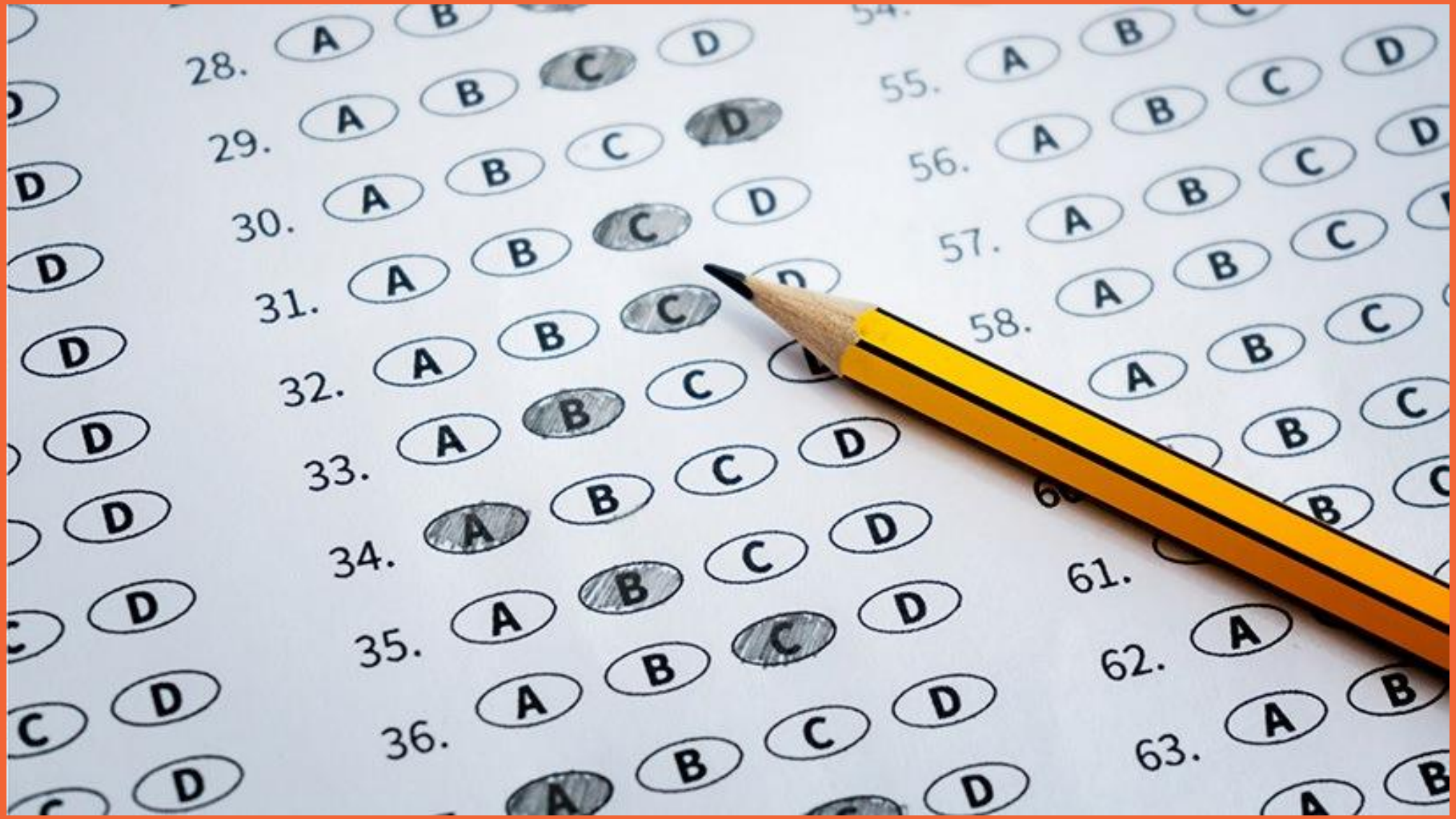

28.
29.
30.
31.
32.
33.
34.
35.
36.
55.
56.
57.
58.
61.
62.
63.

Which of These Best Describes Multiple Choice Evaluation with LLMs?

Which of These Best Describes Multiple Choice Evaluation with LLMs?

A) Forced

Used too often?

Which of These Best Describes Multiple Choice Evaluation with LLMs?

A) Forced B) Flawed

Has fundamental issues?

Which of These Best Describes Multiple Choice Evaluation with LLMs?

A) Forced B) Flawed C) Fixable

Could be better?

Which of These Best Describes Multiple Choice Evaluation with LLMs?

A) Forced B) Flawed C) Fixable D) All of the Above

Nishant Balepur Rachel Rudinger Jordan Boyd-Graber

nbalepur@umd.edu https://nbalepur.github.io/

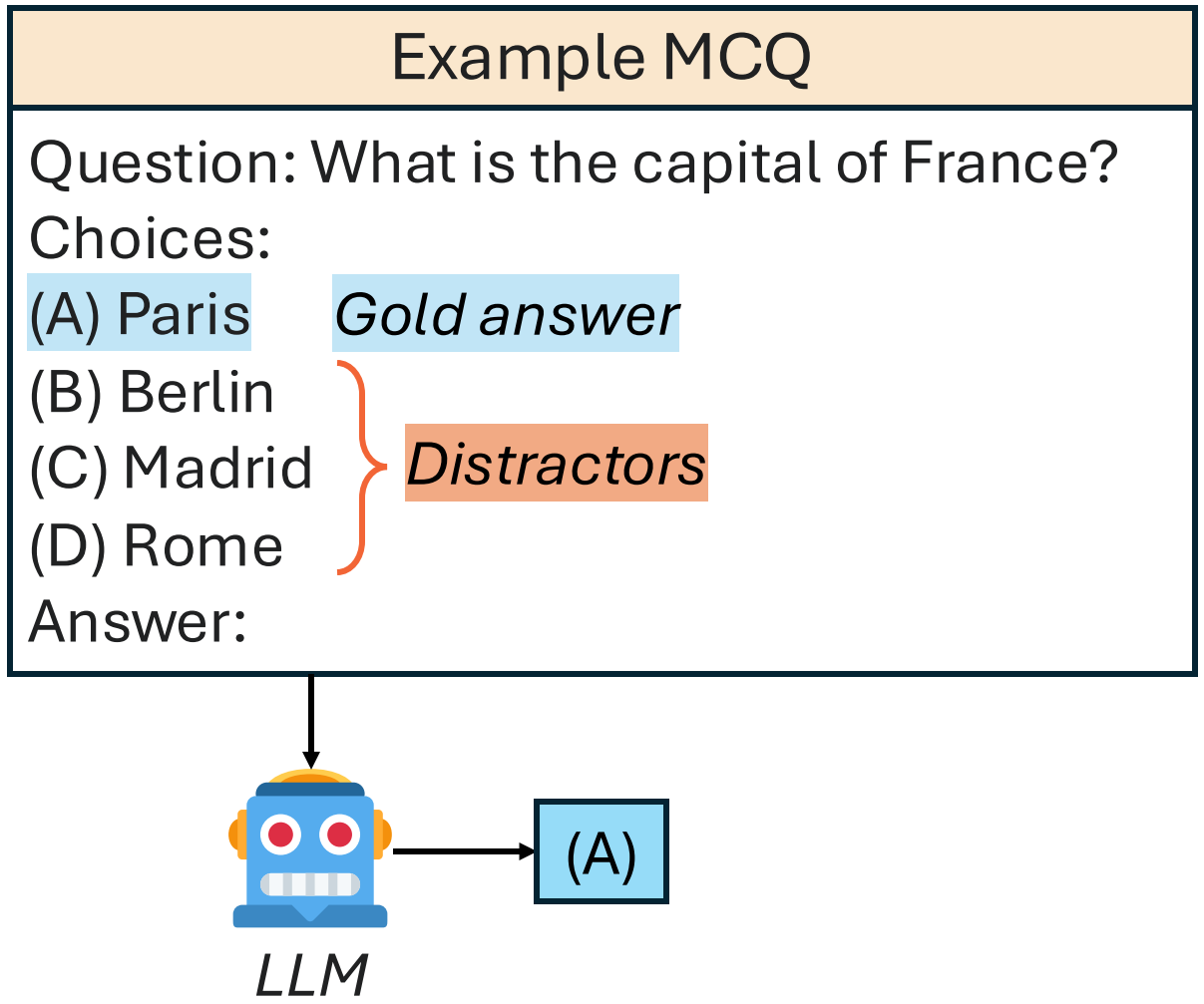
UNIVERSITY OF MARYLAND

https://arxiv.org/abs/2502.14127

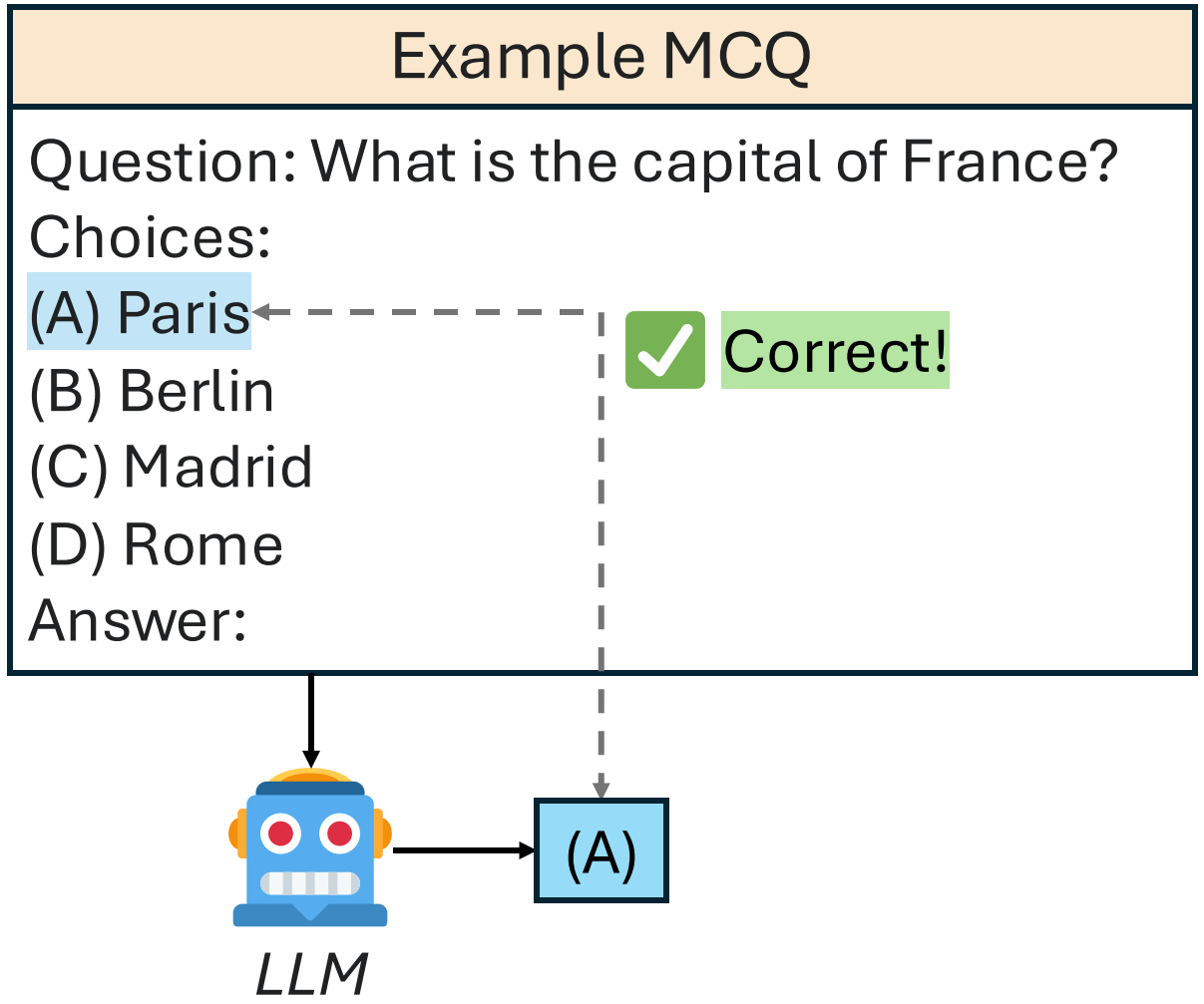
Multiple-Choice Question Answering is Great in Theory

Example MCQ
Question: What is the capital of France? Choices: (A) Paris (B) Berlin (C) Madrid (D) Rome Answer:

Multiple-Choice Question Answering is Great in Theory

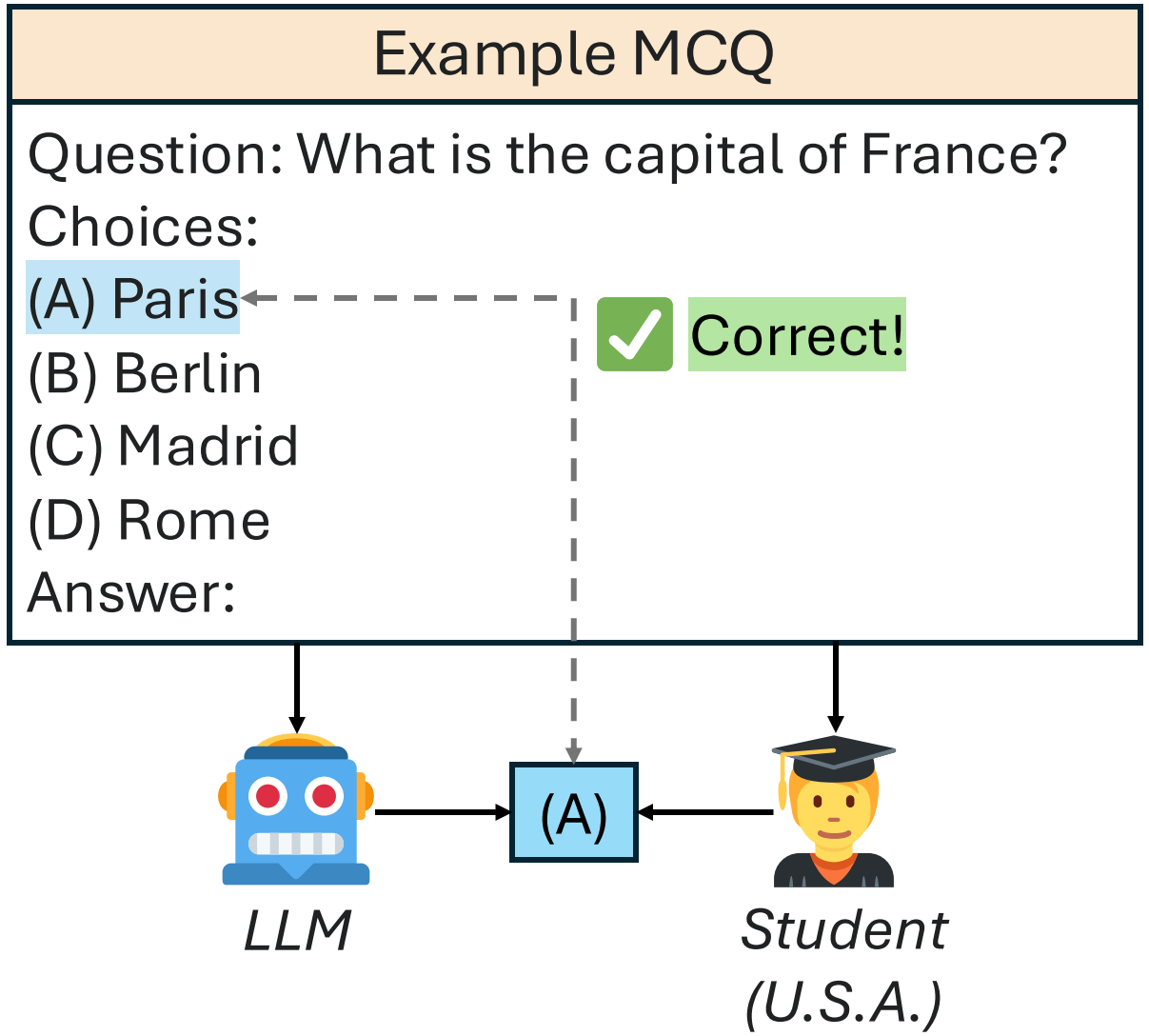


Multiple-Choice Question Answering is Great in Theory



1) Easy to score

Multiple-Choice Question Answering is Great in Theory

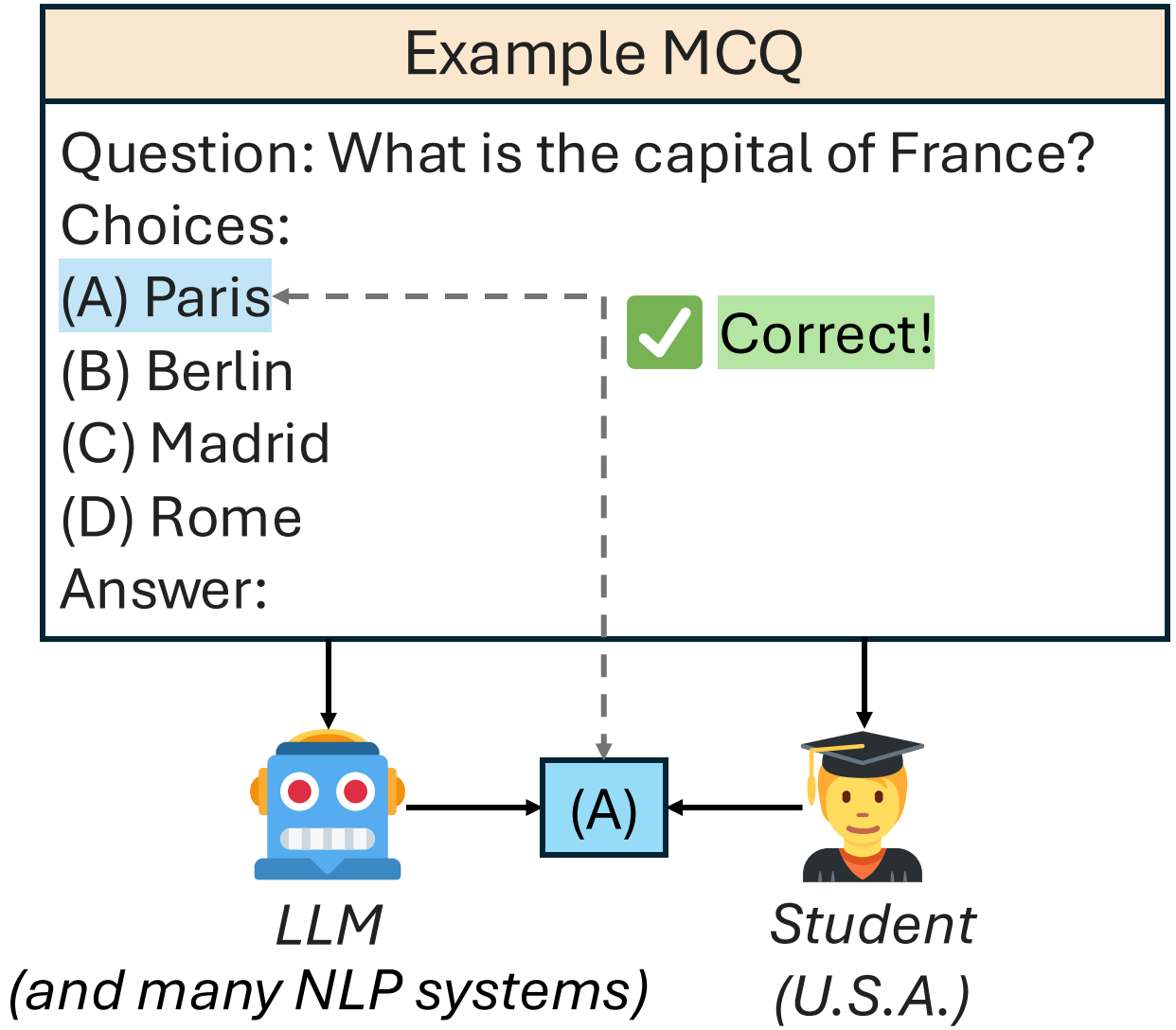


1) Easy to score

2) Aligns with how we test students

SAT® ETS® GRE®
MCAT LSAT

Multiple-Choice Question Answering is Great in Theory



1) Easy to score

2) Aligns with how we test students

SAT® ETS® GRE® MCAT® LSAT®

3) Historically used in NLP

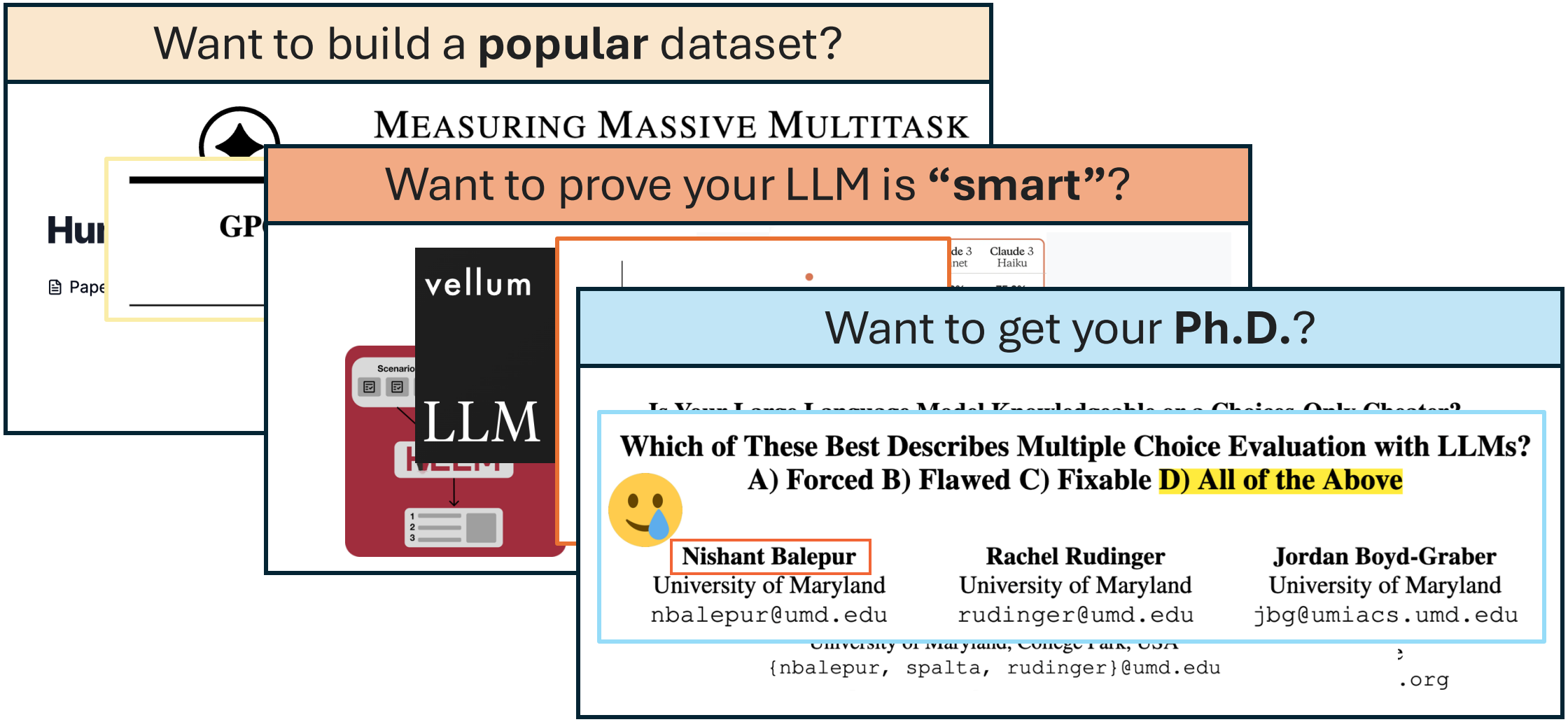
1988 AAAI Presidential Address

Foundations and Grand Challenges of Artificial Intelligence

Raj Reddy

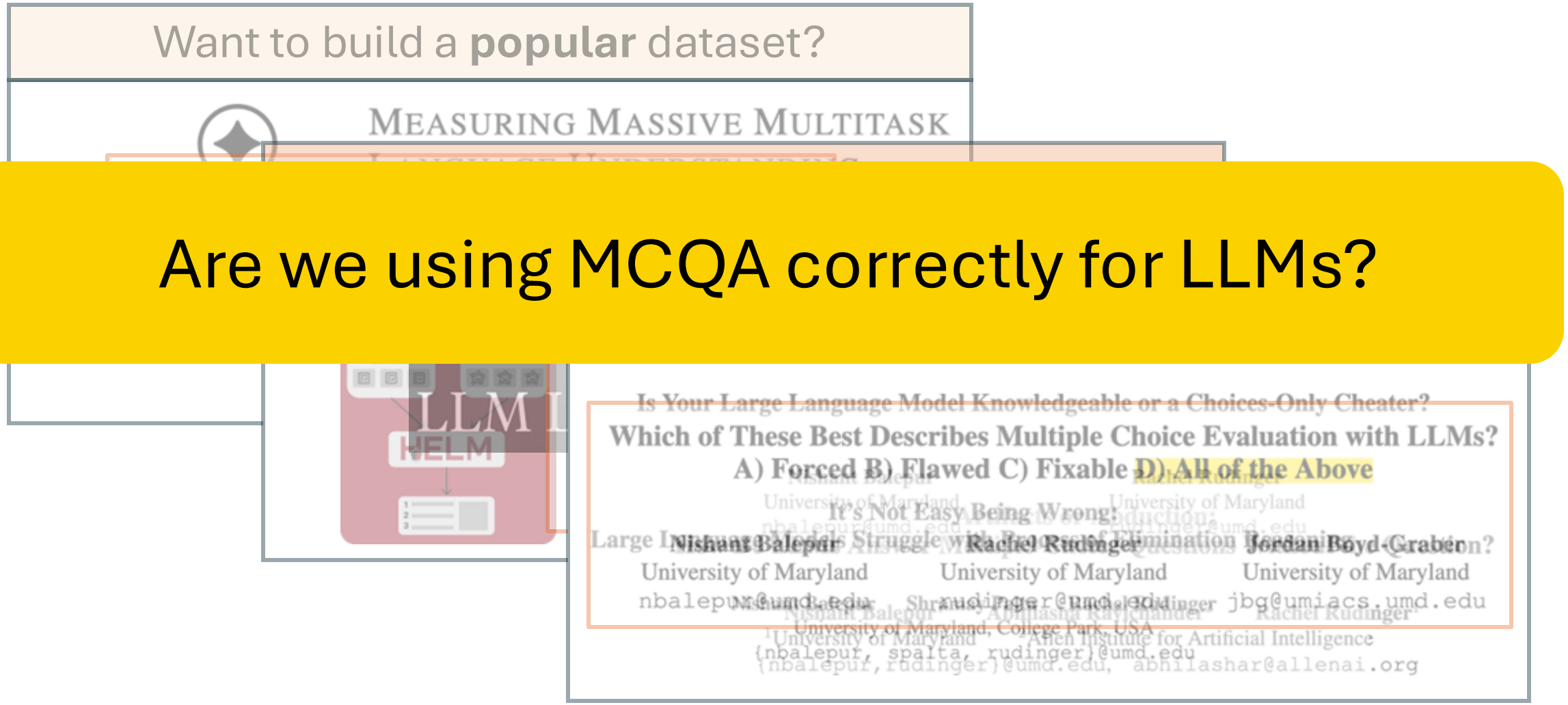
Good luck avoiding MCQA

1) Easy to score 2) Aligns with how we test students 3) Historically used in NLP



Good luck avoiding MCQA

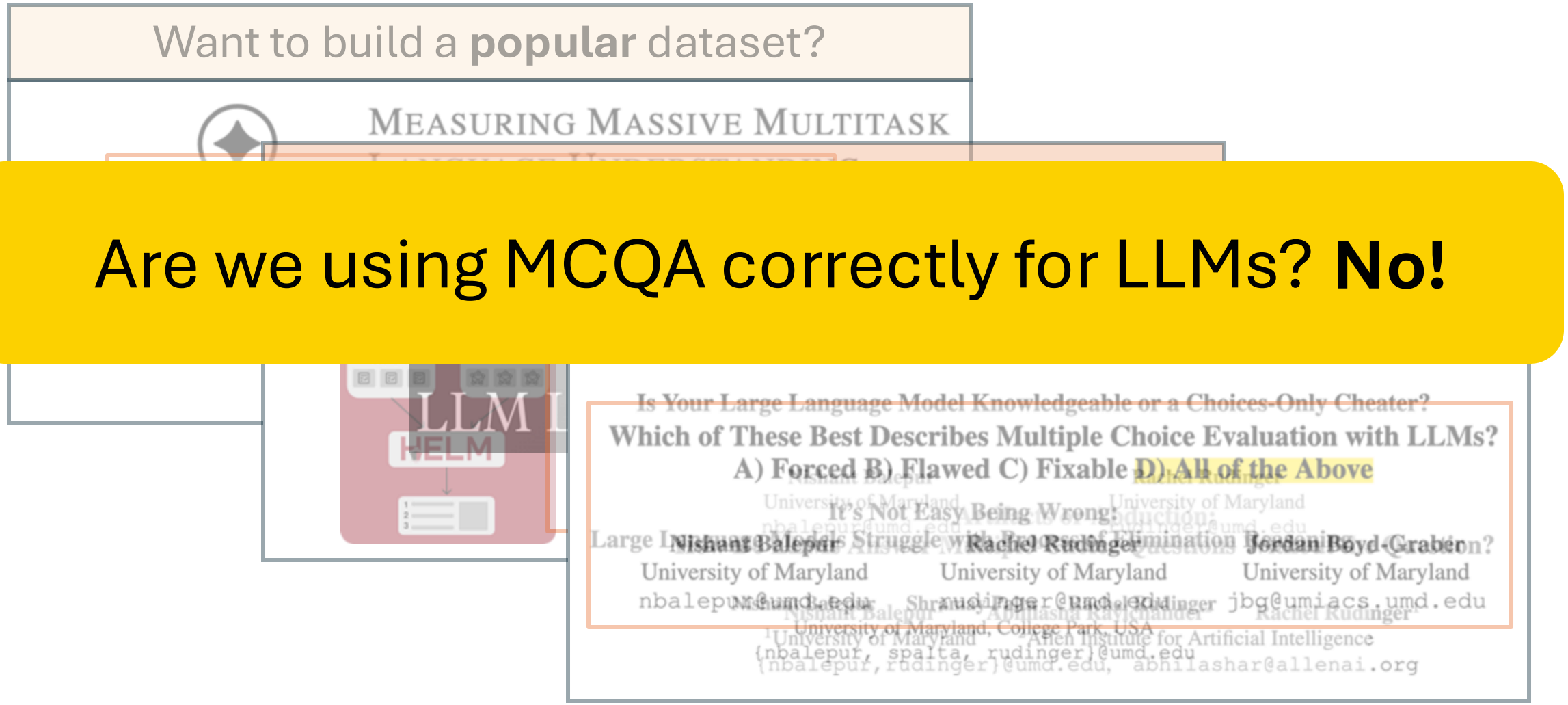
1) Easy to score 2) Aligns with how we test students 3) Historically used in NLP



Are we using MCQA correctly for LLMs?

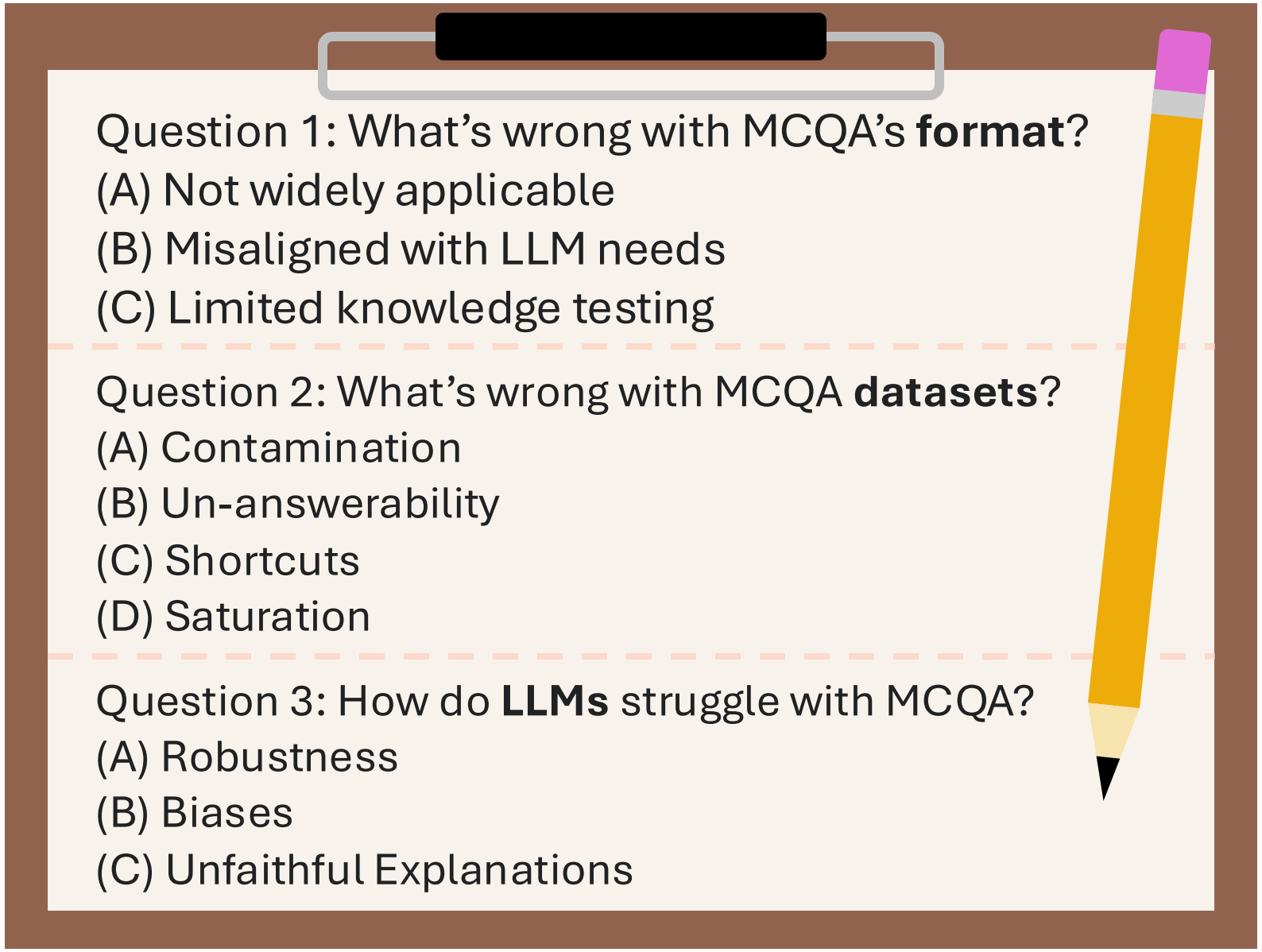
Good luck avoiding MCQA

1) Easy to score 2) Aligns with how we test students 3) Historically used in NLP

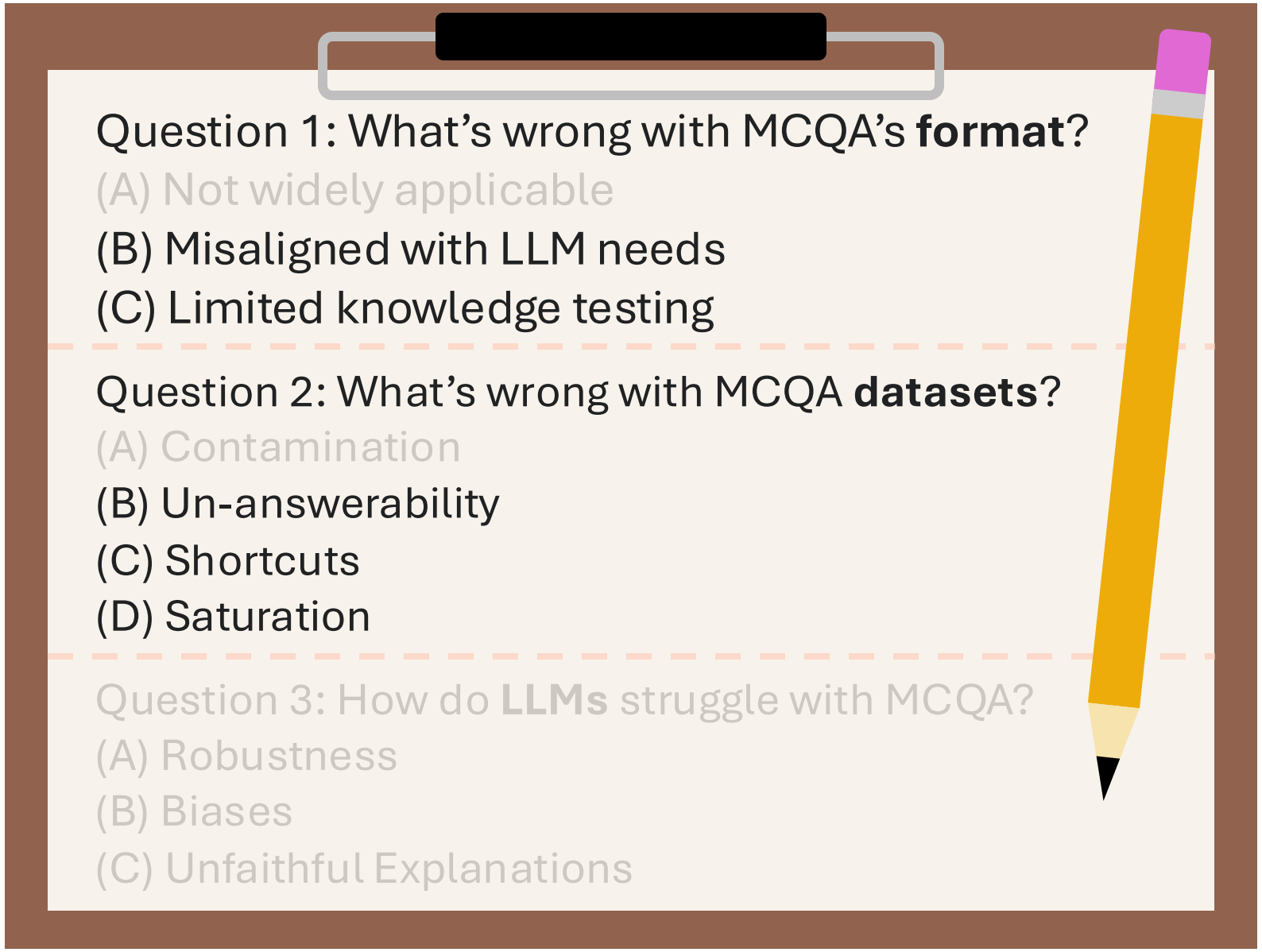


Are we using MCQA correctly for LLMs? **No!**

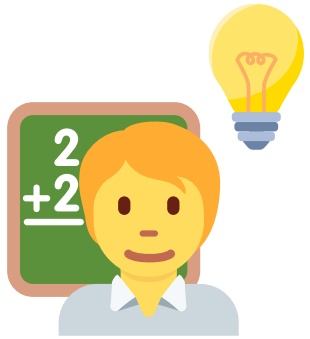
Are we using MCQA correctly for LLMs? **No!**



Are we using MCQA correctly for LLMs? **No!**



Are we using MCQA correctly for LLMs? **No!**



Educators have solutions!

Question 1: What's wrong with MCQA's **format**?

(A) Not widely applicable

(B) Misaligned with LLM needs

(C) Limited knowledge testing ⇒ *New Formats*

Question 2: What's wrong with MCQA **datasets**?

(A) Contamination

(B) Un-answerability ⇒ *MCQA Rubrics*

(C) Shortcuts

(D) Saturation ⇒ *MCQs Easy for Humans*

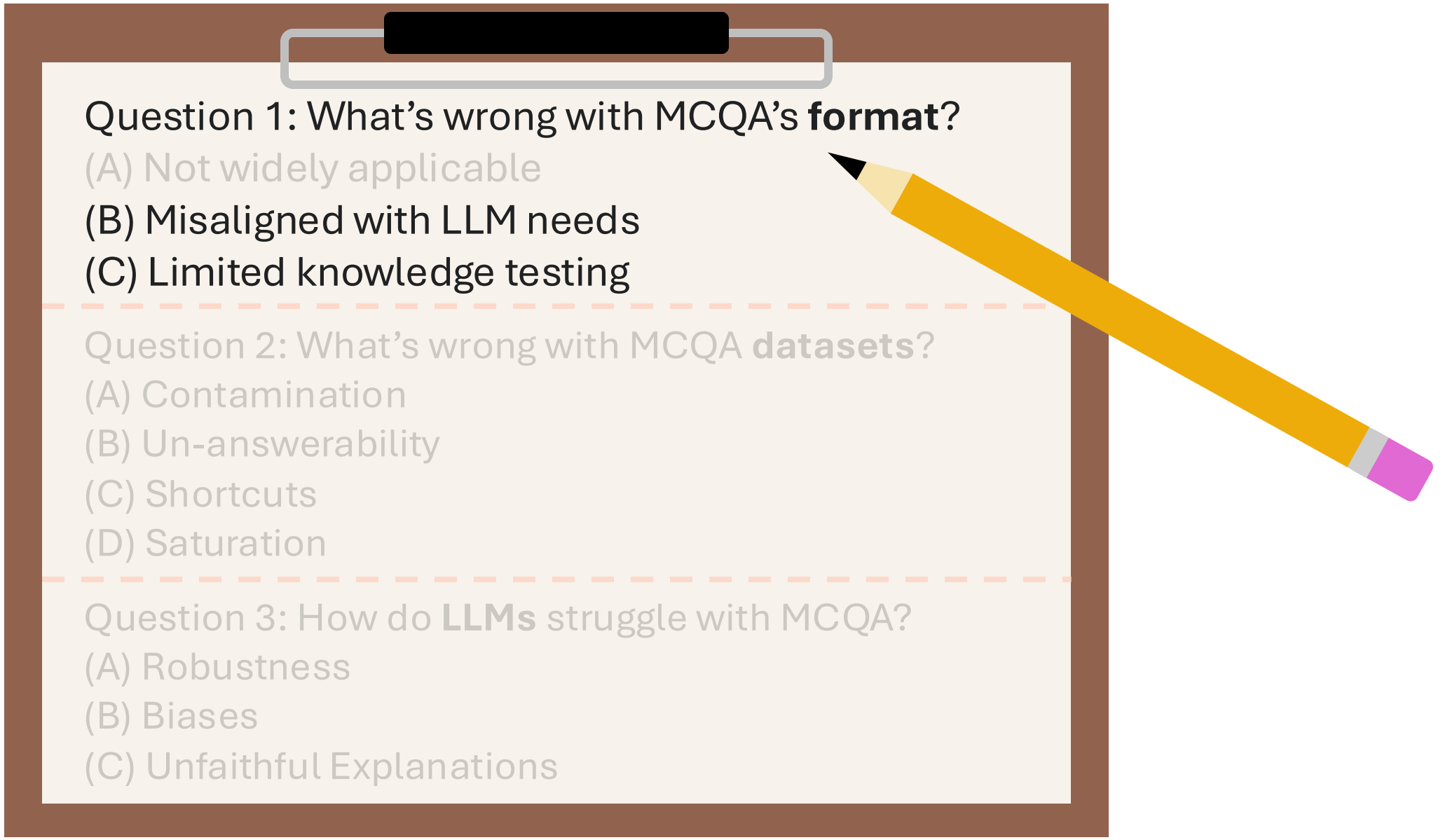
Question 3: How do **LLMs** struggle with MCQA?

(A) Robustness

(B) Biases

(C) Unfaithful Explanations

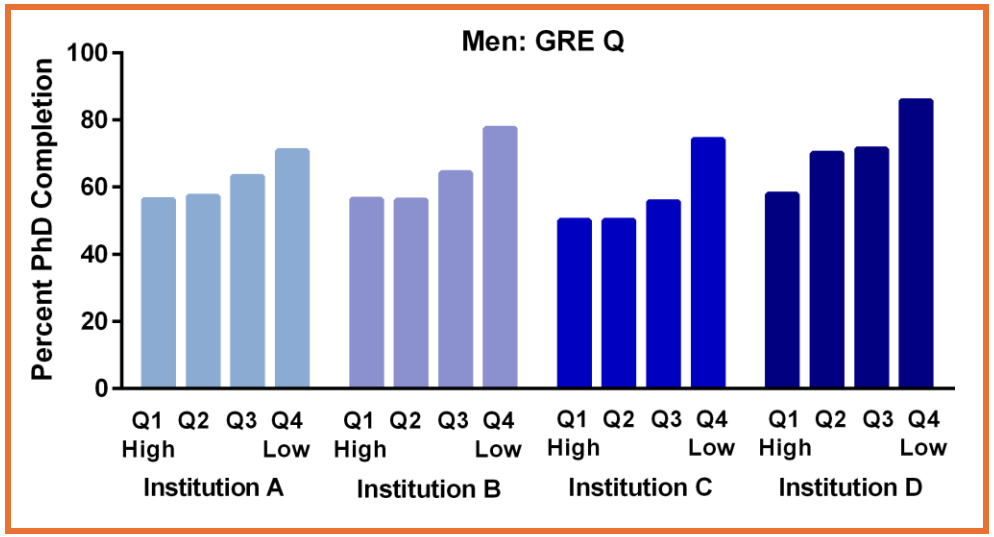
Are we using MCQA correctly for LLMs? **No!**



MCQA is simple

MCQA is simple, so why do humans hate these exams?

Studies showing it fails to predict student success



Dropping standardized exams altogether?!

The New York Times

University of California Will No Longer Consider SAT and ACT Scores

The university system has reached a settlement with students to scrap even optional testing from admissions and scholarship decisions.

r/AskAnAmerican • 3 yr. ago
Tikomeji

Multiple-choice Test?

EDUCATION

As a german student I can't imagine multiple choice question test. Do you guys really ''mostly'' have multiple choice test or also normal test? And if yes how are they look like?

Using other testing formats

We should be just as critical for LLMs!

LLM Use Cases | Knowledge Testing | Better Formats

Evaluations inform LLM selection

So they should contain tasks mirroring how people actually use LLMs

Evaluations inform LLM selection

So they should contain tasks mirroring how people actually use LLMs

71% of tasks are MCQA!

GPT-4 Eval on Academic Benchmarks

	GPT-4 Evaluated few-shot	GPT-3.5 Evaluated few-shot	LM SOTA Best external LM evaluated few-shot	SOTA Best external model (incl. benchmark-specific tuning)
MMLU [49] Multiple-choice questions in 57 subjects (professional & academic)	**86.4%** 5-shot	70.0% 5-shot	70.7% 5-shot U-PaLM [50]	75.2% 5-shot Flan-PaLM [51]
HellaSwag [52] Commonsense reasoning around everyday events	**95.3%** 10-shot	85.5% 10-shot	84.2% LLaMA (validation set) [28]	85.6 ALUM [53]
AI2 Reasoning Challenge (ARC) [54] Grade-school multiple choice science questions. Challenge-set.	**96.3%** 25-shot	85.2% 25-shot	85.2% 8-shot PaLM [55]	86.5% ST-MOE [18]
WinoGrande [56] Commonsense reasoning around pronoun resolution	**87.5%** 5-shot	81.6% 5-shot	85.1% 5-shot PaLM [3]	85.1% 5-shot PaLM [3]
HumanEval [43] Python coding tasks	**67.0%** 0-shot	48.1% 0-shot	26.2% 0-shot PaLM [3]	65.8% CodeT + GPT-3.5 [57]
DROP [58] (F1 score) Reading comprehension & arithmetic.	80.9 3-shot	64.1 3-shot	70.8 1-shot PaLM [3]	**88.4** QDGAT [59]
GSM-8K [60] Grade-school mathematics questions	**92.0%*** 5-shot chain-of-thought	57.1% 5-shot	58.8% 8-shot Minerva [61]	87.3% Chinchilla + SFT+ORM-RL, ORM reranking [62]

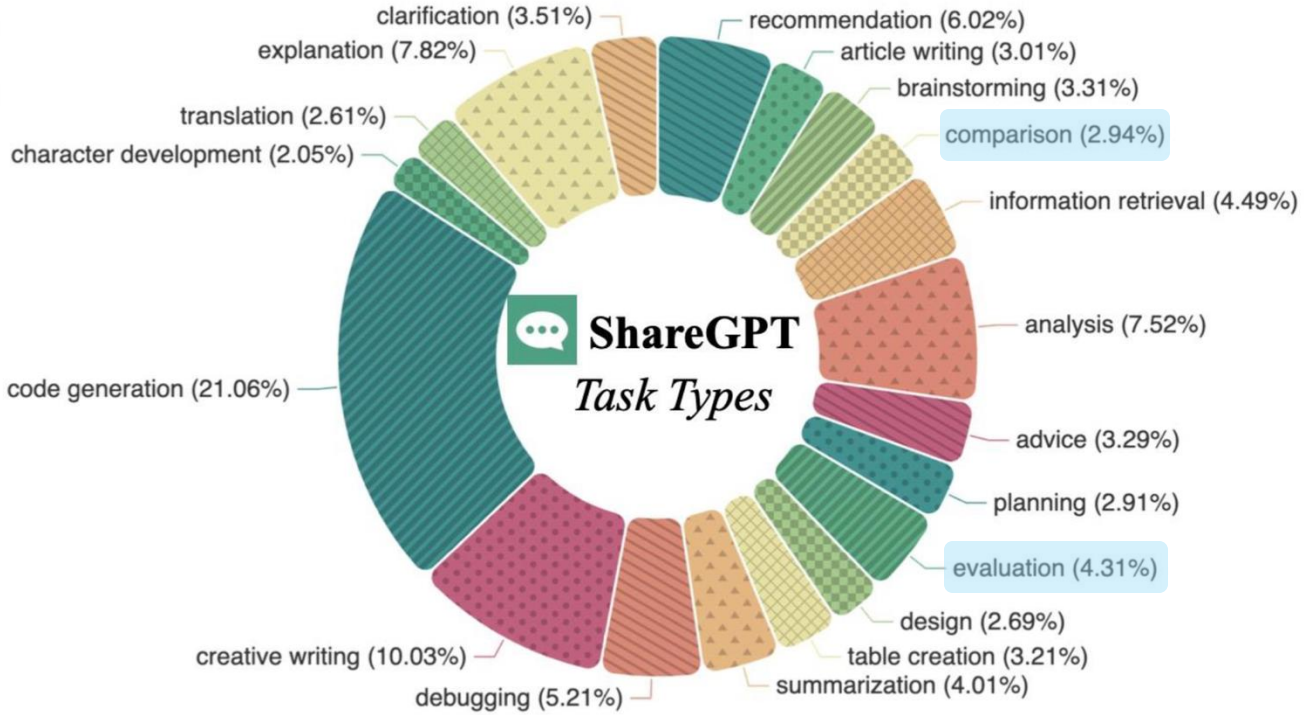
79% (due to BBH)

Evaluations inform LLM selection

So they should contain tasks mirroring how people actually use LLMs

Based on analysis on ShareGPT:[1]

> *"almost all the user queries are free-form text generations" (i.e. not MCQA)*



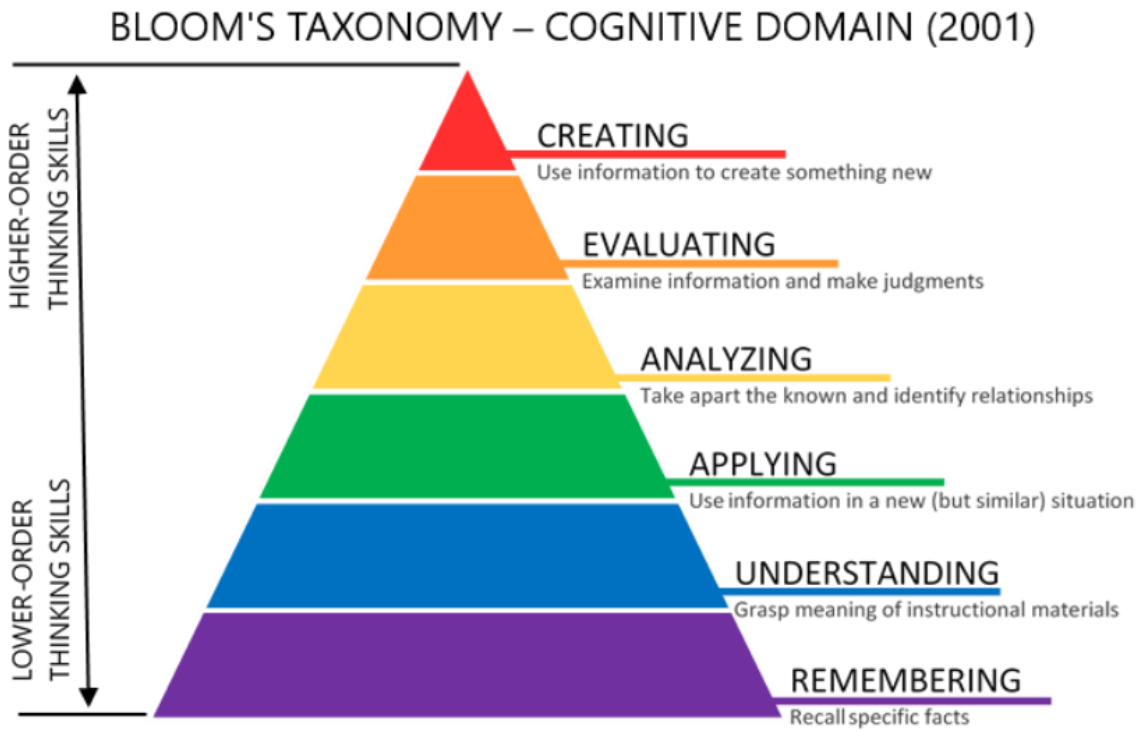
Maybe **7.25%** are MCQA?

versus

71% of tasks in benchmarks

[1] The Shifted and The Overlooked: A Task-oriented Investigation of User-GPT Interactions

MCQA can’t match LLM needs, can it test knowledge?



Educators find it ***really*** hard to write MCQs for higher-order skills (reasoning, creativity…)[2]

Most MCQs fall into “lower-order thinking skills” [1]

MCQA makes it much harder to test advanced knowledge capabilities!

[1] Multiple-choice tests and student understanding: What is the connection?
[2] Multiple choice questions: Can they examine application of knowledge?

What are better MCQA formats?

Multiple-Choice Question

Question: What is the capital of France?
Choices: (A) Berlin (B) Paris (C) Madrid (D) Rome
Answer: (B)

Constructed-Response Questions

Question: What is the capital of France?
Answer: Paris

Give an answer without the choices [1]

Explanation Multiple-Choice Questions

Question: What is the capital of France?
Choices: (A) Berlin (B) Paris (C) Madrid (D) Rome
Explanation: The answer is (B) because…

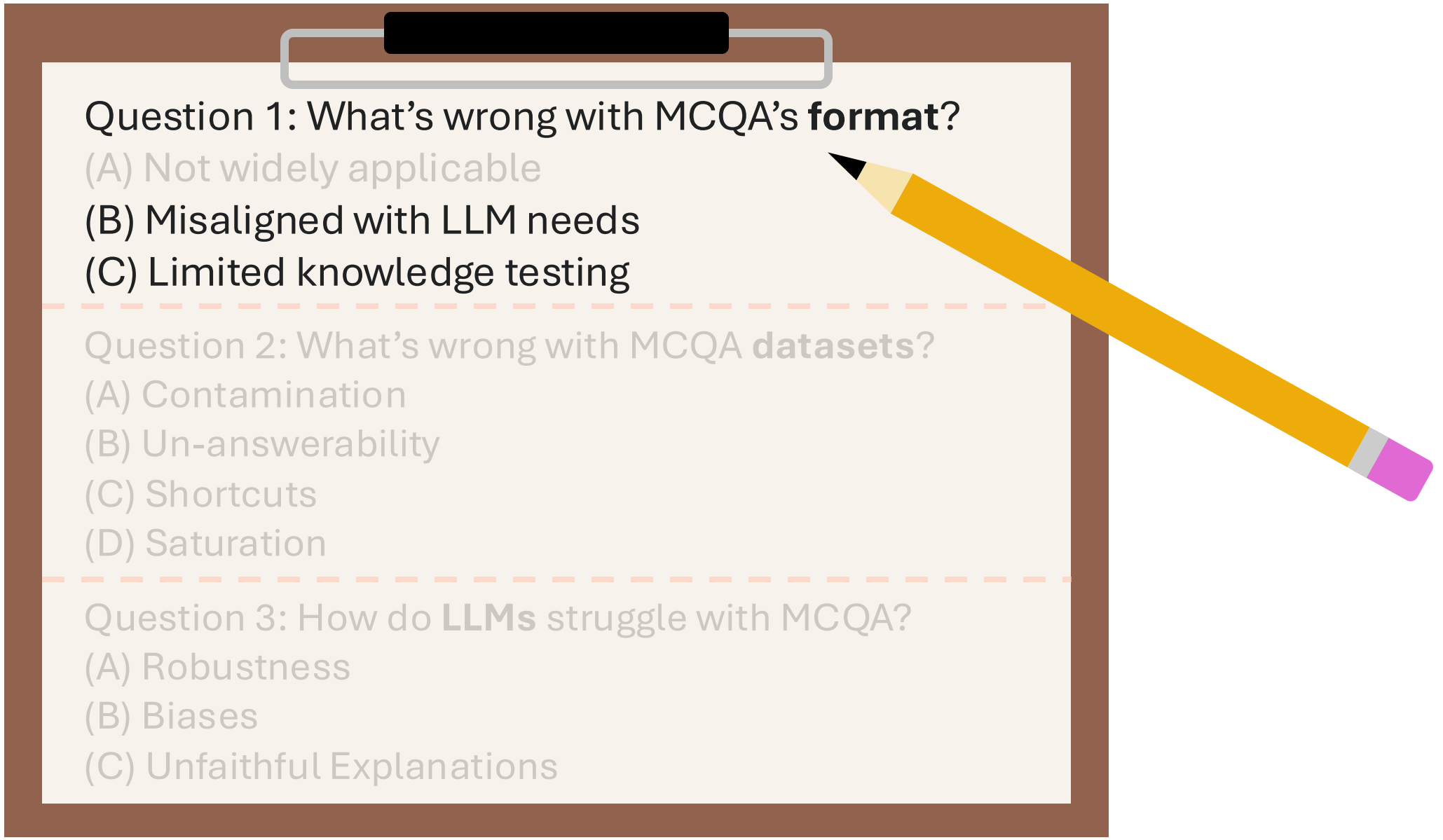
Explain why the answer was selected [2]

✅ Generation tasks that align with LLM needs
✅ Better tests knowledge (based on education)
❌ Harder evaluation metrics

At least we can improve this!

[1] Open-LLM-Leaderboard: From Multi-choice to Open-style Questions for LLMs Evaluation, Benchmark, and Arena
[2] The BiGGen Bench: A Principled Benchmark for Fine-grained Evaluation of Language Models with Language Models

Are we using MCQA correctly for LLMs? **No!**

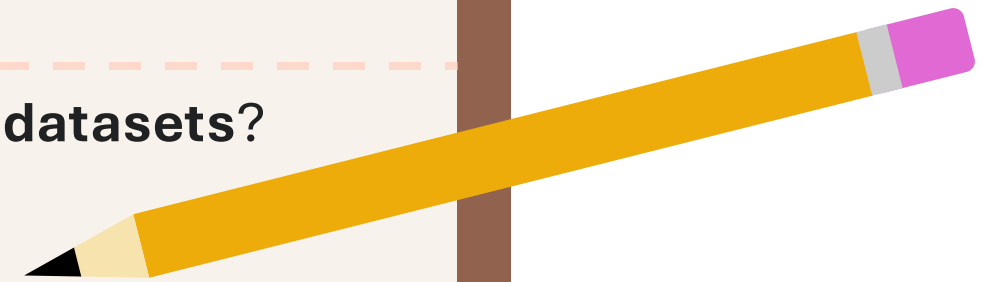


Are we using MCQA correctly for LLMs? **No!**

Question 1: What's wrong with MCQA's **format**?
(A) Not widely applicable
(B) Misaligned with LLM needs
(C) Limited knowledge testing

Question 2: What's wrong with MCQA **datasets**?
(A) Contamination
(B) Un-answerability
(C) Shortcuts
(D) Saturation

Question 3: How do **LLMs** struggle with MCQA?
(A) Robustness
(B) Biases
(C) Unfaithful Explanations

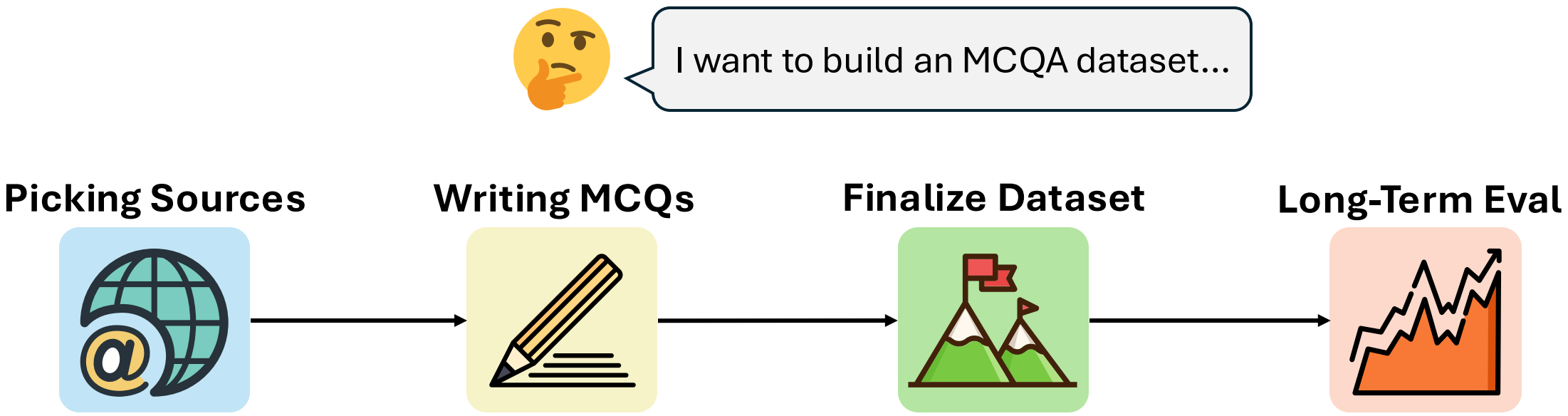


Sometimes, MCQA ***is*** a valid format to use

It can test comprehension, LLM-as-a-judge, …

- Or maybe I haven't convinced you MCQA's format is bad 😔

But still, there are **issues in MCQA datasets** we need to fix!

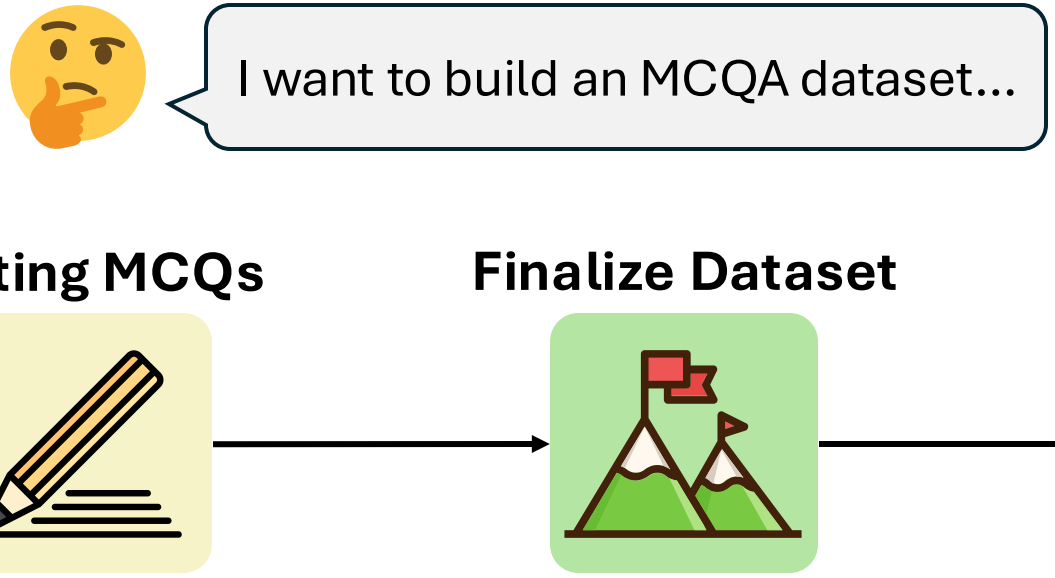


Sometimes, MCQA ***is*** a valid format to use

It can test comprehension, LLM-as-a-judge, …

- Or maybe I haven't convinced you MCQA's format is bad 😔

But still, there are **issues in MCQA datasets** we need to fix!



Un-answerability | Shortcuts | Saturation

Some MCQs are impossible to answer

Multiple Valid Distractors (Social IQA)[1]
Question: Ash redeemed themselves after retaking the test they failed. How will Ash feel as a result? Choices: (A) relieved (B) accomplished (C) proud

Poor Grammar (HellaSwag)[2]
Question: *Man is in roofed gym weightlifting. Woman is walking behind the man watching the man. Woman…*

Incorrect Answer (MMLU)[3]
Question: The number of energy levels for the 55Mn nuclide are Choices: (A) 3 (B) 5 (C) 8 (D) 4

Missing Information? (MMLU)[4]
From the authors: *"[we discard] questions that lack necessary information or require non-textual elements like images or tables"*

Researchers don't know how to write MCQs like experts…

[1] Plausibly Problematic Questions in Multiple-Choice Benchmarks for Commonsense Reasoning
[2] HellaSwag or HellaBad? 36% of this popular LLM benchmark contains errors
[3] Are We Done with MMLU?
[4] MMLU-Pro: A More Robust and Challenging Multi-Task Language Understanding Benchmark

So we should follow educator's guidelines for writing MCQs

Multiple-Choice Writing Guidelines

So we should follow educator's guidelines for writing MCQs

Multiple-Choice Writing Guidelines[1]
<u>General Item-Writing (procedural):</u> 2. Avoid the complex multiple-choice format (e.g. all of the above) <u>General Item-Writing (content concerns):</u> 13. Avoid over-specific knowledge when developing the item

[1] A taxonomy of multiple choice item-writing rules (1989)

So we should follow educator's guidelines for writing MCQs

Multiple-Choice Writing Guidelines[1]
<u>General Item-Writing (procedural):</u> 2. Avoid the complex multiple-choice format (e.g. all of the above) <u>General Item-Writing (content concerns):</u> 13. Avoid over-specific knowledge when developing the item <u>Stem Construction:</u> 20. Ensure the directions in the stem are clear <u>Correct Option Development:</u> 37. Make sure there is one and only one correct option <u>Distractor Development:</u> 39. Incorporate common errors of students } *Most important part of an MCQ!* *Discerns between low and high skill test-takers*

[1] A taxonomy of multiple choice item-writing rules (1989)

Answerable MCQs are still cheatable via **shortcuts**

Intended Solution

MCQ from MMLU
Question: Find all zeros in the indicated finite field of the given polynomial with coefficients in that field. $x^3 + 2x + 2$ in Z_7 Choices: (A) 1 (B) 2 (C) 2, 3 (D) 6 Answer:

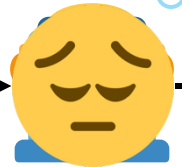
I first need to find the zeros of the input equation...

(C) ✅

Shortcuts (e.g. spurious patterns, annotator artifacts, reasoning ...)[1]

MCQ from MMLU
~~Question: Find all zeros in the indicated finite field of the given polynomial with coefficients in that field. $x^3 + 2x + 2$ in Z_7~~ Choices: (A) 1 (B) 2 (C) 2, 3 (D) 6 Answer:

IDK the answer, but (C) is the only one with 2 numbers...



(C) ✅

Overestimating knowledge!

[1] What Does My QA Model Know?

Dataset Design: Consistency is Key

If correct answers and distractors have obvious differences, models will detect this

Multiple-Choice Writing Guidelines
28. Keep the length of the options fairly consistent 34. Avoid giving clues through the use of faulty grammatical construction

HellaSwag MCQ

Question: A woman is outside with a bucket and a dog. The dog is running around trying to avoid a bath. She…

- (A) rinses the bucket off with soap and blow dry the dog's head
- (B) uses a hose to keep it from getting soapy
- (C) gets the dog wet, then it runs away again
- (D) gets into a bath tub with the dog

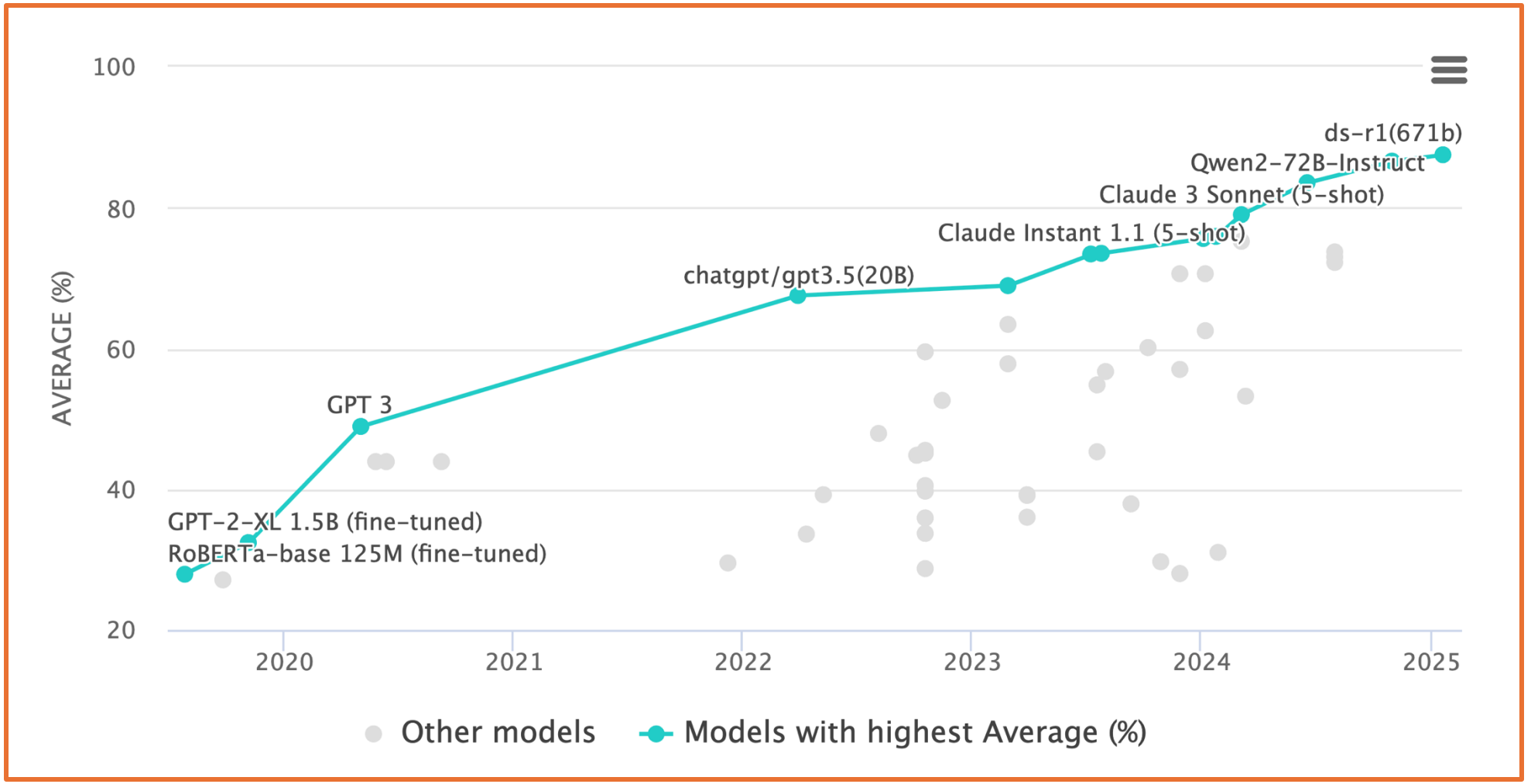
*LLaMA-2 gets **59%** accuracy when only using the choices!*[1]

Please write MCQs consistently![2]

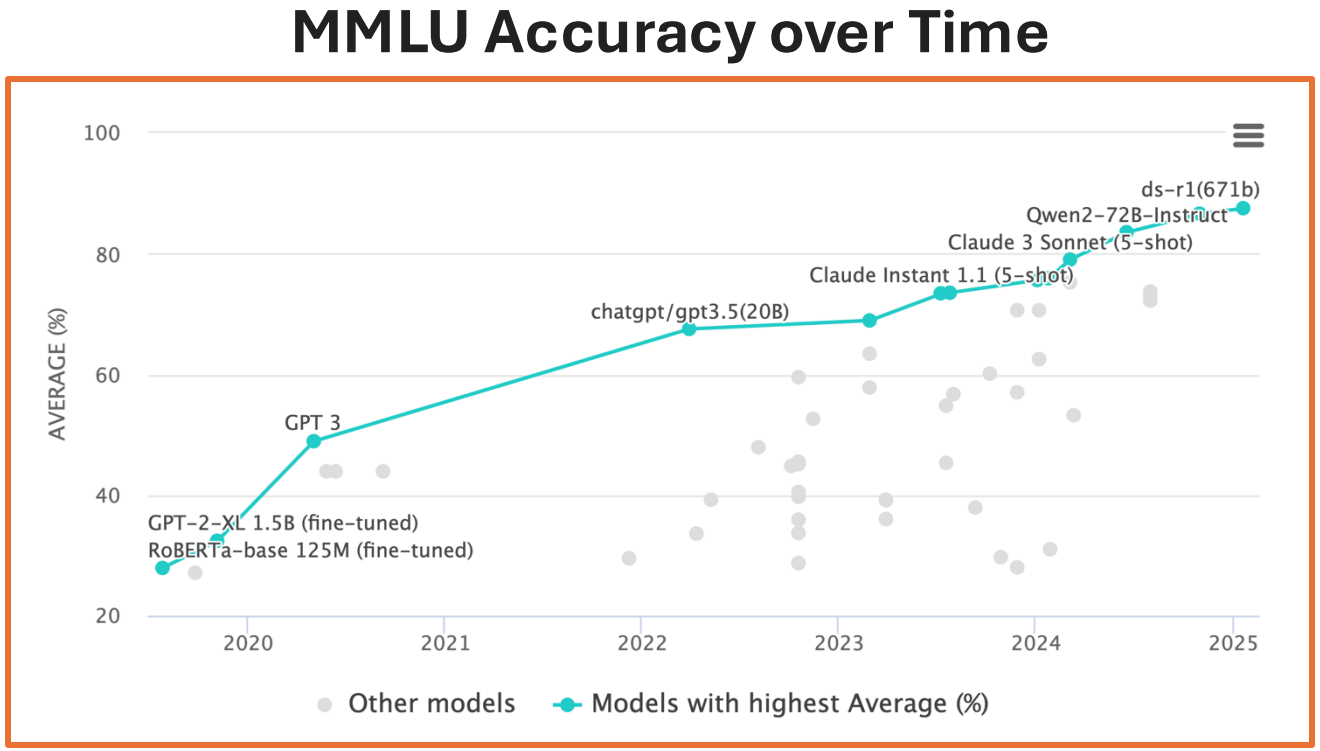
[1] How Do LLMs Answer Multiple-Choice Questions Without the Question?

[2] Is Your Large Language Model Knowledgeable or a Choices-Only Cheater?

Even if your dataset is perfect, hill-climbing is inevitable...



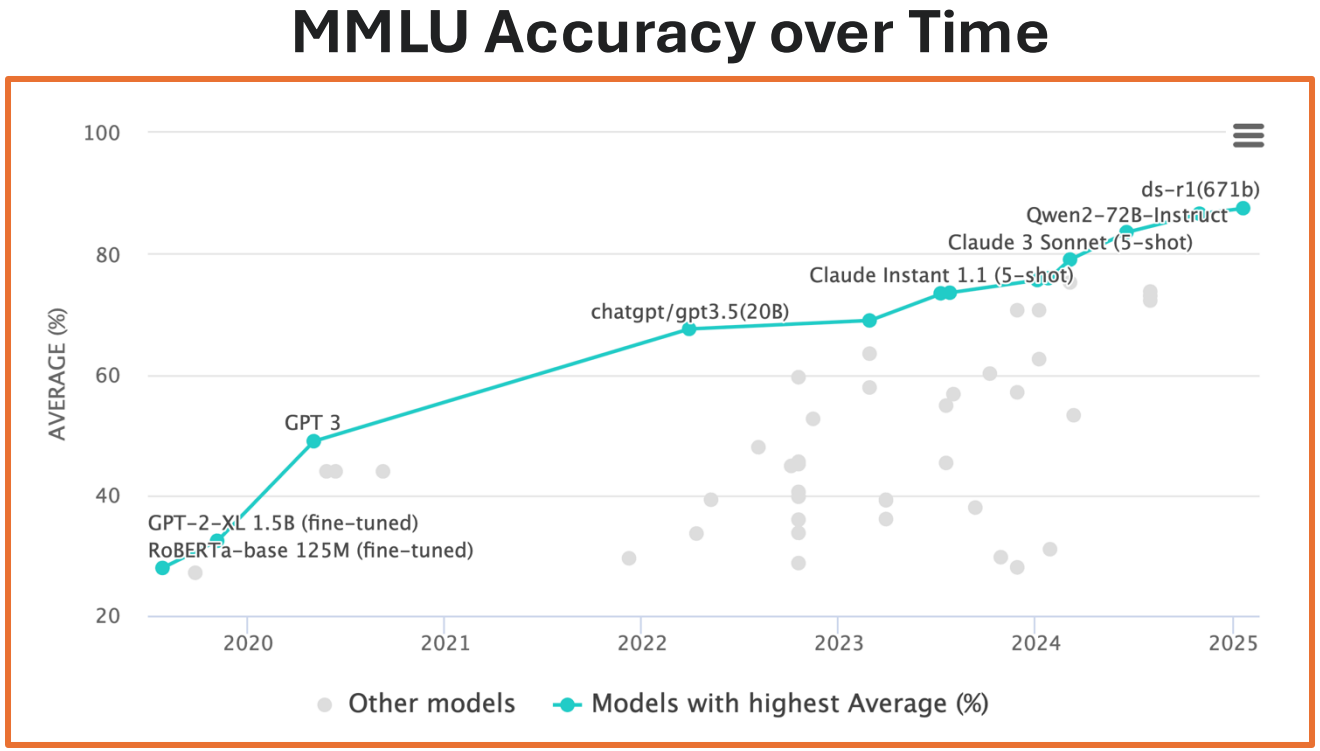
Even if your dataset is perfect, hill-climbing is inevitable…



Given a saturated dataset, how can we make it harder?

- ➢ Filter subsets of hard MCQs
- ➢ Write new, challenging MCQs

Even if your dataset is perfect, hill-climbing is inevitable...



Given a saturated dataset, how can we make it harder?

- Filter subsets of hard MCQs
- Write new, challenging MCQs ←

How should we write harder questions?

AI Hype approach: make MCQs that are insanely difficult for humans and LLMs

MCQ Based on Humanity's Last Exam [1]
Question: How many 2-vertex-connected simple nonisomorphic graphs are there with 5 vertices? Choices: (A) 1 (B) 3 (C) 5 (D) 7 (E) 10 (F) 15

To determine the number of **2-vertex-connected, simple, nonisomorphic graphs with 5 vertices**, we analyze possible constructions:

1. **Complete Graph** K_5: Fully connected (1 graph).
2. **Cycle** C_5: A simple 5-cycle (1 graph).
3. **Adding one edge to** C_5: Three different ways to add a chord (3 graphs).
4. **Adding two edges to** C_5 **to create a nearly complete structure**: Three different ways to form such graphs (3 graphs).
5. **Total distinct graphs**: 1 (cycle) + 3 (one extra edge) + 3 (two extra edges) + 1 (complete) = **8 graphs**.

However, checking standard references and combinatorial methods, the correct answer is 5.

My LLM got it wrong!!!!!!

But why? And how can I make my LLM better?

[1] Humanity's Last Exam

How should we write harder questions? **Adversarially**

Hard for models, but easy for humans

MCQ Based on AdvQA[1]
Question: How many non-pet characters live in SpongeBob's neighborhood? Choices: (A) 3 (B) 4 (C) 5

The non-pet characters in SpongeBob's neighborhood include:

1. **SpongeBob SquarePants**
2. **Patrick Star**
3. **Squidward Tentacles**
4. **Sandy Cheeks** *Sandy isn't his neighbor!*

This gives us a total of **4** non-pet characters in SpongeBob's neighborhood.

My LLM got it wrong!!!!!!

Challenge: How can we make writing these MCQs easier and more fun?

[1] Is your benchmark truly adversarial? ADVSCORE: Evaluating Human-Grounded Adversarialness

What's the best way to build a benchmark?

I want to build a benchmark...

Pick a goal!

Goal: How funny is my LLM?

If it's a basic skill...

If it matches a task...

Consult education formats
(MCQA, Constructed Resp., Explanations...)

Joke generation

Pick fresh sources (uncontaminated)

Rubric-guided MCQ writing

Remove shortcuts before finalizing

Aim for hard, interpretable MCQs

What's the best way to build a benchmark?

I want to build a benchmark...

Pick a goal!

Goal: How funny is my LLM?

If it's a basic skill...

If it matches a task...

Consult education formats

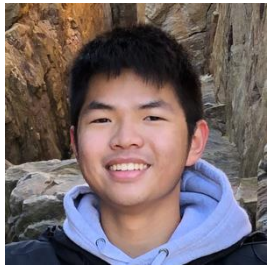
If we don't put in the effort, what do our benchmarks even measure?

Thank you :)

My amazing advisors who let me rant about MCQA as "research"

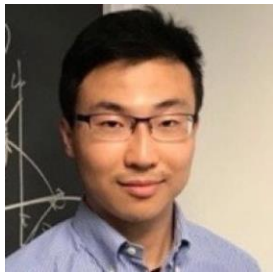


UNIVERSITY OF MARYLAND









And many many many more…

Do you think I'm wrong? clueless? irritating? all of the above?

Let's chat!

Thank you :)

Do you think I'm wrong? clueless? irritating? all of the above?
Let's chat!

Which of These Best Describes Multiple-Choice Evaluation with LLMs?

(A) Forced (B) Flawed (C) Fixable (D) All of the Above

Nishant Balepur Rachel Rudinger Jordan Boyd-Graber

Paper

[redacted]

MCQA might be simple, but it sucks for LLM evaluation; change my mind!