

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

Daeen Kabir^{*†}, Minhajur Rahman Chowdhury Mahim^{*◊}, Sheikh Shafayat[◊],
Adnan Sadik[◊], Arian Ahmed[◊], Eunsu Kim[◊], Alice Oh^{◊‡}

[†]Independent Researcher, [◊]KAIST

daeenkabirdk03@gmail.com

{minhaj, sheikh.shafayat, adnansadik235, arian.ahmed, kes0317}@kaist.ac.kr

alice.oh@kaist.edu

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
Semantics	Miscellaneous Phonetics	80
	Synonyms	364
	Antonyms	165
	One Word Expressions	180
	Idioms	198
	Proverbs	47
Total	Miscellaneous	146
		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

^{*}Equal contribution.

[†]Daeen Kabir conducted this research during his undergraduate studies at KAIST.

[‡]Corresponding author

¹Dataset link: [BLUCK](#)

extensive knowledge of the culture, history, and language of Bangladesh, 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 Ro-CulturaBench (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 than 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.

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 multilin-

gual evaluation settings. Nevertheless, their Bengali questions are mostly translated from English, limiting their effectiveness in assessing native-level linguistic understanding.

For Bengali 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 on STEM subjects. More recently, Tiger LLM (Raihan and Zampieri, 2025) aggregated diverse Bengali corpora, including educational, literary, and QA datasets, contributing significantly to Bengali NLP resources. Notably, there is still no phonetics-focused dataset for Bengali, which leaves granular but crucial aspects of the language absent from current evaluations.

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

Question

Bengali:

'সস্তার

তিন

অবস্থা'র

অর্থ

কী?

Romanization:

'sosta-r

tin

obostha'-r

ortho

ki?

Gloss:

cheap-GEN

three

state-GEN

meaning

what

English Translation:

"What is the meaning of 'the three states of cheapness' (hidden meaning: cheap and nasty)?"

Choice A ❌

Bengali:

সুলভ

জিনিস

ভালো

না

Romanization:

sulobh

jinis

kena

kharap

Gloss:

cheap

thing

good

NEG

English Translation:

"Cheap things are not good."

Choice B ❌

Bengali:

সুলভ

জিনিস

কেনা

থারাপ

Romanization:

sulobh

jinis

kena

kharap

Gloss:

cheap

thing

buying

bad

English Translation:

"Buying cheap things is bad."

Choice C ❌

Bengali:

কমদামী

জিনিস

থারাপ

Romanization:

kom-dami

jinis

kharap

Gloss:

low-price

thing

bad

English Translation:

"Low-priced items are bad."

Choice D ✅

Bengali:

সুলভ

জিনিসের

নানা

দোষ

Romanization:

sulobh

jinis-er

nana

dosh

Gloss:

cheap

thing-GEN

many

flaw

English Translation:

"Cheap things have many flaws."

Figure 1: Illustration of a MCQA sample from the Semantics domain. To aid linguistic understanding of non-native Bengali speakers, we include the original Bengali script, romanization, and word-by-word glossing, following the Leipzig Glossing Rules, alongside the English translation.

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 by category. To ensure quality, we implement two rounds of double-blind cross-checking. Independently, a second author collects questions for the same categories. The two authors then cross-check and agree on a preliminary set. In the second round, two more authors inspect these agreed-upon

preliminary set in a double-blind manner, and cross-check their selection lists. All authors ensure that their selection process conforms to the aforementioned selection criteria. 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-Haiku³, 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 3a 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 4 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. Its 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 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 under-represented 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.

5.1 CoT Evaluation on Pronunciation

We identify existing LLMs as performing markedly poor in the pronunciation category. To understand the source of this weakness, we conducted an additional experiment prompting Claude-3.5-Sonnet to use CoT reasoning on this particular subset under a zero-shot setting. Table 3 shows the results.

The CoT approach did not yield considerable improvement. After evaluating the CoT responses, we attribute this mainly to insufficient knowledge of Bengali grammar as well as limited understanding of Bengali phonetic rules. In several cases, the model made an error in the very first reasoning step due to incorrect background assumptions, causing the entire reasoning chain to collapse. We also observed a tendency for the model to fixate on an

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

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

⁴We 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.

answer prematurely and then generate a forced rationale to justify it. Cases are listed in the Appendix 7.

Pronunciation	Claude 3.5-Sonnet		
	0-shot	5-shot	0-shot CoT
Accuracy	0.348	0.507	0.478

Table 3: Claude 3.5 performance on the Pronunciation subcategory.

6 Conclusion

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’ understanding 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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 Fabio Pardo, Xiaowei Li, Dan Horgan, Joe Stanton,
 Moran Ambar, Fei Xia, Alejandro Lince, Mingqiu
 Wang, Basil Mustafa, Albert Webson, Hyo Lee, Ro-
 han Anil, Martin Wicke, Timothy Dozat, Abhishek
 Sinha, Enrique Piqueras, Elahe Dabir, Shyam Upad-
 hyay, Anudhyan Boral, Lisa Anne Hendricks, Corey
 Fry, Josip Djolonga, Yi Su, Jake Walker, Jane La-
 banowski, Ronny Huang, Vedant Misra, Jeremy
 Chen, RJ Skerry-Ryan, Avi Singh, Shruti Rijh-
 wani, Dian Yu, Alex Castro-Ros, Beer Changpinyo,
 Romina Datta, Sumit Bagri, Arnar Mar Hrafnkel-
 son, Marcello Maggioni, Daniel Zheng, Yury Sul-
 sky, 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 Lepiau, Josh
 Newlan, Zeyncep Cankara, Soo Kwak, Yunhan Xu,
 Phil Chen, Andy Coenen, Clemens Meyer, Katerina
 Tsihla, Ada Ma, Juraj Gottweis, Jinwei Xing, Chen-
 jie Gu, Jin Miao, Christian Frank, Zeynep Cankara,
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 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, Ab-
 hanshu Sharma, Andy Swing, YaGuang Li, Chenxi
 Liu, Carrie Grimes Bostock, Yamini Bansal, Zachary
 Nado, Ankesh Anand, Josh Lipschultz, Abhijit Kar-
 markar, Lev Proleev, Abe Ittycheriah, Soheil Has-
 sas 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 John-
 son, Behnam Neyshabur, Justin Mao-Jones, Ren-
 shen Wang, Vinay Ramasesh, Zaheer Abbas, Arthur
 Guez, Constant Segal, Duc Dung Nguyen, James
 Svensson, Le Hou, Sarah York, Kieran Milan, So-
 phie 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, Se-
 bastien 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

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 Ioannis Antonoglou, Adam Sadovsky, Shane Gu,
 Yingying Bi, Alek Andreev, Sina Samangooei, Mina
 Khan, Tomas Kocisky, Angelos Filos, Chintu Ku-
 mar, Colton Bishop, Adams Yu, Sarah Hodgkin-
 son, Sid Mittal, Premal Shah, Alexandre Moufarek,
 Yong Cheng, Adam Bloniarz, Jaehoon Lee, Pedram
 Pejman, Paul Michel, Stephen Spencer, Vladimir
 Feinberg, Xuehan Xiong, Nikolay Savinov, Char-
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 Chesus, Bernd Bohnet, George Tucker, Tamara von
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 Cao, Aditya Siddhant, Zoe Ashwood, Jordi Orbay,
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 Xu, Yang Gao, Carl Saroufim, James Molloy, Xinyi
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 Song, Tom Kwiatkowski, Anna Koop, Ajay Kan-
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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.

```
<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 মুলুক তার
(d) বুড়ি 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 মুলুক তার
  (d) বুড়ি 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>"},
...
...
...
1
```

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

7.2 Additional BLUCK Results

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

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

Answer:
""

(a) Illustration of our zero-shot standard prompt.

System Prompt: "You are an AI assistant tasked with answering MCQ questions. Your goal is to select the correct answer and output it as a single letter inside angle bracket."

User Prompt:

""
Your goal is to select the correct answer and
output it as a single letter inside angle bracket.

<Question>
'আল্লাদ' শব্দের প্রমিত উচ্চারণ-
Options:
(a) আল্লাদ
(b) আল্হাদ্
(c) আহ্লাদ
(d) আল্লাহদ
</Question>

<Reasoning>First think step-by-step in Bengali
language and reach the final answer.</
Reasoning><Instruction>Give the final answer
as a single letter inside angle bracket (<a>, , <c>, or <d>). </Instruction>

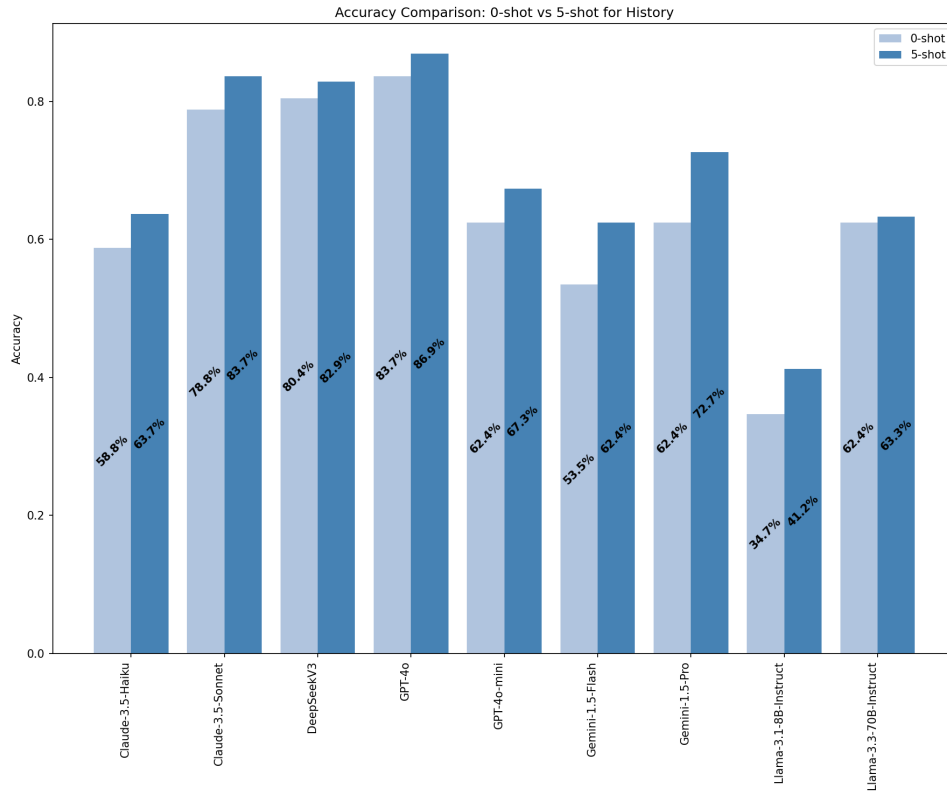
Answer:
""

(b) Prompt of zero-shot CoT reasoning by Claude-3.5-Sonnet on the Pronunciation category.

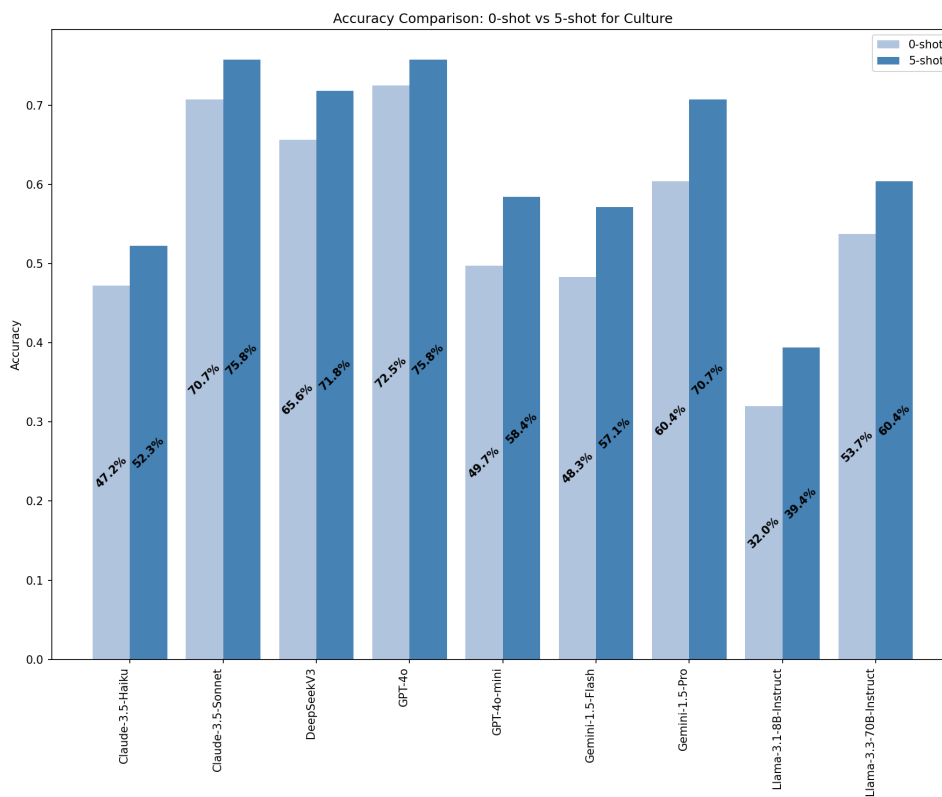
Figure 3: Prompting strategies used in our evaluation.

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 4: 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.

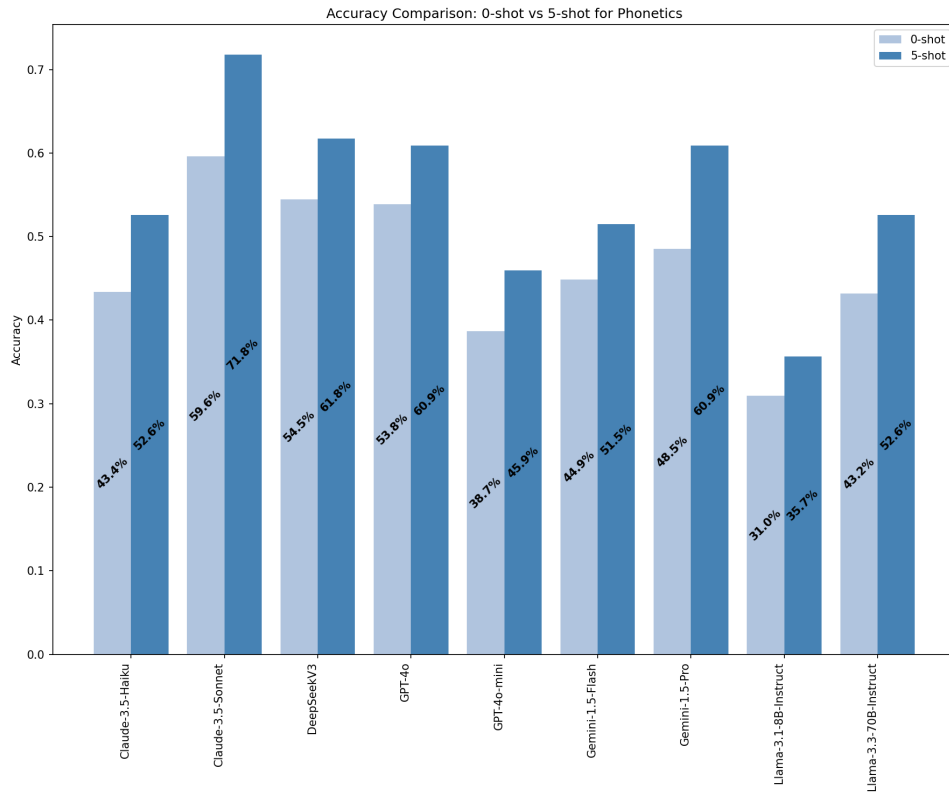


(a) Accuracy for the history domain (0-shot and 5-shot).

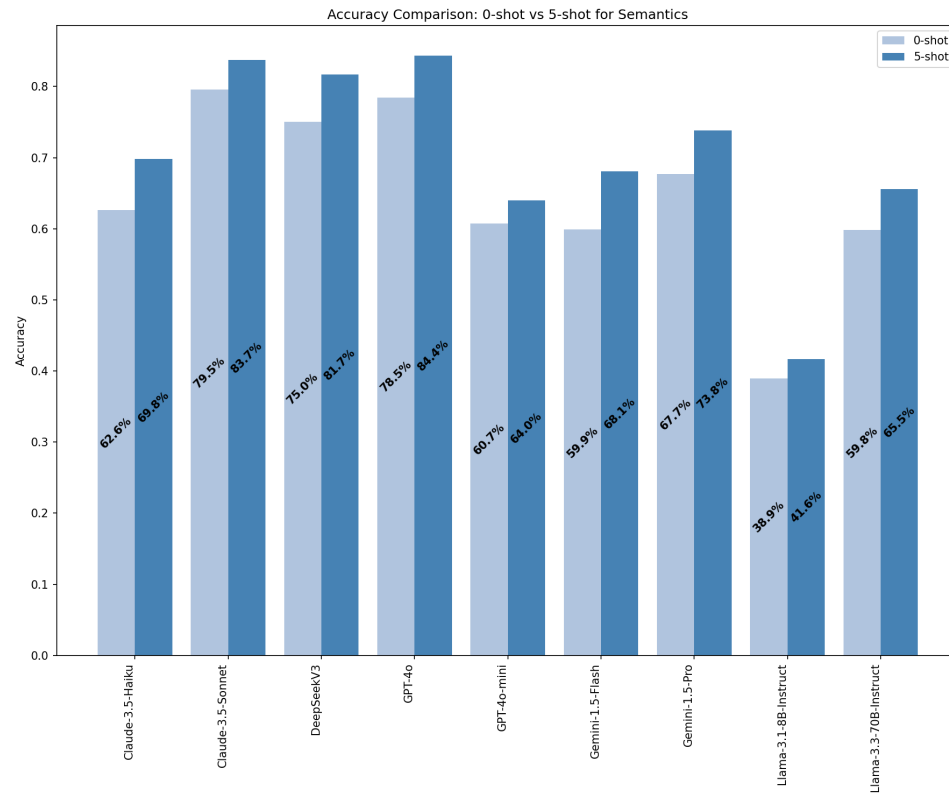


(b) Accuracy for the culture domain (0-shot and 5-shot).

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

Question

Bengali: ধলেশ্বরী কোন নদীর শাখা নদী?

Romanization: Dholeshwari kon nodi-r shakha nodi?

Gloss: Dhaleshwari which river-GEN branch river

English Translation: "Dhaleshwari is a tributary of which river?"

Choice A ✗

Bengali: পদ্মা

Romanization: Podda

Gloss: Padma

English Translation: "Padma River"

Choice B ✗

Bengali: বুড়িগঙ্গা

Romanization: Burigonga

Gloss: Buriganga

English Translation: "Buriganga River"

Choice C ✓

Bengali: যমুনা

Romanization: Jomuna

Gloss: Jamuna

English Translation: "Jamuna River"

Choice D ✗

Bengali: মেঘনা

Romanization: Meghna

Gloss: Meghna

English Translation: "Meghna River"

Figure 6: Example MCQA from the Culture domain.

Question

Bengali: শহিদ মুক্তিযোদ্ধা শাফী ইমাম রুমি মুক্তিবাহিনীর কোন গোঁরীলা দলের সদস্য ছিলেন?

Romanization: shohid muktijoddha Shafi Imam Rumi muktibahini-r kon gorilla dal-er shodossho chhilen?

Gloss: martyr freedom-fighter Shafi Imam Rumi liberation-force-GEN which guerrilla group-GEN member be.PST

English Translation: "Of which guerrilla group of the Liberation Force was martyr freedom fighter Shafi Imam Rumi a member?"

Choice A ✗

Bengali: বাংলাদেশ লিবারেশন ফোর্স

Romanization: Bangladesh Liberation Force

Gloss: Bangladesh Liberation Force

English Translation: "Bangladesh Liberation Force"

Choice B ✓

Bengali: ক্র্যাক প্লাটুন

Romanization: Crack Platoon

Gloss: Crack Platoon

English Translation: "Crack Platoon"

Choice C ✗

Bengali: বিএনএস বাশার

Romanization: BNS Baa-shaar

Gloss: BNS Bashar

English Translation: "BNS Bashar"

Choice D ✗

Bengali: ঢাকা গোঁরীলা (দক্ষিণ)

Romanization: Dhaka gorilla (dokkhin)

Gloss: Dhaka Guerrilla (South)

English Translation: "Dhaka Guerrilla (South)"

Figure 7: Example MCQA from the History domain.

Question

Bengali: 'বাংলা সাতটি স্বরধ্বনির মধ্যে কোন তিনটি বিবৃত?'

English Translation: "Among the seven Bengali vowel sounds, which three are open?"

a) অ, ই, উ b) আ, ঈ, ঊ c) অ, এ, অ্যা d) অ্যা, আ, অ

আমি ধাপে ধাপে চিন্তা করি:

১. বাংলা ভাষায় সাতটি স্বরধ্বনি আছে: অ, আ, ই, ঈ, উ, ঊ, এ, ও

২. বিবৃত স্বরধ্বনি হল যেগুলি উচ্চারণের সময় জিহ্বা মুখবিন্দুরে সম্পূর্ণ বিস্তৃত অবস্থায় থাকে

৩. বাংলা ভাষায় তিনটি বিবৃত স্বরধ্বনি হল:

- অ (অর্ধ-বিবৃত)

- এ (অর্ধ-বিবৃত)

- অ্যা (সম্পূর্ণ বিবৃত)

৪. দেওয়া অপশনগুলি পর্যালোচনা করি:

- (a) অ, ই, উ - এগুলি সবগুলি বিবৃত নয়

- (b) আ, ঈ, ঊ - এগুলি বিবৃত নয়

- (c) অ, এ, অ্যা - এই তিনটিই বিবৃত স্বরধ্বনি

- (d) অ্যা, আ, অ - এর মধ্যে আ বিবৃত নয়। সূত্রাং, সঠিক উত্তর হল (c) অ, এ, অ্যা

<c>

Let me think step by step:

1. There are seven vowel sounds in Bengali: অ, আ, ই, ঈ, উ, ঊ, এ, ও

2. The open vowels are those in which the tongue remains fully expanded in the oral cavity during pronunciation.

3. The three open vowels in Bengali are:

- অ (half-open)

- এ (half-open)

- অ্যা (fully open)

4. Let's review the given options:

- (a) অ, ই, উ – not all of these are open

- (b) আ, ঈ, ঊ – these are not open

- (c) অ, এ, অ্যা – all three are open vowels

- (d) অ্যা, আ, অ – here আ is not open

Therefore, the correct answer is (c) অ, এ, অ্যা

<c>

(a) In this case, the model fails (red) to acknowledge all seven correct Bengali vowel sounds in the beginning, which leads to erroneous reasoning.

Question

Bengali: "সৌধ" শব্দের প্রমিত উচ্চারণ হলো-

English Translation: "The standard pronunciation of the word 'সৌধ' is—"

a) সোউধ b) শোউধ c) সোউধো d) শোউধো

আমরা ধাপে ধাপে এই প্রশ্নের উত্তর দেই:

১. 'সৌধ' শব্দে 'সৌ' এর উচ্চারণ হবে 'সোউ'

২. 'ধ' এর শেষে হাসন্ত থাকবে, তাই এর উচ্চারণ হবে 'ধ'

৩. সূত্রাং পুরো শব্দের প্রমিত উচ্চারণ হবে 'সোউধ'

৪. বিকল্পগুলি বিশ্লেষণ করি:

- (a) সোউধ - সঠিক উচ্চারণ

- (b) শোউধ - 'স' এর জায়গায় 'শ' ভুল

- (c) সোউধো - শেষে 'ও' যুক্ত করা ভুল

- (d) শোউধো - 'স' এর জায়গায় 'শ' এবং শেষে 'ও' যুক্ত করা ভুল

৫. অতএব, সঠিক উচ্চারণ হলো 'সোউধ' যা (a) বিকল্পে আছে।

<a>

Let's answer this question step by step:

1. In the word 'সৌধ', the pronunciation of 'সৌ' will be 'সোউ'.

2. A hasanta is present at the end of 'ধ', so its pronunciation will be 'ধ'.

3. Therefore, the standard pronunciation of the full word will be 'সোউধ'.

4. Let's analyze the options:

- (a) সোউধ — the correct pronunciation

- (b) শোউধ — incorrect because 'স' is replaced with 'শ'

- (c) সোউধো — incorrect because an extra 'ও' is added at the end

(d) শোউধো — incorrect because 'স' is replaced with 'শ', and an extra 'ও' is added at the end

5. Therefore, the correct pronunciation is 'সোউধ', which appears in option (a).

<a>

(b) The model starts (red) with a hallucinated assumption of pronunciation of a certain Bengali letter and continues to explain on justifying the answer.

Figure 8: Failure Case in CoT Reasoning for Pronunciation Subcategory