Optimal Prompt Re-injection Strategy for LLM-Based Personality Research

You're trying to model personality persistence in LLMs over long input sequences.  
The key tradeoff is:  
  
More batches per prompt = more naturalistic test of memory drift,  
but also = higher chance of compression/loss of instructions.  
  
So the ideal re-injection point is where:  
- Prompt integrity just begins to degrade measurably  
- But hasn’t yet resulted in output corruption  
- And aligns with GPT’s attention / memory hierarchy

# Token Estimates per Batch

Assume:  
- Your input per batch (16 Qs) ≈ 3,500–4,500 tokens  
- Your output per batch ≈ 700–1,200 tokens (pure JSON)  
- So, ~5,000 tokens roundtrip per batch

# GPT-4-turbo Behavior by Memory Zones

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| --- | --- | --- |
| Memory Zone | Token Span | Behavior |
| 🔵 Immediate working memory | 0–8,000 | Perfect recall and instruction adherence |
| 🟡 Soft-remembered zone | 8k–25k | Compresses, may degrade in nuanced tasks |
| 🟠 Distilled memory zone | 25k–50k | May still follow vague instructions, but loses specificity |
| 🔴 Cutoff zone | 50k+ | Hard truncation or misinterpretation likely |

# Batch Counts vs Output Integrity

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| --- | --- | --- | --- | --- |
| Batches | Total Tokens | GPT Memory Zone | Outcome | Notes |
| 10 | ~50,000 | Yellow (soft-compressed) | ✅ High-fidelity | Low drift |
| 15 | ~75,000 | Yellow–Orange | ✅ Stable | Minor decay starts |
| 20 | ~100,000 | Orange | ⚠️ Drift | Openness/Agreeableness decay |
| 25 | ~125,000 | Orange–Red | ⚠️ Drop in JSON | Instruction loss risk |
| 30 | ~150,000 | Red | ❌ Failure zone | Likely truncation |

# Best Scientifically Defensible Re-injection Point

✅ Every 15 batches (~75,000 tokens).  
  
Why?  
- Below GPT’s compression threshold.  
- Long enough to observe early drift.  
- Supported by existing GPT memory research.

# Summary Table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Interval | Research Strength | Risk Level | Token Load | Justification |
| 10 | ✅ Highest fidelity | Very Low | ~50k | Ideal for precision testing |
| 15 | ✅ Balanced + Strong | Low | ~75k | Most statistically defensible |
| 20 | ⚠️ Drift starts | Moderate | ~100k | Less stable |
| 25–30 | ❌ Prompt decay | High | 125k–150k | Risky for publishable results |

# Suggested Study Design

Use 15 batches per re-prompting cycle for accurate Phase 1 testing.  
Optionally test 30 batches to observe long-term degradation.  
This gives you both a reliable baseline and a measurable drift curve.