Neuroscience-Based Mental Performance Training

Cognitive Optimization Through Structured Progression

Problem Statement

Sustained cognitive performance requires deliberate training of attention control, emotional regulation, and metacognitive awareness. Most existing solutions treat focus as a binary state or rely on external scaffolding (apps, timers, blockers) that create dependency rather than capability. What is needed is a system that cultivates autonomous mental performance through structured practice and validation.

Solution Framework

A neuroscience-grounded training system that develops cognitive autonomy through three foundational capacities: attention training (sustained focus independent of external stimuli), emotional regulation (recognizing and modulating affective states without suppression), and metacognitive awareness (accurate self-assessment of cognitive state and capacity).

The system does not impose focus — it cultivates the user's capacity for self-directed attention through deliberate practice validated by empirical measures.

Core Architecture

- TAS-20 alexithymia assessment gates users into three training tracks based on baseline emotional awareness
- Structured progression through exercises targeting specific cognitive capacities (breath awareness, body scan, open monitoring, metacognitive journaling)
- On-device Whisper transcription for voice-based self-assessment without cloud dependency
- Gate criteria system — users advance only after demonstrating measurable improvement in target capacity
- Local-first data architecture (Flutter + Drift) — all training history stored on device, no cloud sync required

Technical Implementation

Android application (Flutter) with offline-capable operation. Voice transcription via on-device Whisper model eliminates latency and privacy concerns. Training data stored locally in SQLite (Drift ORM), enabling longitudinal self-analysis without external dependency.

Three user tracks modeled as structured data rows rather than separate code paths — track selection determined by TAS-20 score, exercise progression governed by completion of gate criteria, advancement logic identical across tracks.

Market Positioning

Target users: knowledge workers, students, and high-performance individuals seeking cognitive optimization without pharmaceutical intervention. The system fills the gap between meditation apps (which lack structure and validation) and clinical interventions (which treat pathology rather than cultivate performance).

Revenue Model

One-time purchase ($30-50) or subscription ($10/month). No in-app purchases or freemium gates — the entire training system is delivered upfront. Revenue driven by user acquisition and retention, not engagement manipulation.

Competitive Landscape

Headspace and Calm provide guided meditation but lack progression structure and empirical validation. Focus@Will and Brain.fm provide ambient audio but build dependency rather than capacity. The mental performance system is distinct: it trains autonomous cognitive control through structured practice, not passive consumption.

Development Status

Architecture complete. Flutter implementation operational with on-device Whisper integration, Drift local storage, and TAS-20 gating. Three training tracks defined with exercise progression and gate criteria. Next: user testing to validate training effectiveness and refine progression thresholds.