



Project Presentation – Cognition in Football

PERIODISATION OF COGNITIVE TRAINING INTO A PLAYER DEVELOPMENT PROGRAM

‘SUCCESS IN FOOTBALL IS MULTIFACTORIAL - THE NEXT GENERATION OF THE PREMIER LEAGUE’S BEST ACADEMY PLAYERS MUST TRAIN ALL THE PHYSICAL, TECH/TAC, PSYCH/SOCIAL AND COGNITIVE PARTICULARITIES WITHIN THE GAME’ [CARNEVALE ET AL., 2022].



Presentation Objectives | Outcomes



RUN THROUGH A BRIEF OVERVIEW OF THE THREE ELEMENTS RELATED TO COGNITION IN FOOTBALL.

GET SOME COGNITIVE TRAINING INSIGHTS [EXECUTIVE FUNCTIONS : VIA MOTOR TASKS | VR TRAINING : SCANNING | BRAIN ENDURANCE TRAINING : TASKS ON SOMA NPT APP]

DISCUSS RECOMMENDATIONS.

CONSIDER WAYS FORWARD [I.E., NEXT STEPS | PROJECT TWO AND BEYOND] – WHAT COULD WE TRY TO DO TO FURTHER SUPPORT PLAYERS WITHIN AN ALREADY WORLD-LEADING PLAYER DEVELOPMENT PROGRAM?

LITTLE DIRECT FOCUS IS EXERTED TOWARDS TRAINING COGNITIVE ABILITIES [“THE NEXT FRONTIER IN FOOTBALL” - ARSÈNE WENGER] DESPITE THEIR RECOGNISED IMPORTANCE TO PLAYER DEVELOPMENT.

Analysis & Research

SIMONS ET AL., [2016] CONVEY THAT NO COMPELLING EVIDENCE EXISTS SHOWING A TRUE POSITIVE TRANSFER OF COGNITIVE TRAINING INTERVENTIONS TO REAL-WORLD TASKS.

- SINCE AUGUST 2023 [2021].
- MICHAEL RABASCA [DIRECTOR OF COGNITIVE PERFORMANCE AT LA GALAXY]
- JES BUSTER MADSEN [NEUROSCIENTIST AND HEAD OF RESEARCH & DEVELOPMENT AT FC COPENHAGEN]
- CHRISTOPHER RING [PROFESSOR IN THE SCHOOL OF SPORT, EXERCISE AND REHAB SCIENCE AT BIRMINGHAM UNIVERSITY]
- GRANT HAYES [COGNITIVE TRAINING EXPERT & CEO AT SOMA TECHNOLOGIES]
- WOOHYUK CHANG [PHD RESEARCHER] & MATT MILLER [SPORTS PSYCHOLOGY LEAD] REGARDING THE SOCCERBOT AT NORWICH CITY FC
- JAMES DENNIS [BE YOUR BEST VIRTUAL REALITY TRAINING SOFTWARE]
- VITAS LABS [A VR TRAINING COMPANY]
- LIAM MCCARTHY [SENIOR LECTURER IN SPORTS COACHING AT THE CARNEGIE SCHOOL OF SPORT – LEEDS BECKETT UNIVERSITY]
- ALEX CHAPMAN [CONSULTANT AT THE PREMIER LEAGUE]
- PHILIP GALLAGHER [HEAD OF PERFORMANCE ADVISORS AT UK SPORT]
- HANNAH LEVI [ACADEMY SPORTS PSYCHOLOGY LEAD AT CHELSEA FC]
- SAM PAGE [U9-U14 HEAD OF COACHING & PLAYER INSIGHTS LEAD AT CHELSEA FOOTBALL CLUB]



Executive Functions – Brain Endurance Training – Virtual Reality Training

- COGNITIVE ABILITIES ARE DEFINED AS ‘THE BRAIN’S THOUGHT PROCESSES THAT LEAD TO ACTION’ [HEISLER, LOBINGER & MUSCULUS, 2023].
- ‘EXECUTIVE FUNCTIONS ENABLE PLAYERS TO EXTRACT PROCESS, DISCARD, AND USE ALL THE INFORMATION FROM THE GAME’ TO MAKE THE BEST POSSIBLE DECISIONS IN THE QUICKEST POSSIBLE TIME [DAMUNT & GUERRERO, 2021].
 - WORKING MEMORY – STRONG WM: PLAYER WHO SHOWS GOOD ANTICIPATION TO INTERCEPT OR ONE WHO CAN MAKE ACCURATE HIGH-QUALITY DECISIONS QUICKLY ACROSS SIMILAR SITUATIONS [I.E., RETRIEVING INFORMATION FOR PROBLEM SOLVING]. LOW WM: PLAYER WITH LACK OF ATTENTION IN VARIOUS SCENARIOS.
 - INHIBITION – STRONG CI: PLAYER MAKES FEWER BAD DECISIONS [I.E., DOES NOT GIVE AWAY UNNECESSARY FOULS / ERROR FREE BEHAVIOUR, ARON, 2007], SELECTS THE CORRECT RESPONSE, SUCH AS MAKING A KEY [CHANCE CREATING] PASS [CARDOSO ET AL., 2015].
 - FLEXIBILITY – STRONG CF: PLAYER CAN OFFER DIFFERENT SOLUTIONS TO PROBLEMS TO CHANGING SITUATIONS ON THE FIELD [I.E., IDENTIFIES THE MOST EFFICIENT ALTERNATIVE], RADKE, MERTENS, SPIELMANN AND MAYER, 2023.
- ‘EXECUTIVE FUNCTIONS MUST BE TARGETED SPECIFICALLY IN TRAINING IN ORDER TO IMPROVE THEM’ [DIAMOND & LING, 2016].



Executive Functions – Brain Endurance Training – Virtual Reality Training

- BRAIN ENDURANCE TRAINING [BET] IS A FORM OF MENTAL FATIGUE INOCULATION [KIND OF LIKE TAKING A VACCINE TO IMMUNISE THE BODY] WHEREBY FATIGUING COGNITIVE TASKS ARE ADDED TO STANDARD PHYSICAL TRAINING TO IMPROVE SUBSEQUENT PHYSICAL PERFORMANCE [STAIANO ET AL, 2023].
- BET CAN LEAD TO FREEING UP BRAIN ENERGY THAT CAN BE USED FOR MOTOR PLANNING [I.E., DECISION MAKING] AND EXECUTION [E.G., PHYSICAL EXERTION]. WHAT SCHARFEN & MEMMERT, 2021 REFER TO AS ‘HIGHER NEURAL EFFICIENCY’.
 - BET INCREASES THE RESILIENCE CAPACITY AND ENHANCES THE COGNITIVE CAPACITY OF THE BRAIN WITHOUT OVERLOADING THE HEART, LUNGS AND MUSCLES.
 - THIS MEANS INCREASED RESISTANCE TO ‘THE ADVERSE EFFECTS OF MENTAL FATIGUE’ [TRECROCI ET AL, 2020] AND A REDUCTION IN THE LIKELIHOOD OF PERFORMANCE DECLINE.
- ‘COGNITIVE ABILITIES CAN BE IMPROVED VIA INDIVIDUALISED ADAPTIVE TRAINING, AND THESE IMPROVEMENTS ARE REFLECTED IN MORE EFFICIENT NEURAL NETWORKS’ [BHERER ET AL, 2005].
- “THE NEXT STEP COULD BE SPEED OF DECISION-MAKING, QUALITY OF INFORMATION TAKEN AND THE FLEXIBILITY OF DECISION-MAKING”, ARSÈNE WENGER.



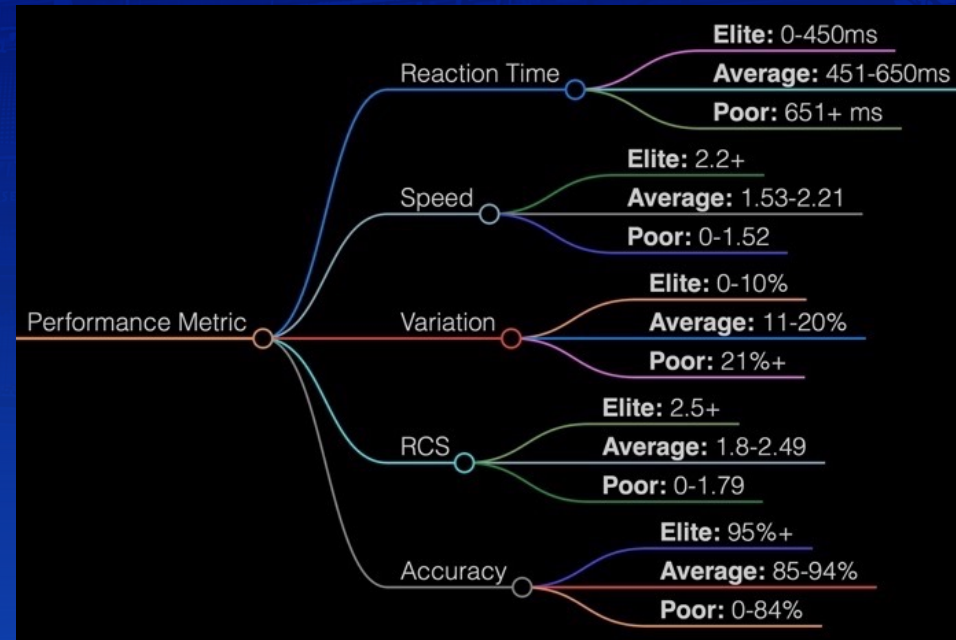
Executive Functions – Brain Endurance Training – **Virtual Reality Training**

- VR ‘SIMULATES A REALISTIC ENVIRONMENT AND CREATES AN IMMERSIVE EXPERIENCE’ [ZHAO & GUO, 2022] AND SEVERAL STUDIES HAVE DEMONSTRATED THE **EFFECTIVENESS OF VR ON SCANNING SKILL IMPROVEMENT** [MILES ET AL, 2012; GRAY, 2017; KITTEL ET AL, 2020].
- ROCA ET AL, [2018] REFERRED TO THE CAPACITY OF VR TO DEVELOP ATTENTIONAL FOCUS
 - E.G., **HIGHER SCANNING RATE** [I.E., NO. OF SCANS/LESS FIXATED VISUAL SEARCH—NOT BALL WATCHING]
 - AND **MORE EFFICIENT SCAN TIMING** [I.E., SCANNING WHEN BALL IS MOVING BETWEEN PLAYERS].
 - VR TRAINING ALLOWS INJURED PLAYERS TO PARTICIPATE IN SCENARIO-BASED TRAINING AND VR TRAINING **DOES NOT INCREASE THE PHYSICAL LOAD** ON AN ATHLETE.
- ‘**COGNITIVE SKILLS SHOULD BE ENHANCED THROUGH REPETITIVE AND TARGETED EXERCISES**’ [WALTON, KEEGAN, MARTIN AND HALLOCK, 2018].
- GEIR JORDET DEFINES **SCANNING** AS “A BODY AND/OR HEAD MOVEMENT IN WHICH A PLAYER’S FACE IS ACTIVELY AND TEMPORARILY DIRECTED AWAY FROM THE BALL, WITH THE INTENTION OF **LOOKING FOR INFORMATION THAT IS RELEVANT TO PERFORM A SUBSEQUENT ACTION** WITH THE BALL.”



Let's try some things

- EXECUTIVE FUNCTIONS
 - DUAL TASKING, COORDINATIVE TRAINING & COMPLEX MOTOR TASKS.
 - USING LADDERS.
- BRAIN ENDURANCE TRAINING + EXECUTIVE FUNCTIONS
 - USING SOMA-NPT APPLICATION AND ANALYTICS.
 - DOWNLOAD AND LOG ON WITH ID
- VIRTUAL REALITY TRAINING
 - HEADSETS AND BYB SOFTWARE.
 - ONLY ONE HEADSET...
- DRILLS : CLICK ON THE + - CHOOSE 1 MINUTE FOR DURATION – SEE INFO & START
 - CMSIT – FOR INHIBITION
 - RVIP – FOR PROCESSING SPEED
 - COLOUR SHAPE TASK – FLEXIBILITY [TASK SWITCHING]
 - 4 CHOICE FLANKER – FOR DECISION MAKING & MEMORY



Recommendations

- **PRACTICAL PITCH-BASED INTERVENTION**
 - **DUAL TASKING, COORDINATIVE TRAINING & COMPLEX MOTOR TASKS.**
 - **ATHLETIC DEV. & MOVEMENT CLUB INTEGRATION?**
- **OFF-FIELD BET**
 - **USING SOMA-NPT APPLICATION AND ANALYTICS.**
 - **INTEGRATING CUTTING-EDGE TECHNOLOGY INTO A FUTURE 'ARENA SESSION' STATION [INTERMIXED BET]?**
- **VIRTUAL REALITY TRAINING**
 - **HEADSETS AND BYB SOFTWARE.**
 - **HOW TO BEST PERIODISE?**
- **COLLABORATION**
 - **LEVERAGING EXPERTISE & EXPERIENCE.**
 - **INFORMAL KNOWLEDGE EXCHANGE RELATIONSHIP.**
 - **CLUB STUDY VISITS?**

ALIGNING WITH WORKING TOWARDS VISION 2030 VIA: RESEARCH TO CHALLENGE CURRENT SYSTEMS, HELP ANSWER KEY PERFORMANCE QUESTIONS; CONSISTENTLY UPDATE BEST COACHING PRACTICE; LEVERAGING OPPORTUNITIES FOR SPECIAL PROJECTS TO MAINTAIN OUR COMPETITIVE ADVANTAGE; AND TO REMAIN INNOVATIVE PLUS PROACTIVE AT ENHANCING INDIVIDUAL PLAYER DEVELOPMENT SUPPORT OVER THE NEXT SIX YEARS.

