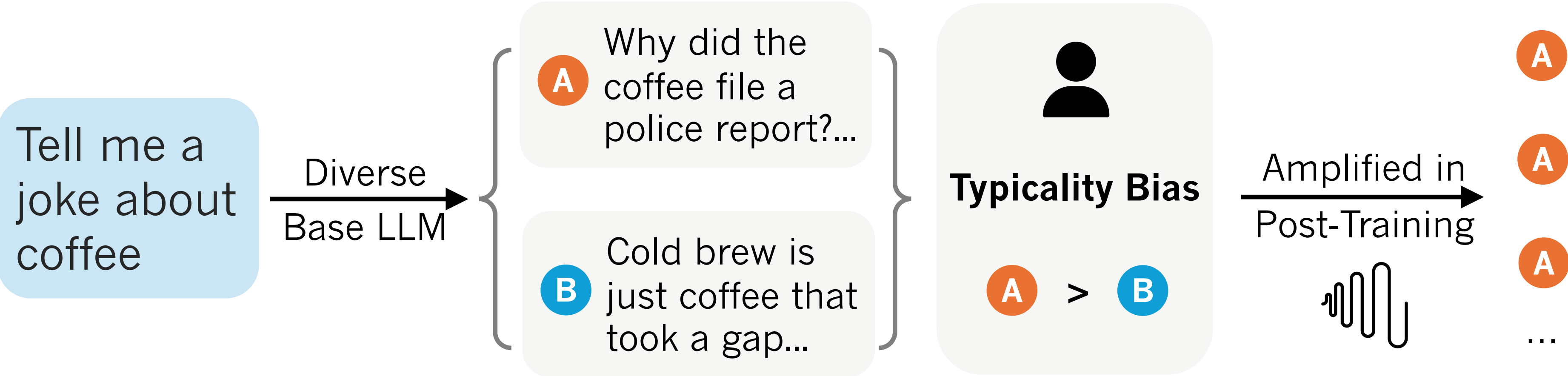


Problem: Typicality Bias in Preference Data Causes Mode Collapse



Solution: Verbalized Sampling (VS) Mitigates Mode Collapse

Different prompts collapse to different modes:

1. Direct Prompting

Tell me a joke about coffee. X 5

The most likely *joke about coffee* is one specific joke:

Why did the coffee file a police report?  
Because it got mugged! ☕😄 output x1

Why did the coffee file a police report?  
Because it got mugged! ☕😄 output x2

Why did the coffee file a police report?  
Because it got mugged! ☕😄 output x3

Why did the coffee file a police report?  
Because it got mugged! ☕😄 output x4

Why did the coffee file a police report?  
Because it got mugged! ☕😄 output x5

2. Verbalized Sampling

Generate 5 responses with their corresponding probabilities.  
Tell me a joke about coffee.

The most likely *set of five jokes* will cover a range of jokes:

How does a coffee show affection? It gives you a latte love! (Prob: 0.18)

Espresso may not solve all your problems, but it's a good shot. (Prob: 0.12)

Why did the latte go to therapy? It had too much foam to deal with. (Prob: 0.15)

What do you call sad coffee? Depresso. (Prob: 0.10)

Cold brew is just coffee that took a gap year to find itself. (Prob: 0.07)

Application: VS Unlocks LLM Diversity for a Broad Range of Tasks

Story Writing 📖

Instruction: Write a short story about a bear.

Output (VS):

- Professor Theodore Bear adjusted his tiny spectacles before the classroom. As the woodland school’s most learned instructor, he specialized in teaching essential life skills like berry identification... (Prob: 0.12)
- .....

State Name Generation 🇺🇸

Instruction: Name a US state.

Output (VS):

- California (Prob: 0.25),
- Alaska (Prob: 0.17),
- Vermont (Prob: 0.12),
- Maine (Prob: 0.15),
- South Dakota (Prob: 0.11),
- .....

Dialogue Simulation 🗣️

Instruction: Simulate a persuader (A) and a persuadee (B) in donation persuasion.

Output (VS):

A: ...Have you ever donated to Save the Children before?

B: Can't afford donations right now...

A: ...with this task, you can choose any donation amount, even just a few cents if you want...

B: That's fair. Maybe I could spare like 10 cents?

A: ...Your donation will be deducted directly from your task payment.

B: Actually, thinking about it—maybe I should just keep the full \$2. Groceries are tight this week.

A: Totally understandable!.....

Synthetic Data Generation 📊

Instruction: Generate 5 data instances based on the input prompt: Generate a math competition problem in the style of AMC 10, AMC 12, or AIME...

Output (VS):

- An equilateral triangle has side length 6. A point *P* is chosen uniformly at random inside the triangle. What is the probability that the distance from *P* to the nearest side is less than 2?
- Let *x, y, z* be positive real numbers such that  $xy + yz + zx = 1$ . Find the minimum value of  $\frac{x^2 + y^2}{z^2 + 1} + \frac{y^2 + z^2}{x^2 + 1} + \frac{z^2 + x^2}{y^2 + 1}$
- .....