



Australian Government

Department of Defence
Science and Technology

Cognitive Gym

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C&B STC

Land Human Sciences

Land Division

DST Group

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Background

- Army piloting 2 **Human Performance Centres (HPCs)**
 - one hosted by 3 Brigade (3BDE) , Townsville
- HPCs aim: ADF personnel can **outperform** (physically and cognitively) and **outlast** an adversary that is intelligent, agile, and adaptable
- DST is supporting Army in the establishment and **evaluation** of the HPCs
- C&B STC has developed a **Cognitive Fitness Framework (CF2)** to guide research in support of the HPCs
- The **Cognitive Gym** concept is nested in the CF2

Cognitive Fitness Framework

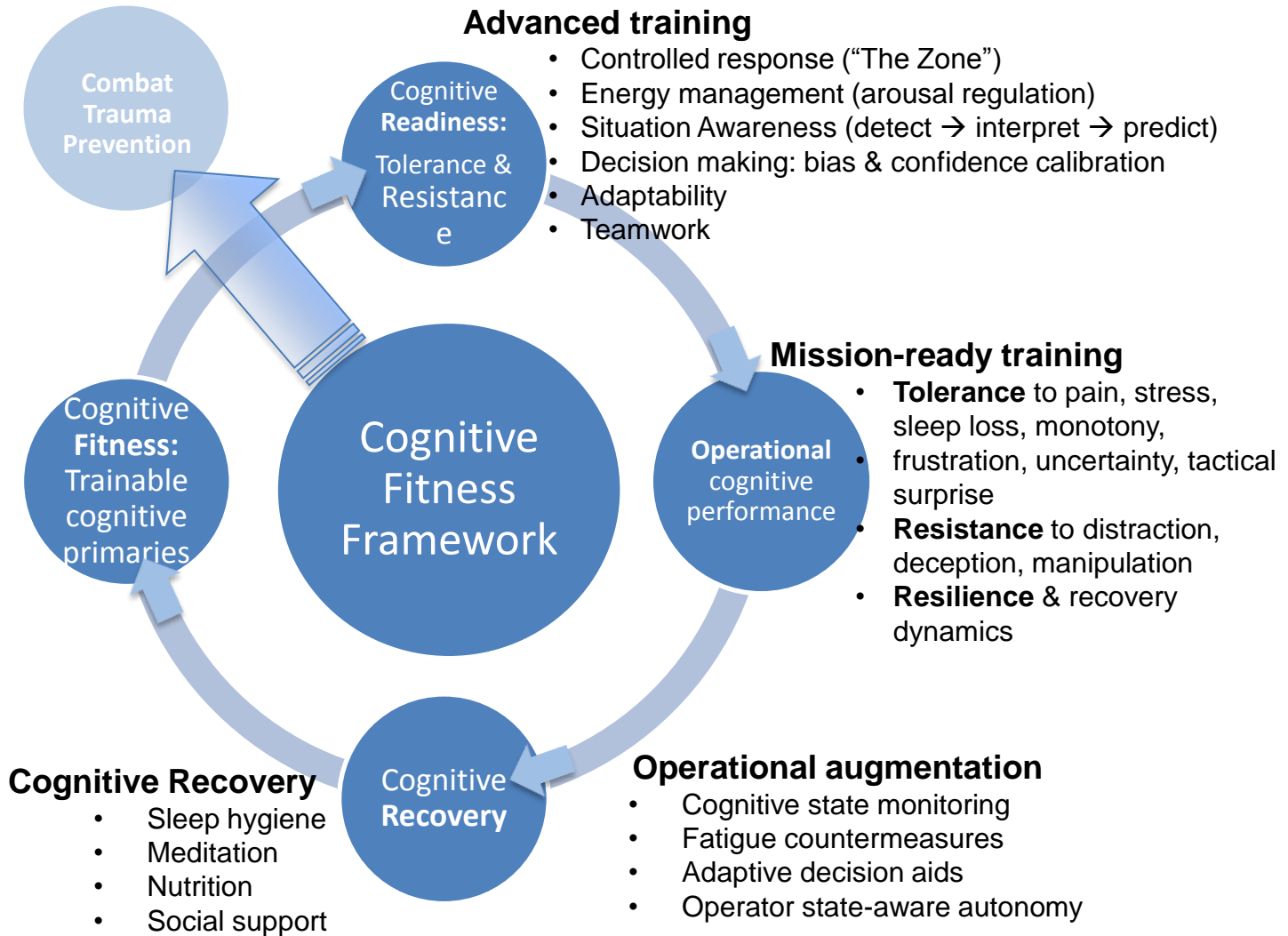
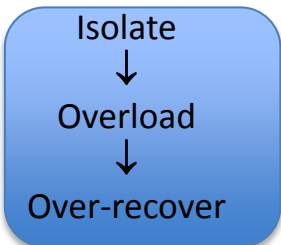
Cog Gym

Foundational Training

- Self-awareness
- Attention skills
- Task Switching
- Impulse control
- Co-action



Gold-standard Training:



Cognitive Gym -Overview

- analogous to a physical gym
- allows Army personnel to enhance their cognitive performance and/or develop skills that enable them to maintain cognitive performance under stress
- still in its development stages

Knowledge Gaps

- What are the key operationally-relevant cognitive attributes?
- How do they map onto soldier competencies?
- How trainable are they?
- What are the best-practice tools to assess them?
- What types of training do they require?
(e.g., foundational vs. mission-specific)
- Best-practice training protocols/design principles?
(e.g., modalities/dosage/periodisation/training phases?)
- Potential inclusions: executive function training, dietary supplements, biofeedback, martial arts

Current Status

- Identification of key **trainable** cognitive attributes - critical to integrated framework for human performance & resilience
- Down-selection of **cognitive primaries** for Cognitive Gym trials
- DST **Cognition Lab** stood up to evaluate assessment tools & training protocols
- **CogniPlus** test drive complete → advice on HP trial inclusions in progress

- **Collaborations** established to progress evaluation of assessment tools & training protocols:

- Current RA (U of Sydney)
- CTD round 21 / Innovation (U of Newcastle): biomarkers of resilience and VR-based training
- HPRnet project (U of Canberra/AIS)
- Alertness CRC, RAAF AvMed



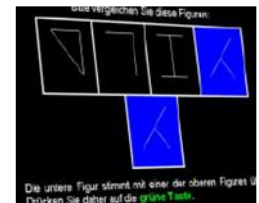
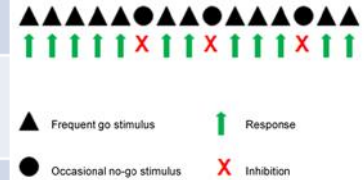
- **Impact:** selecting best-practice cognitive assessment & training protocols HPC to deliver **measurable gains in cognitive fitness** → add to overall soldier effectiveness (both **performance** and **resilience**)

HPC – Vasey Resilience Centre 3BDE

- Peak Performance Program (P3)
- 3 week course; groups of 20
- Holistic approach:
 - Strength and conditioning
 - Nutrition
 - Health awareness
 - Social and community engagement
 - Individual character enhancement
 - Combat shooting
 - Cognitive enhancement

Current Status: Training & Assessment constructs

Test	Time budget (minutes)	Target skills
COG	20	Cognitrone (attention & concentration) (CogniPlus = FOCUS and SELECT)
DT	15	Determination Test (reaction time, stress tolerance, attention) (No CogniPlus equivalent)
INHIB	10	Response Inhibition (go-nog; behavioural shift) (CogniPlus = HIBIT-R)
NBN	11	Nonverbal n-back (visual Working Memory capacity) (CogniPlus = NBACK)
SIGNAL	20	Signal Detection: Sustained focussed attention (CogniPlus = VIG and SELECT)



Day 1	Day 2	Day 3	Day 4	Day 5	Day 6		Final Day
VTS Cognitive Baseline	Cogniplus Training Program 1	Cogniplus Training Program 1	Cogniplus Training Program 1	Cogniplus Training Program 2	Cogniplus Training Program 2	and so on until the 4 Cogniplus training Programs have been completed	VTS Cognitive post-intervention assessment

Performance Skills: Example

- Mental Skills Foundation
- Attention Control
- Building Confidence
- Energy Management
- Goal Setting
- Imagery



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Mental Skills Training With Basic Combat Training Soldiers: A Group-Randomized Trial

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Cognitive skills training has been linked to greater skills, self-efficacy, and performance. Although research in a variety of organizational settings has demonstrated training efficacy, few studies have assessed cognitive skills training using rigorous, longitudinal, randomized trials with active controls. The present study examined cognitive skills training in a high-risk occupation by randomizing 48 platoon (N = 2,432 soldiers) in basic combat training to either (a) mental skills training or (b) an active comparison condition (military history). Surveys were conducted at baseline and 3 times across the 10-week course. Multilevel mixed-effects models revealed that soldiers in the mental skills training condition reported greater use of a range of cognitive skills and increased confidence relative to those in the control condition. Soldiers in the mental skills training condition also performed better on obstacle course events, rappelling, physical fitness, and initial weapons qualification scores, although effects were generally moderated by gender and previous experience. Overall, effects were small, however, given the rigor of the design, the findings clearly contribute to the broader literature by providing supporting evidence that cognitive training skills can enhance performance in occupational and sports settings. Future research should address gender and experience to determine the need for targeting such training appropriately.

Keywords: cognitive training, sport psychology, performance, basic combat training, soldiers

Numerous studies have examined how training can benefit employee outcomes, including skills acquisition (e.g., Taylor, Russ-Eli, & Chan, 2005), self-efficacy (e.g., Frazier & Geringer, 2000), and job performance (e.g., Arthur, Bennett, Edens, & Bell, 2003). Although training content may differ across organizations, training that emphasizes cognitive skills has been identified as particularly effective (Aguinis & Kraiger, 2009). Conceptualized broadly, cognitive skills training encompasses self-instructional

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- Questions?