Harnessing the Human Dimension

Measuring and Improving Cognitive Performance

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Proliferation of Technology
Evolving automation

- Greater automation

- Less manpower

- Human Dimension is Primary differentiator

The Changing Human Dimension

Less numbers, more responsibilities

- More warrior isolation
- More information processing
- More critical decision-making
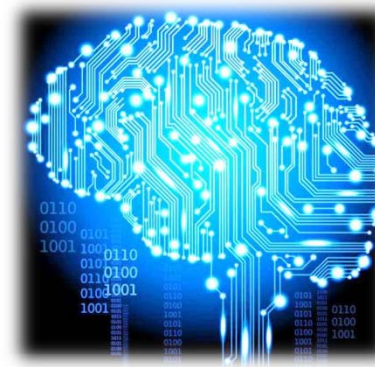- Greater risk of human error due to capacity overload

Redefining the Human Advantage
Train, monitor and optimize Peak Performance

- Train to peak performance
- Monitor human physiological and cognitive biometrics during performance
- Identify performance threats
- Optimize to sustain peak performance

The Performance Loop
Continuous processing

Sensory input
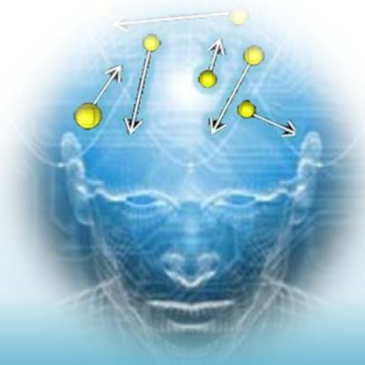
Absorbing a complex scene

Perception

Understanding visual cues

Anticipating how the scene will evolve

Cognition

Evaluating options
Making decisions
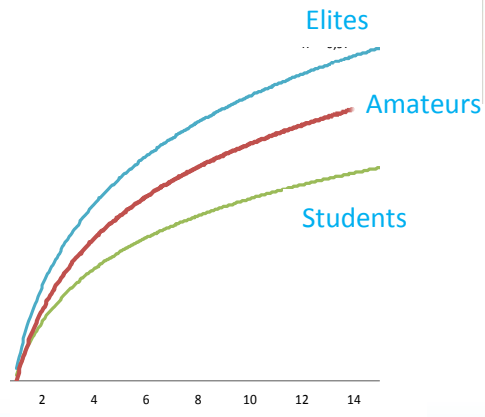
Execution

Complete the Action

Extraordinary Learning Skills

To process complex and neutral dynamic visual scenes

- Neutral cognitive task

- Steeper learning rate

- Superior adaptivity

Elites

Amateurs

Students

2 4 6 8 10 12 14

nature.com

31 January 2013

Sports stars' strong visual learning skills

Professional athletes may be able to learn how to process complex, dynamic visual scenes faster than other people, a *Scientific Reports* paper suggests.

Latest news

- RNA fragments may yield rapid, accurate cancer diagnosis
- Ion collider flagged for closure
- South Korea launches satellite to join global space club

Biological Motion Perception
The fundamentals of body language
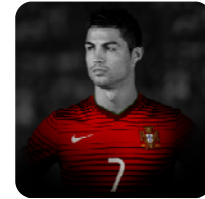
Advanced Cue Recognition

Action prediction

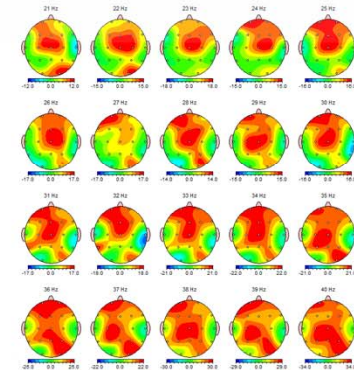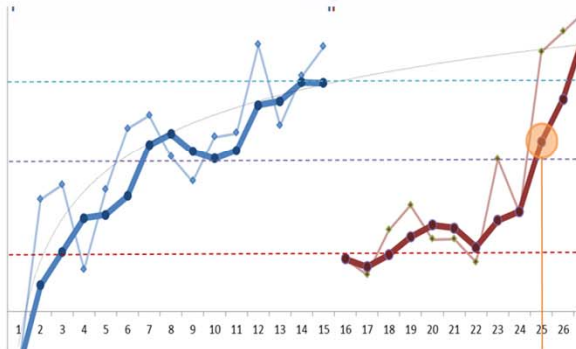- Pure cognitive task

- Multiple object tracking

- Elites superior

Superior Perception

- translates to superior awareness and action
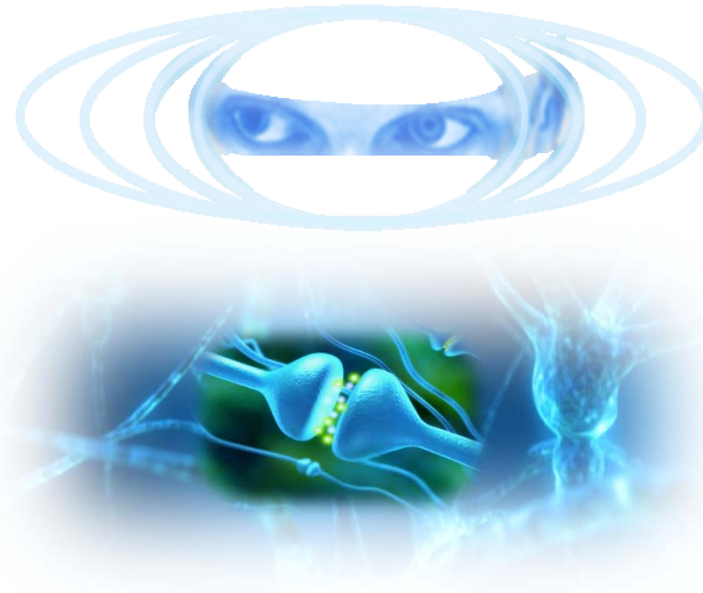
How to Measure and Train Cognitive abilities?
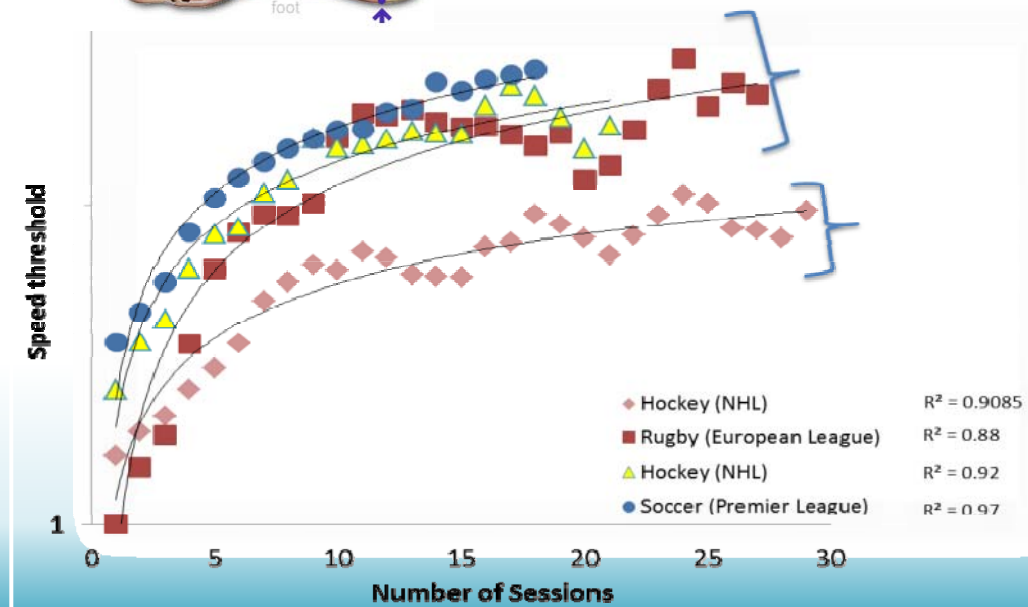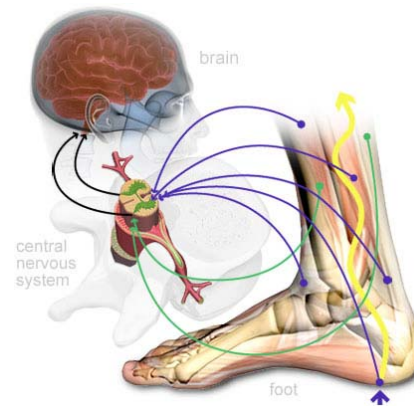
NeuroTracker

3D Multiple Object Tracking

- Measures attention

- Rapid learning

- Integrates with other tasks

Cognitive Load Effects
Powerful influences on learning

- Combined load drops
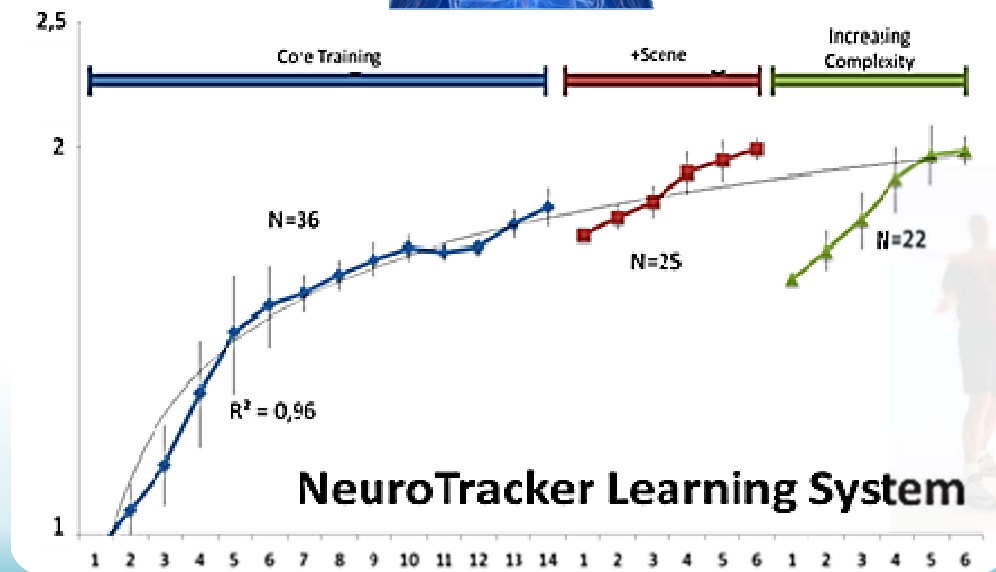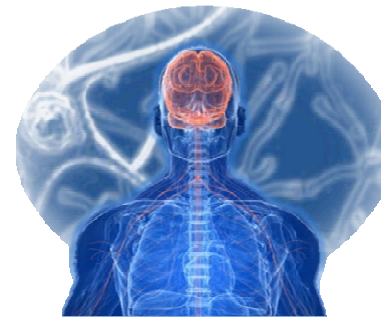
- Progressive loading

- Accelerated learning

Functional Measures

Progressive Threshold of adaptive Learning

- Optimize thresholds

- Progressive physical and cognitive loading

- Skill specific functional measures
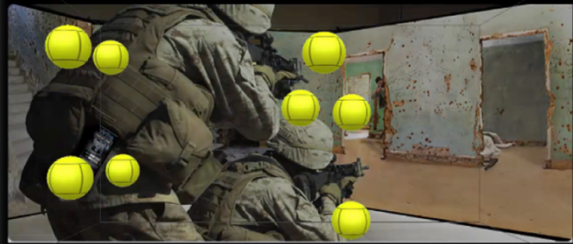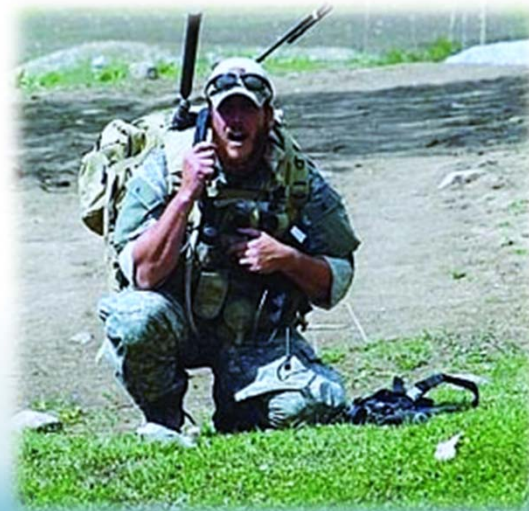
- Accelerated adaptation

NeuroTracker Learning System

Dual-Task Testing

Measuring skills integration and decision-making under pressure

- Functional Measure of the impacts of multi-tasking

- Assess critical activities

- Train and measure tactical scene recognition and tactical decision making while maintaining situational awareness

Training attention flexibility
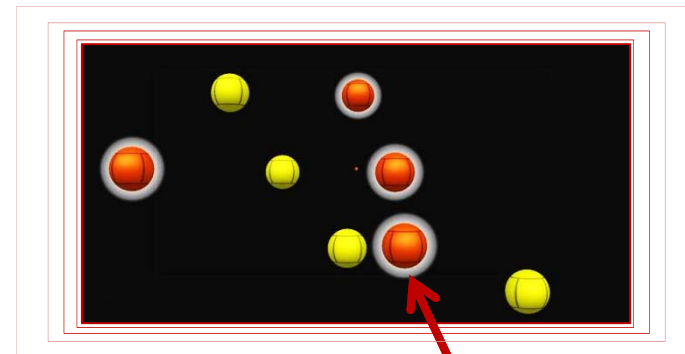
Live Tracking and Performance Optimization
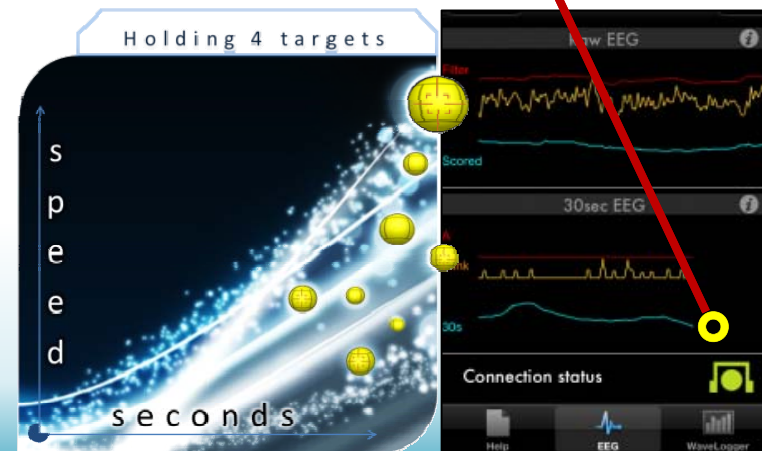
NeuroTracker & Real-Time EEG
Closed neurofeedback loops

- EEG Alpha Peaks detects loss of NeuroTracker

- Targets are immediately refreshed (red)

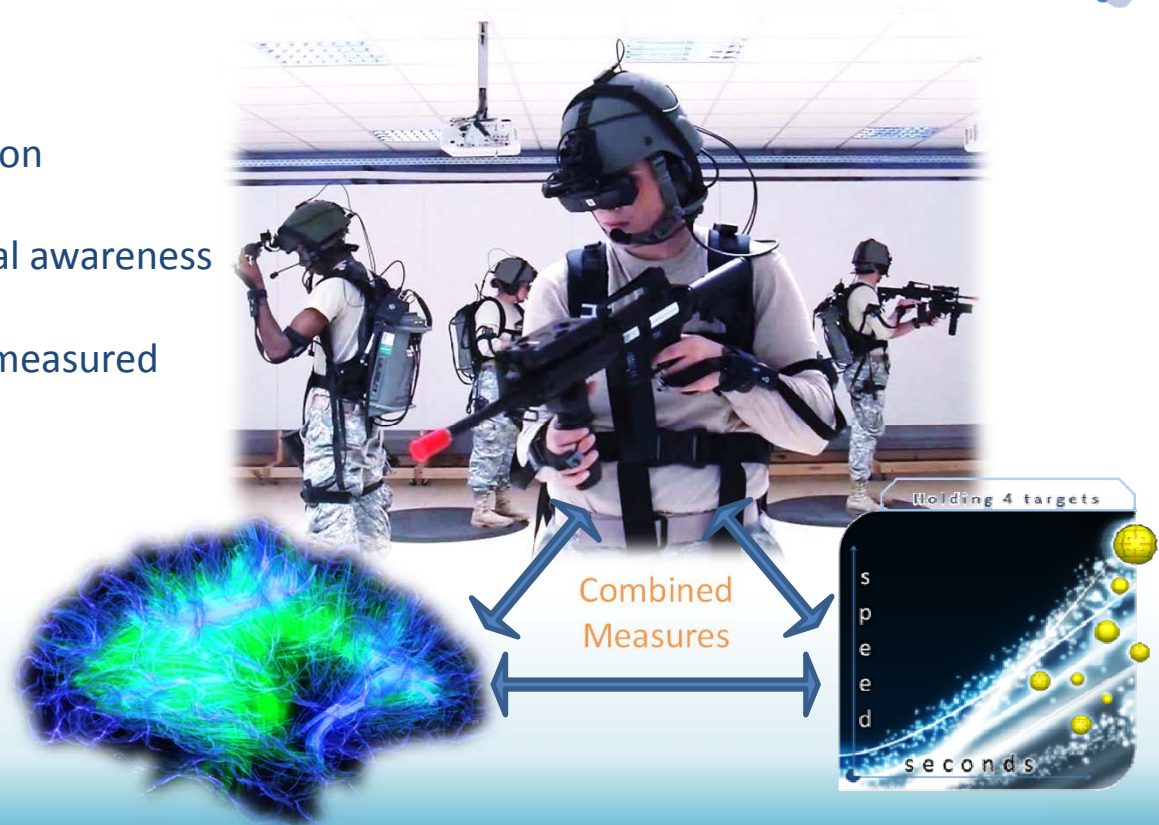- Continuous & automated peak NeuroTracking

Refresh

Dual-Task Active Baseline

Dynamic measures of neural activity

- NeuroTracker + EEG allows full action

- NeuroTracker represents situational awareness

- Impacts on situational awareness measured

JTAC demands

Combined Measures
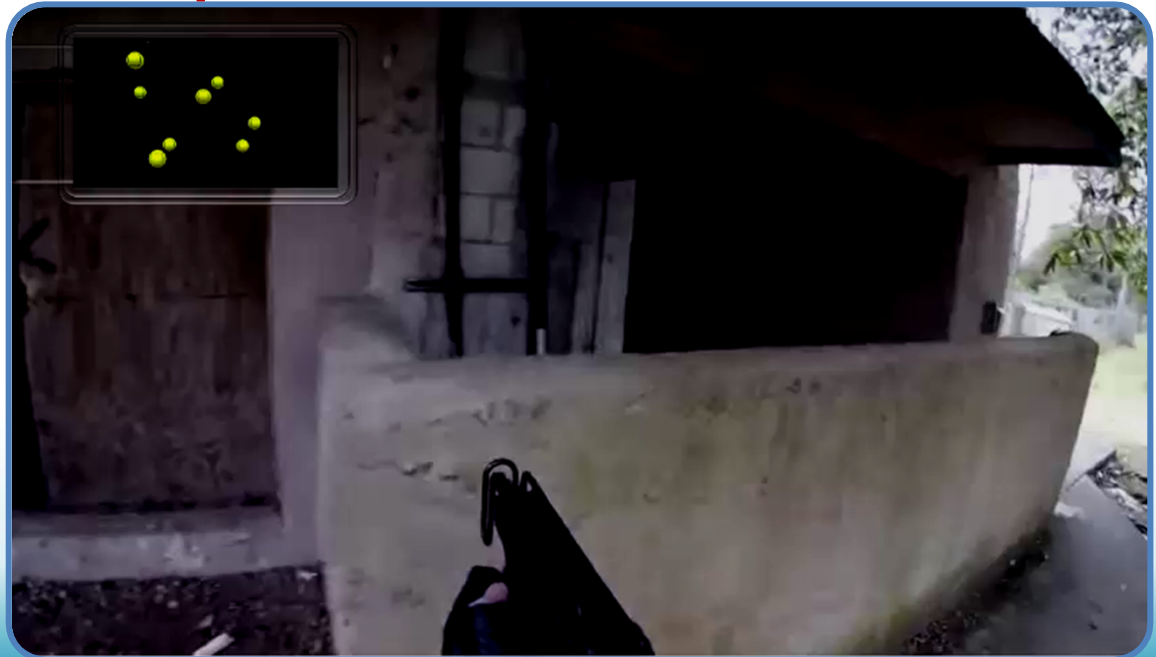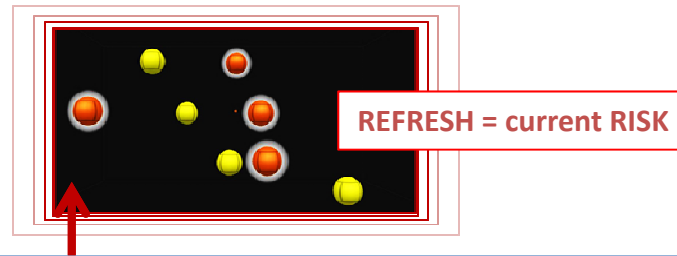
Holding 4 targets

speed

seconds

NeuroTracker HUD - Full Live Action

Live situational awareness feedback

- Conditioned multi-tasking

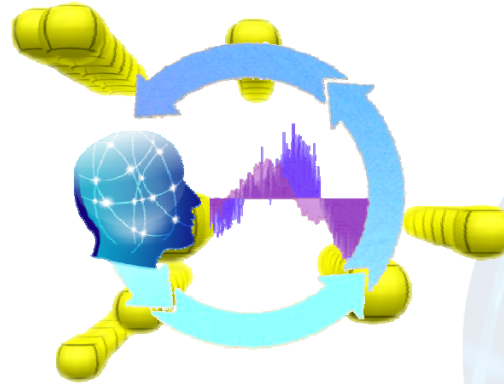- Online awareness state feedback

- Live cues to respond

REFRESH = current RISK

Heightened Conditioning & Performance
- in training and in the field

- Manage higher cognitive loads

- Combined NeuroTracker measure

- Recover situational awareness

Impact of
dual-task

Recovery with
NeuroTuner

Institutionalization
Fully utilizing the human dimension

- Integrate cognitive training into training programs

- Track biometrics & cognitive behaviour

- Optimize cognitive capabilities

Thank You

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