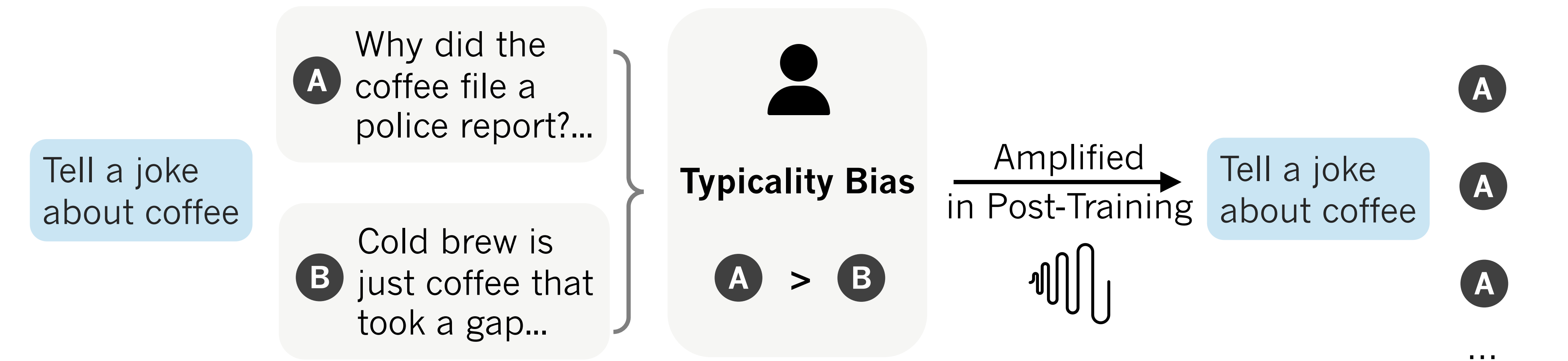


**Problem: Typicality Bias in Preference Data Causes Mode Collapse**



**Solution: Verbalized Sampling (VS) Mitigates Mode Collapse**

- Different prompts elicit different modes

**Direct Prompting**

(1) Prompt for an instance  
⇒ the mode instance

Tell a joke about coffee X 5

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

**Verbalized Sampling Prompting**

(2) Prompt for a distribution  
⇒ the mode distribution

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

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 Wide Range of Tasks**

**Story Writing**

Diversity

VS

Prob

“Generate 5 responses with prob lower than...”

**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**

Direct VS

Uniform

**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  $\frac{x^2 + y^2}{z^2 + 1} + \frac{y^2 + z^2}{x^2 + 1} + \frac{z^2 + x^2}{y^2 + 1}$
- .....