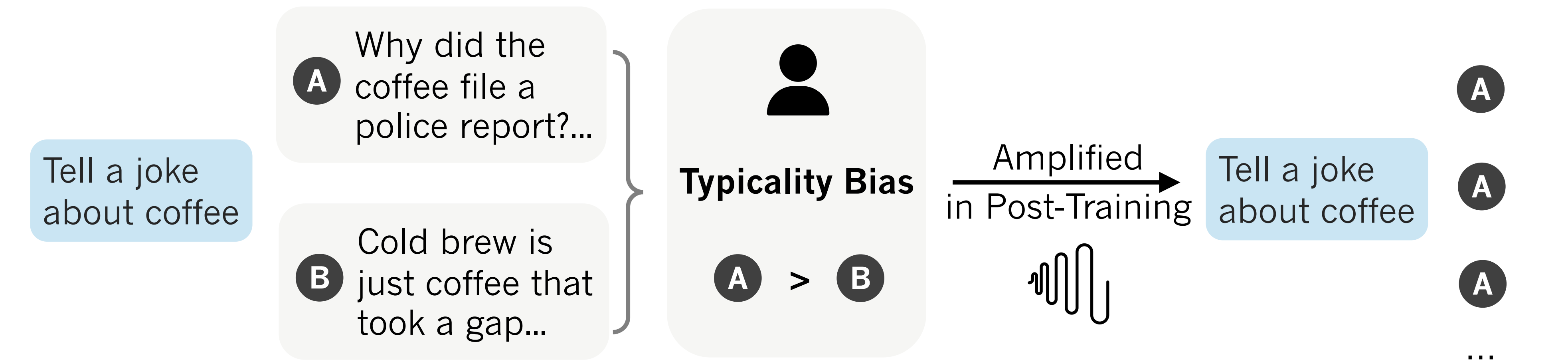


Problem: Typicality Bias in Preference Data Causes Mode Collapse



Solution: Verbalized Sampling (VS) Mitigates Mode Collapse

- Different prompts elicit different modes

Direct Prompting

(1) Prompt for an instance
⇒ the modal 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 modal 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)

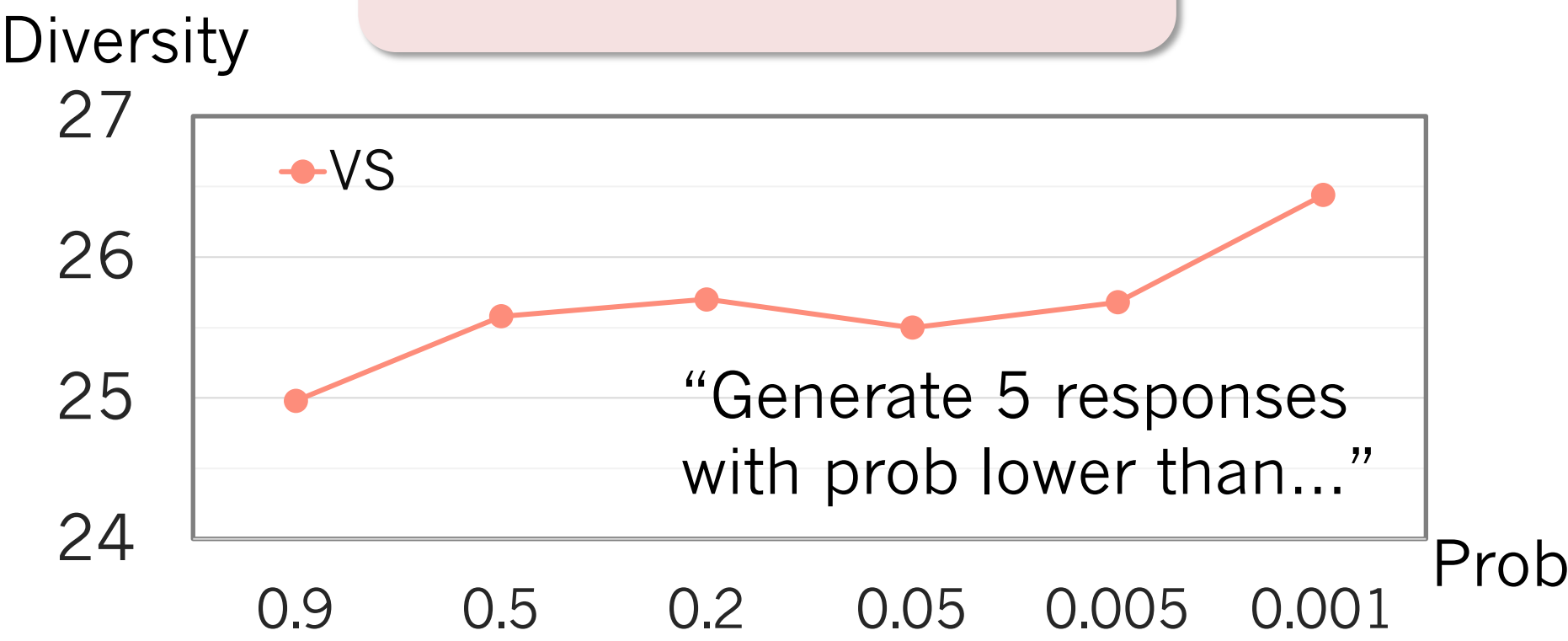
Why did the latte go to therapy? It had too much foam to deal with. (Prob: 0.15)

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

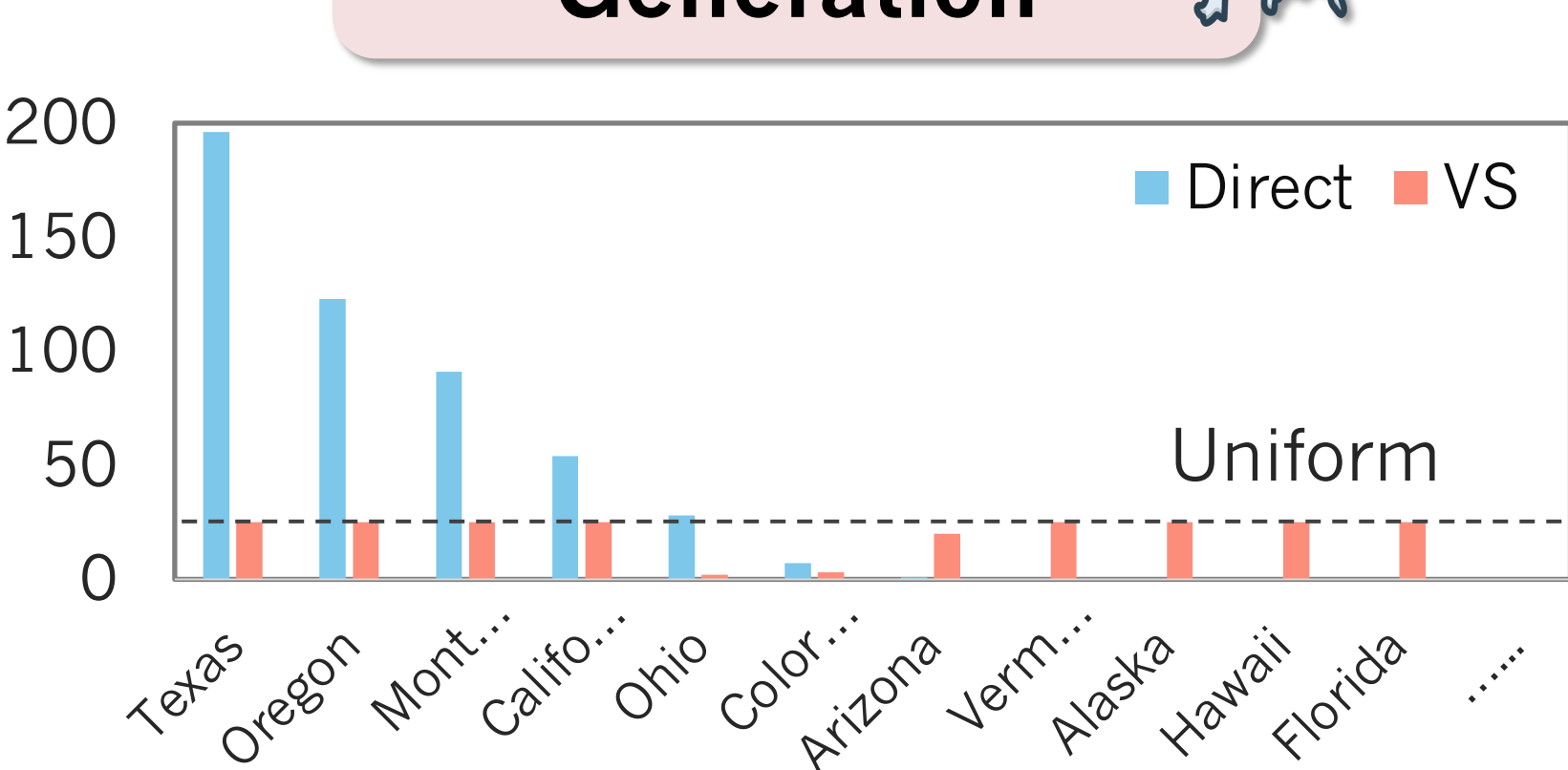


Instruction: Write a short story about a bear.

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