Prosody-on-Demand:
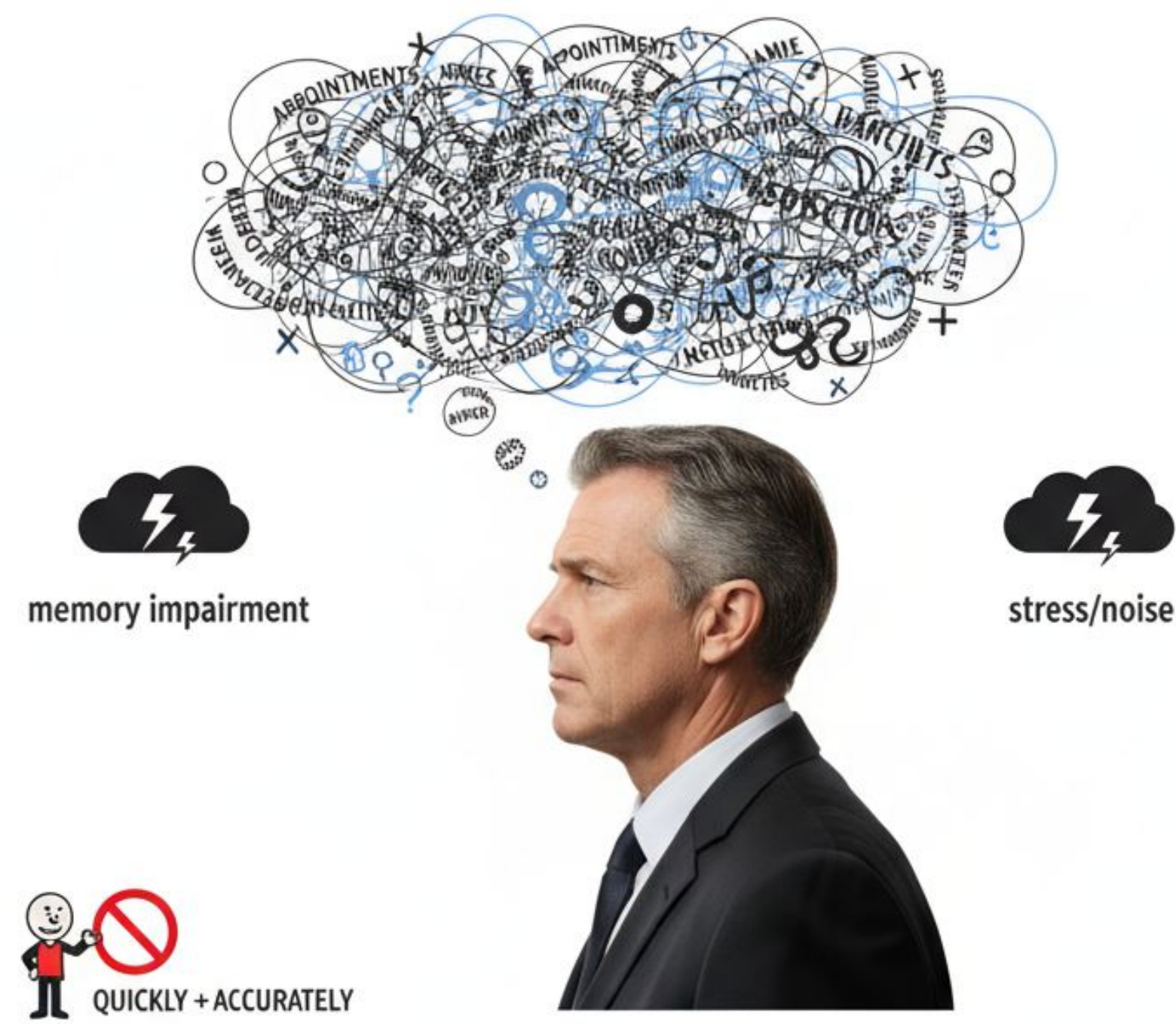# Proposal for an Active Earplug to Support Memory Recall
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1. Problem

- **Low retention from flat speech:**
  Neutral/low-prosody speech is encoded weakly, so details are lost.

- **Daily impact:**
  Missed instructions and reduced independence for people with memory difficulties.

- **Not only clinical:**
  Under stress/noise/fatigue, healthy listeners' recall of spoken details also drops.

3. Why It Works

- **Prosody boosts memory:**
  Rhythm and intonation give the brain timing cues that make speech easier to encode and recall.

- **Everyday proof:**
  Rhymes and chants ("*one, two, buckle my shoe*") show how patterned speech sticks better.

- **Scientific evidence:**
  Alzheimer's patients remember sung/prosodic material more reliably than neutral speech (*Simmons-Stern et al., Neuropsychologia, 2010*)

2. Solution

- **Content-preserving real-time transform:**
  neutral → prosodic speech; [words]/meaning unchanged.

- **LLM-guided prosody:**
  a high-speed streaming LLM selects rhythm/intonation at phrase/sentence boundaries.

- **Low-delay re-synthesis for listening/learning:**
  renders the prosodic output fast enough for talks, briefings, and media.

4. Development Roadmap

Prosody Engine R&D – Design a high-speed, content-preserving LLM for neutral → prosodic conversion.

Bench Prototype – Test end-to-end latency, intelligibility, and quality in controlled lab setups.

Pilot Study (Lab) – Evaluate memory gains vs neutral speech; assess usability and acceptability.

Earplug Hardware α – Build ear-level prototype with placeholder for embedded AI converter.

Verification & Pathway – Validate device performance, address ethics/IP, and prepare for health-standards compliance.

Neuttral Speech   Prosodic Speech

Active Earplug

EEG