

PUSHING THE BOUNDARIES OF ACHIEVEMENT

A SERIES ON THE LATEST EVOLUTION OF APPLIED NEUROSCIENCE



Thank you for joining us today, along with our
International Partners.



Your Panelists

Alex Kitzes Ph.D.

Clinical Psychologist & Co-Founder of Stronger Brains Inc, USA

Cheryl Chia

Physiotherapist & Founder of Singapore-based BrainFit

Dave Stanley

Director of Learning Ecosystems at LearnFast Australia

Your Presenter - Tom Nugent III

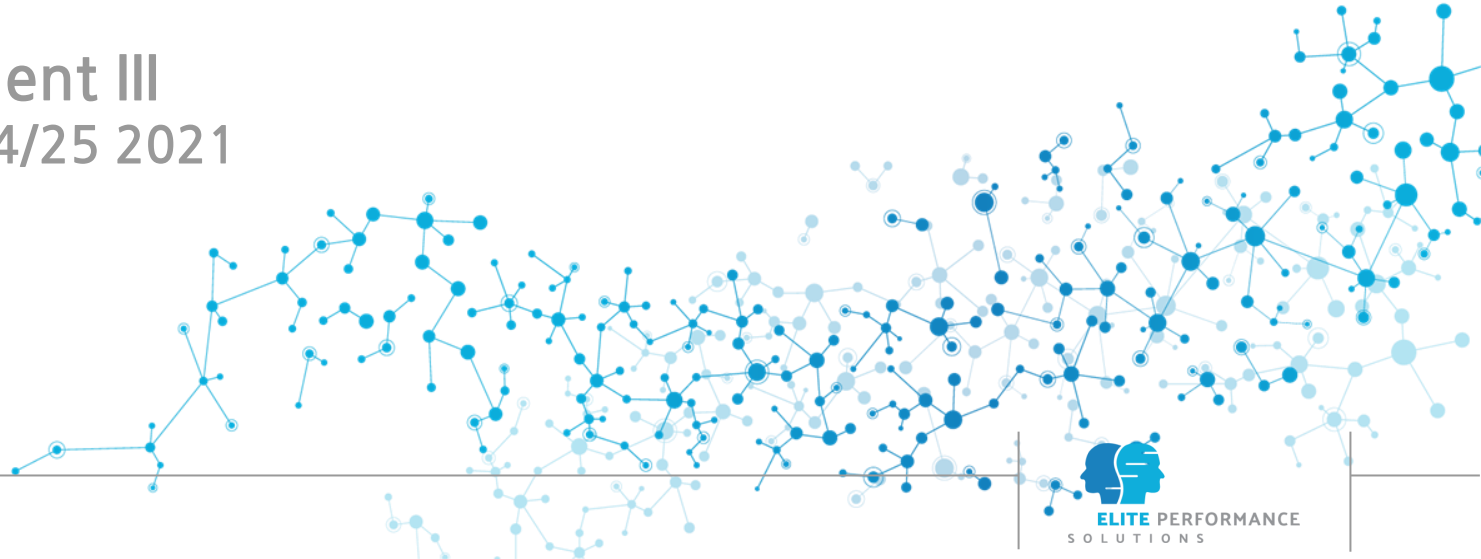
Tom has over 20 years of experience in neuroscience research and program management working with elite organizations ranging from professional sports teams, special operator communities in the U.S. military and abroad, as well as e-sports athletes and teams.

Tom has been involved in well over \$250 million worth of research and development efforts in applied neuroscience and learning domains with a career spanning from the National Institutes of Health (NIH), to the Defense Advanced Research Projects Agency (DARPA), to private sector companies developing bleeding edge neuroscience applications.

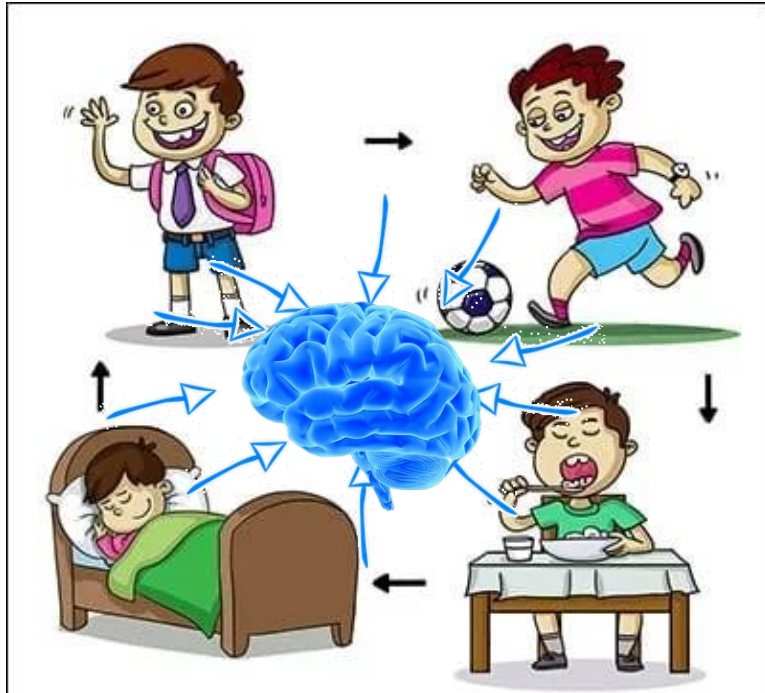
A former Division I athlete and avid gamer, Tom received his undergraduate degree from Princeton University, and his graduate degree from Duke University School of Medicine.

Elite Performance Outside the Classroom

Tom Nugent III
February 24/25 2021



Read, Play, Eat, Sleep!



Work-Exercise-Eat-Sleep... Rinse and Repeat

- Sleep for better learning
- Exercise for improving learning
- Nutrition for improved learning and recovery
- We can train our brain just like our bodies

The brain is at the center of it all!

Athletes who spend >\$1Mil a year on physical maintenance are now learning to think above the neck as well

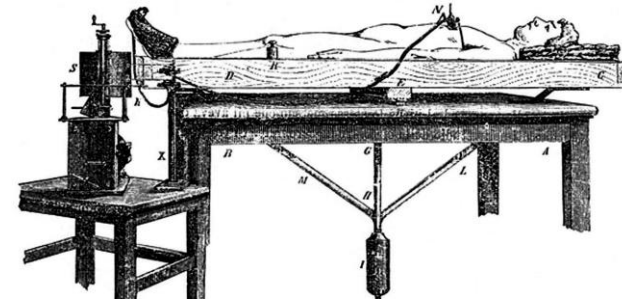
What Are We Doing Here?

- Quick Warm up
- Neuro 101
- The Approach
- Testing/Training/Tracking
- Identify/Improve/Invest
- The Athletic Genius
- Efficiency/Structure/Expertise
- Don't forget Gamers
- A Freebie
- Questions

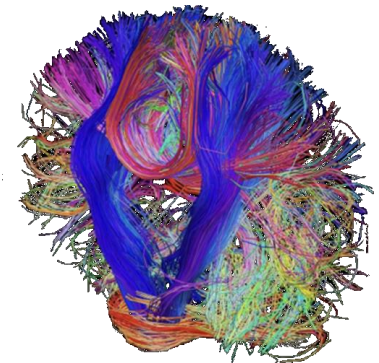
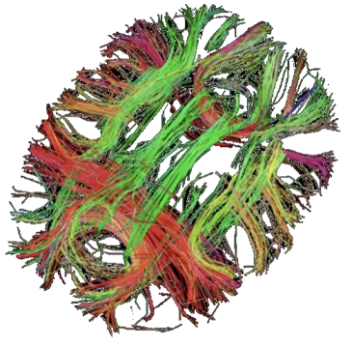


Trained Brains, Endurance, and a History Lesson

- As early as the 1800's researchers were beginning to identify the concept of mental toughness/mind over matter
- Angelo Mosso
- The 'human circulation balance'
- His early research identified that mentally fatigued individuals showed a decrease in muscular contractions and force
- Subsequent studies have shown that mental fortitude, pressure resilience, or grit, could increase an individual's capacity for physical activity, and the tougher you are mentally the more you can do physically



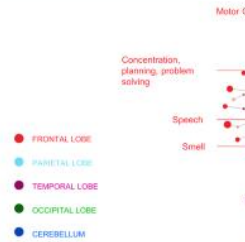
The Amazing Brain



- Up to 100 Billion Neurons
- Each neuron connected to up to 10,000 other neurons
- One thousand trillion synaptic connections

How We Understand It






Brain Anatomy - Functional Organization



Functional Brain Networks



Brainwave Frequencies

HUMAN BRAINWAVES		FREQUENCY (Hz)	CORRELATES	
GAMMA		Heightened perception, learning, problem solving tasks, cognitive processing	30 +	Multi-sensory processing, euphoria, high focus
32 – 100 Hz				
BETA		Awake, alert consciousness, thinking, excitement	13 - 30	Active cognition, intense, concentration
13 – 32 Hz				
ALPHA		Physically and mentally relaxed	8 – 13	Relaxation, reflection, closed eyes
8 – 13 Hz				
THETA		Creativity, insight, deep states, dreams, deep meditation, reduced consciousness	3 - 7	Memory creation, hypnagogia
4 – 8 Hz				
DELTA		Deep (dreamless), sleep, loss of bodily awareness, repair	< 3	Slow-wave sleep
0.5 – 4 Hz				



ELITE PERFORMANCE
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The EPS Approach



QUICK

- Our neurocognitive assessment is conducted remotely.
- Users receive their cognitive skill score in minutes.

IN-DEPTH

- Includes a report with benchmarked metrics (your brain's vital signs) and a brain visualization showing your neural pathways

CUSTOMIZED

- Global brain training to rewire neuropathways.
- **EPS Focus:** Targeted neurofeedback to improve attention and focus.
- **EPS Warm Up:** Pre-test or match warm-up for peak cognitive performance.
- **EPS Cool Down:** Reduce anxiety, improve sleep, and help “turn off” after intense training/events.

NEUROCOGNITIVE

- Periodic, reassessment of cognitive skills to show improvement and comparison to our databases.

PHYSIOLOGICAL

- Measurement of neural pathways to show neuroplastic changes.

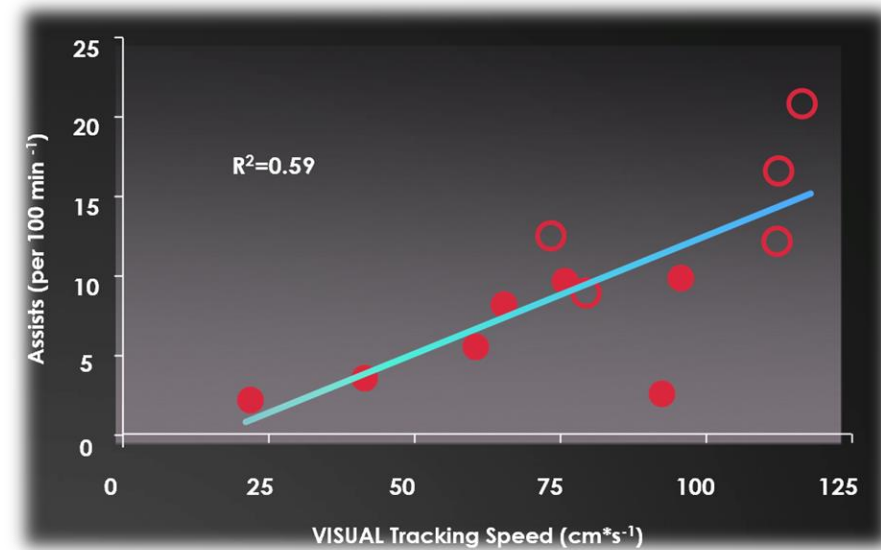
TRAINING EVOLVES WITH YOU



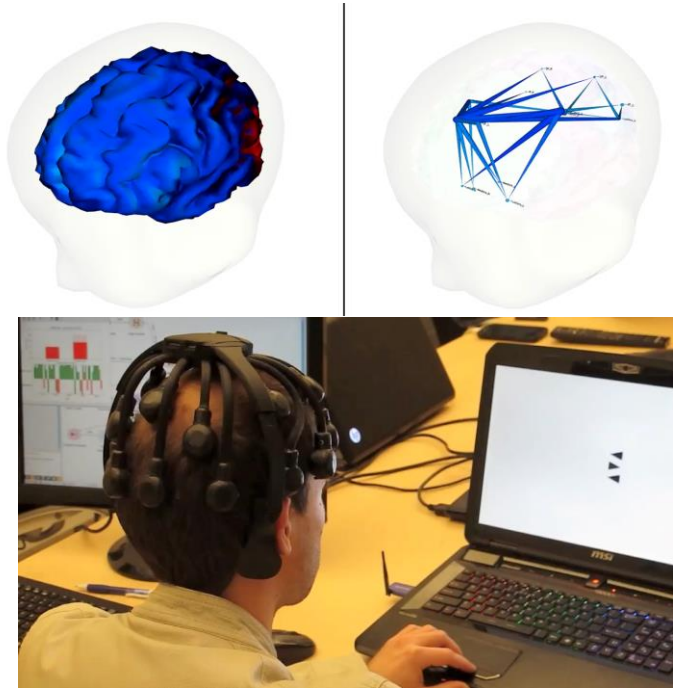
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Why Brain Testing Matters

Faster Brains = Fast Players = Better Players

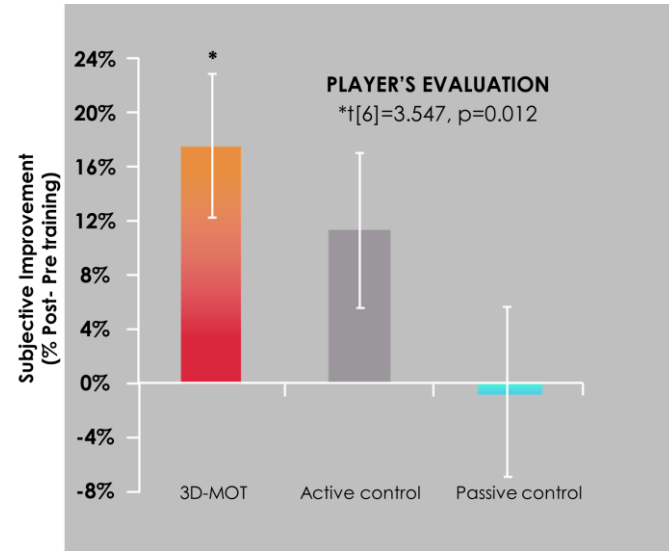
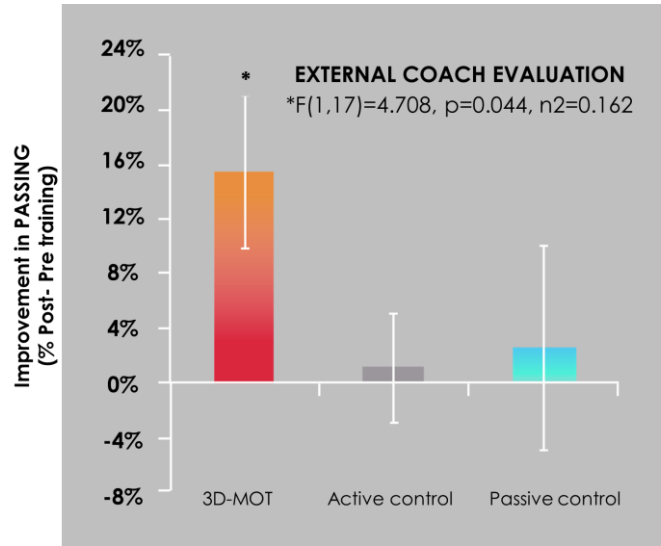


Testing Insight Examples



- Using neurocognitive and neurophysiological assessments, our prior work has shown to be successful in identifying differences between individuals, groups, and positions/skills
- Accelerating Skill Acquisition
- Identify Top of the Class Talent
- Identify different cognitive skill sets related to a player position
- Cognitive Depth Charts
- Identify learning types to be more effective coaches

Why Brain Training Matters



Soccer players who trained their visual-perceptual skills showed **increased passing accuracy** and **improved decision-making** as judged by an independent panel of coaches

Training Insight Examples



- Through targeted neuroplastic training, we've seen significant improvements in cognitive vital signs scoring, EEG indicators of improved network and pathway efficiency, and positive self reporting
- Neuroprotective
- Internal awareness
- Training without testing first is like doing sit ups for improving arm strength
- Complexity is good and needed for continued improvement

Identification of Talent: Recruitment Insight

- The amount of investment that is put into draft selection is massive both from a resource and financial perspective
- Have another layer of insight, adding the human element back into assessments of physicality, character and scholastic achievement. Uncover correlations between the academic calendar and athletic performance
- Neuroperformance is a differentiator. Everyone is measuring physical characteristics, and now massive dollars are invested in advanced 'big data' analytics. By looking at the brain, you get accurate insight based on the individual and not just their historical data



Improving Existing Talent: Athletic Performance

- Quantify coaches' insights
- Customized training program to improve their cognitive capacities that show the greatest room for growth
- Re-assess every few months to show the impact of training, quantify the impact of the calendar grind, and better understand the influences of the season



Investing in You: Health and Career

- Concussive events
- Physical Injuries
- Players on IR/PUP lists
- Prolong careers

40 OVER 40

NHL star Jaromir Jagr just turned 44 but remains an impact player, following the path of these 40 age-defying men and women who showed that 40 doesn't have to mean the end.



The Genius Brains of Athletes



- An elite athlete's skill is more than just muscle memory and being physically strong
- The notion of the dumb jock is completely wrong
- A study of Division I athletes provided evidence that playing sports helps improve auditory processing capability. Suggesting that for kids who are struggling with sensory processing would benefit from the noise reduction benefits of playing sports (Krizman et al 2020)

The Genius Brains of Athletes (efficiency)

- Athletes' brains can complete tasks with a quieter brain; using less neurons and less energy to successfully achieve their goal
- Soccer Obstacle Course
- Revved up and Ready
- Table tennis players study



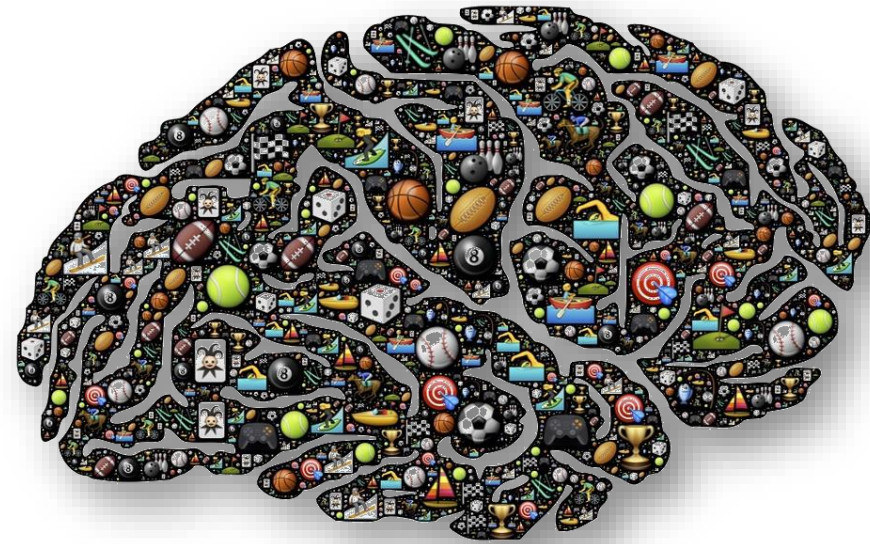
The Genius Brains of Athletes (structure)



- German Jugglers
- Thicc Brains Studies
- Athletes and Musicians
- Italian Free throw Study



The Genius Brains of Athletes (expertise)



- Professional cricket player pitch prediction
- The Quiet Eye of elite athletes
- Is the sky the limit?

The Genius Brains of E-Athletes

- Gameplay involves repeated actions that strengthen networks associated with memory and learning
- Game types have different impacts
- Laser Focus
- More is More
- Cognitive skills on par with elite athletes in traditional sports



The Genius Brains of E-Athletes

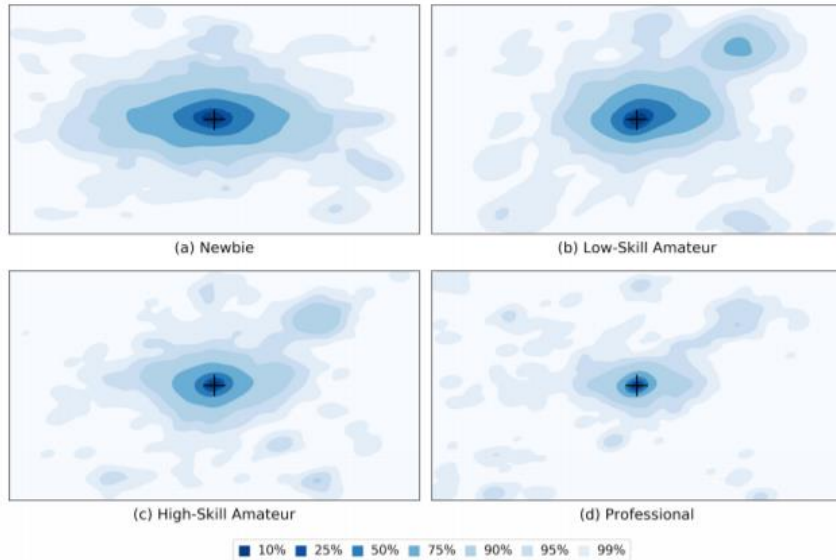
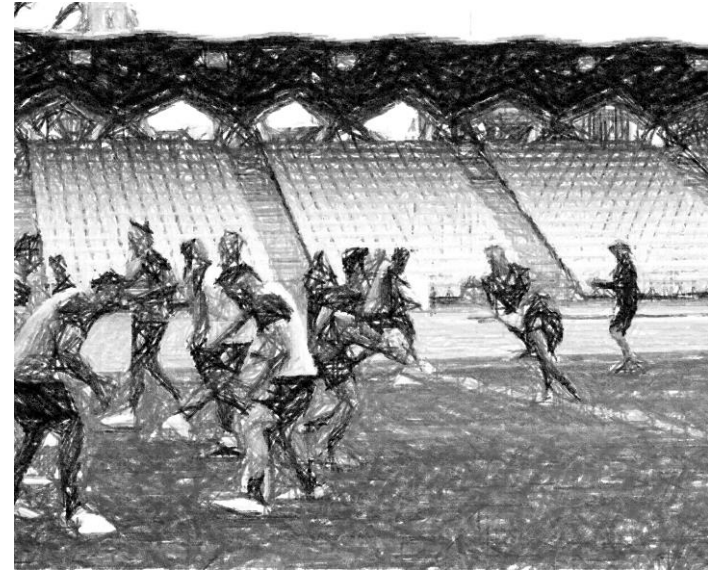


Figure 2. Gaze heatmaps for players of different skill. Every color area bounds the cumulative probability of the gaze to be inside it.

- Gaming can help slow down the natural grind of ageing
- Increased capacity for cognitive load
- Flow State/ In the Zone
- Elite Working Memory = Faster Reactions

What Happened?

- Elite athletes have **Elite Brains!** A genius is a genius regardless of modality
- Not all brains are built the same. Each player is unique in their individual performance and understanding their brain vitals can give **deeper insight** into how to best coach and train them
- **Position specialization** makes a difference
- Through a Cognitive Combine you can **better identify talent**
- With Neuroperformance Training, you can **improve existing talent** on your team
- Specific training and boosts to cognitive skills will **improve brain performance** – which will improve global life skills for the player as well performance on the field of play
- **Increased speed of recovery** from Injury and seasonal grind
- **Lengthen career**



Panel Discussion & Questions



Tom

tom@eliteperform.org

Baseball is ninety percent mental and
the other half is physical - Yogi Berra

Elite Performance Solutions provides our software and services through our partners:



**STRONGER
BRAINS**

For better lives 



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Thank you again for joining us!

Join us next month (March 23/24) for,

Improving Educational Outcomes by
Enhancing the Perceptual, Cognitive &
Language Skills of Students
with Paula Tallal Ph.D.

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