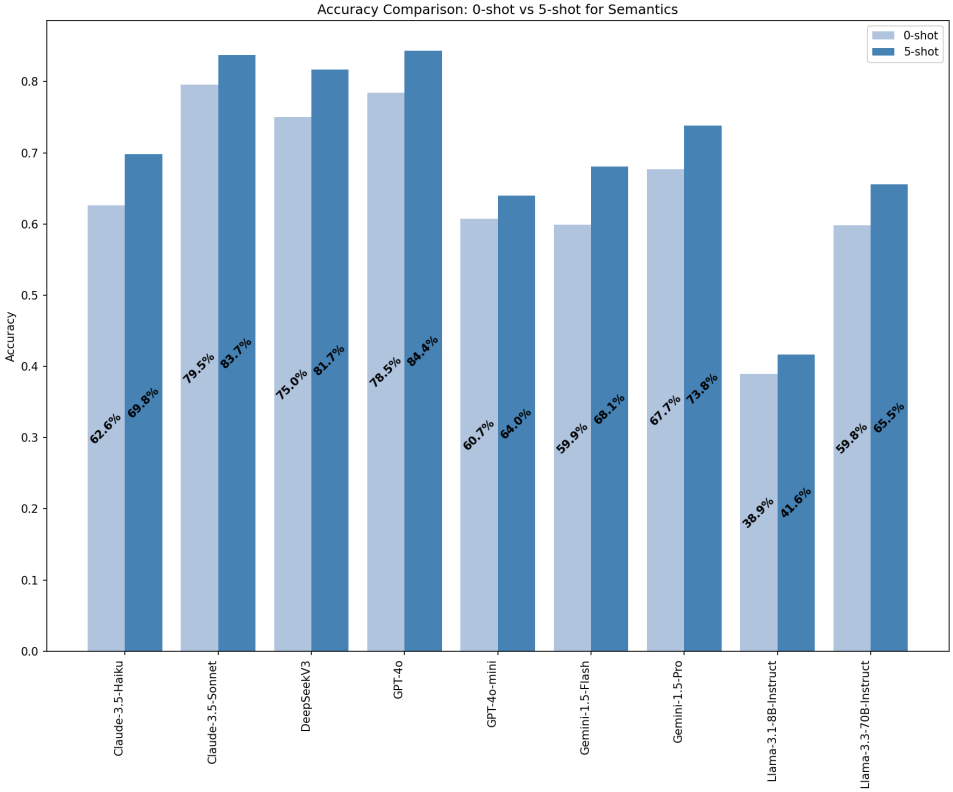


(b) Accuracy for the culture domain (0-shot and 5-shot).

Figure 3: Comparison of accuracy across history and culture domains under 0-shot and 5-shot settings.



(a) Accuracy for the phonetics domain (0-shot and 5-shot).



(b) Accuracy for the semantics domain (0-shot and 5-shot).

Figure 4: Comparison of accuracy across phonetics and semantics domains under 0-shot and 5-shot settings.