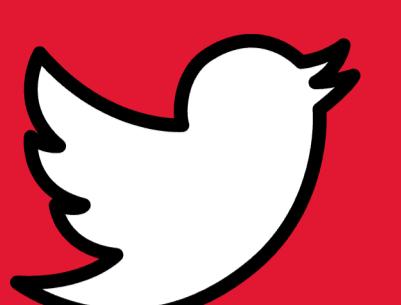




# It's Not Easy Being Wrong: Large Language Models Struggle with Process of Elimination Reasoning



Paper



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What reasoning strategies can solve multiple-choice questions?

**Question:** Where do you put your grapes before checking out?

**Choices:**

- (A) Shopping Cart
- (B) Mouth

Typical Approach: **Direct Answer** Reasoning

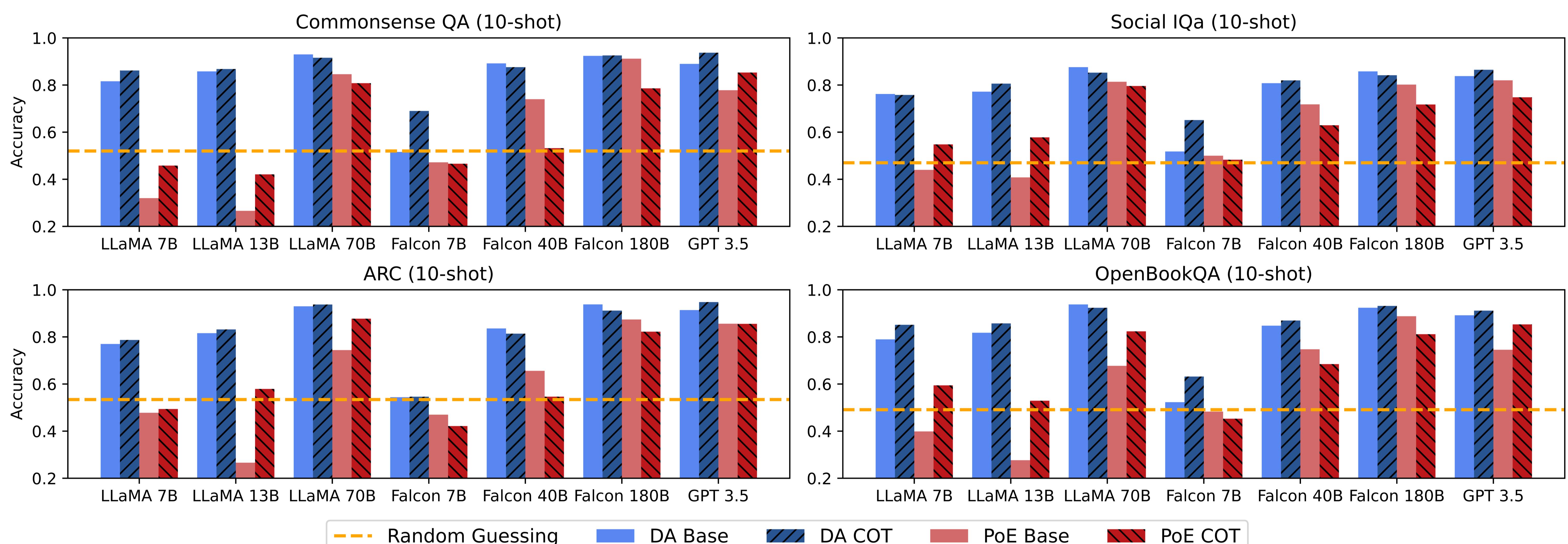
**Correct Answer:** Just before checking out at a grocery store, shoppers often place their food items, including grapes, in the shopping cart for transportation. So the correct answer is "shopping cart," which is choice (A)

Alternative: **Process of Elimination** Reasoning

**Incorrect Answer:** Just before checking out, you would not put grapes in your mouth as that would be consuming them before purchasing and stealing. So the incorrect answer is "mouth" which is choice (B)

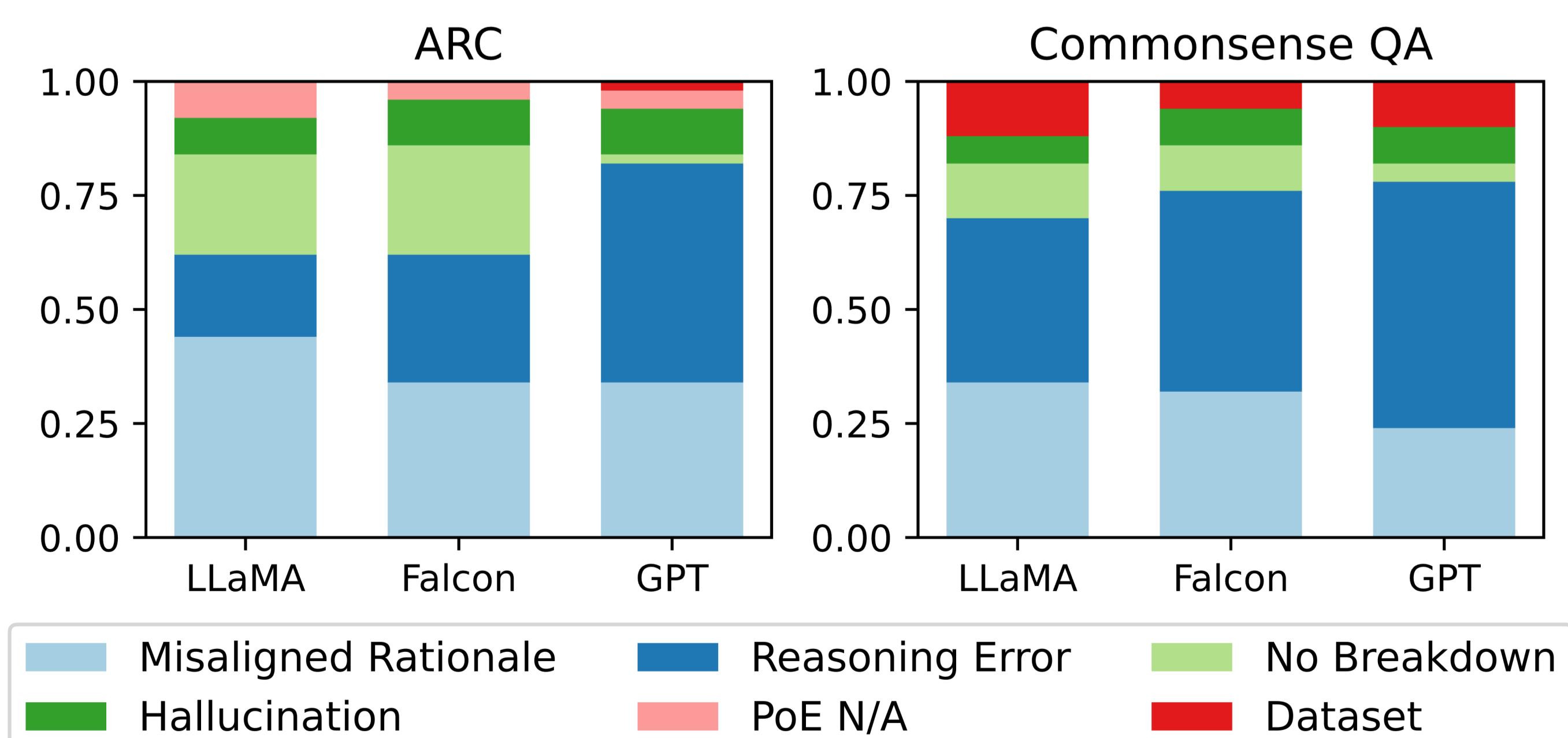
Can LLMs perform **Process of Elimination** Reasoning with Chain-of-Thought?

When there's only two choices, **Directly Answering** and **Process of Elimination** should be consistent...

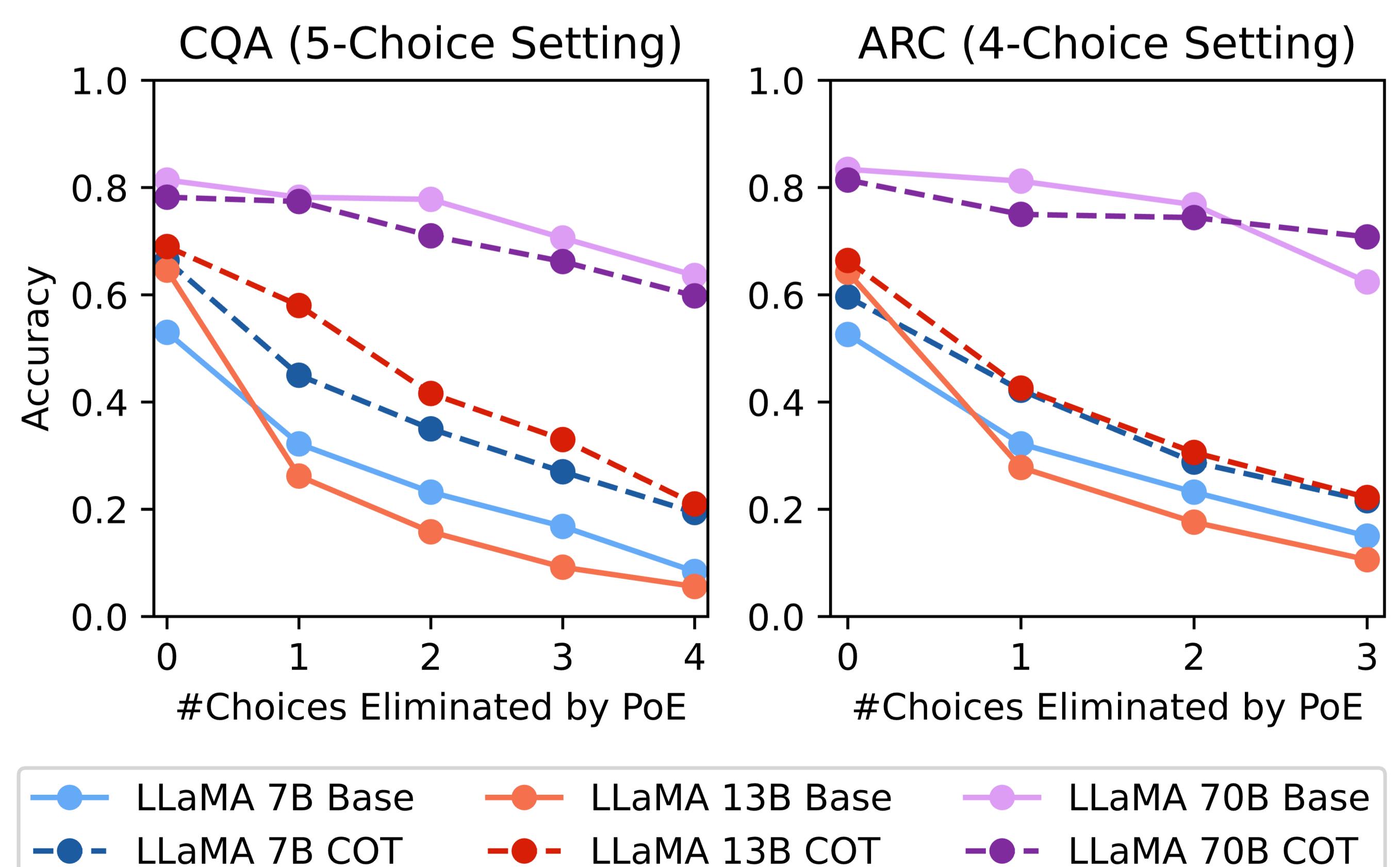


But LLMs are **significantly worse** at Process of Elimination!

Why does Process of Elimination fail?



Can Process of Elimination be used **iteratively**?



Most common errors:

1. **Misaligned Rationale:** Does “opposite” task
2. **Reasoning Error:** Logical error in rationale

Process of Elimination **errors propagate** iteratively