The importance of Non Cognition Functions and the Memory during soccer learning processes
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AC Milan and FC Metz Consultants
Cogitraining and Senseball
WELLINGTON SOCCER CLUB
ROYAL PALM BEACH FLORIDA
is the US Cogitraining-Senseball referential club

Summer 2015: Cogitraining-Senseball training camps for players and workshops for coaches

We work with coaches from AC Milan, FC Metz, RSC Anderlecht, KRC Genk. Pro license and UEFA A and B coaches, present-day Belgian female internationals and former male Belgian professional players with experience in the European Champion’s League!!!

INFO: WWW.WELLINGTONSOCCER.COM
The general Cogitraining-SenseBall work strategy

COMPETITION
COMPETENCE

GAME
PLAYING
ABILITY
ABILITY
BODY MASTERY
BALL MASTERY

Mental skills
Cognitive skills
Non cognitive skills
Moving

Cognitive readiness
LEARNING IN THE OLD MEANING = INVITE YOUNG PEOPLE TO TRANSFER YOUR KNOWLEDGE
LEARNING to play SOCCER

Training programs

Tactics

Games Scrimmages

Competition

PSYCHOLOGICAL TRAPS - PRIMING

WINNING

TALENT

IDENTIFICATION

AT SCHOOL

IN SOCCER

KNOWLEDGE
TESTING: WHO ARE THE BEST??? MERITOCRACY

DO WE CHOOSE FOR A LEARNING PROCESS OR A WINNING PROCESS???

TALENT

SCHOOL
IQ-TEST

Maturity differences

SPORTS
PROFILE TEST

Priority to early matured athletes
Does an IQ-test always determine exactly and precisely how intelligent someone is and is this a real good and permanent test?

**RESEARCH:** 79 children were divided into 3 groups according their IQ results. The best group scored an average of 119, the second group an average of 101 and the weakest group an average of 79.

All children take part of a test: half of the group gets a candy (a M&M) when they deliver correct answers on questions.

**FINDINGS:** the children with the highest score and the group in the middle rewarded with candy didn’t change their IQ-score. The children in the weakest group rewarded with M&M raised their IQ-score from 79 to 97, the same level of the group in the middle!

**THE QUESTION:** did these children have a low IQ or not? What score 79 of 97, represents their intelligence correctly??
IQ and talent identification: reliable parameters???

Does TALENT IDENTIFICATION always determine exactly and precisely how talented someone is and is this a real good and permanent test?

Who is considered to be the best boxer all times?

Tales of the tape: physical measurements to identify naturals applied on Ali.

- fist structure       YES or NO → NO
- reach               YES or NO → NO
- chest expansion     YES or NO → NO
- weight              YES or NO → NO

Muhammad Ali had great speed but didn’t have the physique, the strength and the classical moves. In fact he boxed all wrong. Sonny Liston was a natural! Unimaginable Ali could beat Sonny. The matchup was so ludicrous that the arena where the fight took place was only half full!!
IQ and talent identification: reliable parameters???

WHERE DID THE VICTORY COME FROM?

Other no naturals? Michael Jordan, Babe Ruth, Ronaldo (Brazil), Wilma Rudolph, Jackie Joyner-Kersee and ........
When I was 11 I had a growth hormone problem. But being smaller I was more agile. And I learnt to play with the ball on the ground because that’s where it felt more comfortable. Now I realize sometimes bad things can turn out good.

As a boy “Messi” was named “La Pulga” (the flea) because of his height. But it appears Messi cared little about his stature and brushed off suggestions that size would prevent him from playing as a professional in the future. *His perception of the situation was helpful, positive and above all confident.*

Messi refused to let his physicality handicap him. In fact he used it to his advantage. “I am more agile”, he said. “I can learn to play with the ball on the ground better than everyone else.” I believe, despite the fact he was smaller, he felt taller than his teammates. He may have physically looked up on everyone but he chose to mentally look down on his opposition. He cared little for their body shape. *He only thought about his soccer, is ability, and how he wanted to play.*

*Soccer Tough, Dan Abrahams*
Several Belgian professional soccer clubs were having doubts about their player’s skills and still these players have reached the top. In the Belgian national team (4th in the FIFA ranking) 6 players were told they did not have the talent to go to the top!

- Thibaut Courtois Chelsea
- Simon Mignolet FC Liverpool
- Mousa Dembele Tottenham
- Dries Mertens SC Napoli
- Naver Chadli Tottenham
- Steven Dufour RSC Anderlecht
CONCLUSION

THERE ARE A NUMBER OF LESS VISIBLE COMPONENTS THAT MIGHT HAVE AN INFLUENCE ON THE ACADEMIC AND SPORTS SKILLS DEVELOPMENT!!!
“Success is no accident. It is hard work, perseverance, learning, studying, sacrifice and most of all, love of what you are doing or learning to do.”

~Pele
LEARNING AND THE BRAIN
Is the human brain only a program processor???

- Affection
- Emotion
- Stress (allostasis)
- Tools of the mind (non-cognitive skills)
- Memory (LT)
- The role of the working memory
- The influence of the unconscious mind
- Choking: don’t think too much
- Mindset
- Stereotyping
- Organize your brain through moving
- Create more neuronal networks through moving
NON COGNITIVE SKILLS

These are the resources you need to develop before and while you are learning: persistence, self-control (attention and concentration), curiosity, conscientiousness (not influenced by material incentives to perform), grit, mental endurance (character) and self-confidence
The non cognitive skills in TOOLS OF THE MIND, kindergarten and prekindergarten curriculum

- **Controlling impulses** → executive functions: Stroop test: GREEN, RED - and toy-car incident (contradictory information: c pronounced as k – 1 ball to share with others – pass the ball and don’t follow the ball ....)

- **Staying focused** on a task at hand

- **Avoiding distractions and mental traps** (assumptions, beliefs, comparisons, desires, expectations)

- **Managing emotions**

- **Organizing thoughts**

Tools of the Mind, Dr. E. Bodrova and Dr. D. Leong

Vygotskian-based teaching methods
Task Performance

Correct Responses (%)

Dots-Incong.  Flanker  Rev. Flanker  Dots-Mixed
Demands EF

Children Passing Freest (%)

More Demanding of EF
Diamond et al., 2007
HOW CAN WE CREATE A LEARNING FRAMEWORK THAT ANTICIPATES THE INFLUENCE OF NON COGNITIVE SKILLS?

SOCIAL INTERACTION ➔ COGNITION ➔ NON COGNITIVE SKILLS
Our principle: SYNCHRONISATION
SYNCHRONISATION= SOCIAL INTERACTION
WHY?

Social interaction promotes general cognitive functioning = COGNITION

(Ybarra O., Burnstein E., Winkielman P., Keller M.C., Manis M., Chan E., Rodriguez J. in Soc Psychol Bull 2008 Feb.)

The components of COGNITION: ALERTNESS, CONCENTRATION, PERCEPTUAL SPEED, LEARNING, MEMORY, PROBLEM SOLVING, CREATIVITY, AND MENTAL ENDURANCE.
(Mozart’s brain and the fighter pilot, Richard Restak, M.D.)
HOW DO WE ORGANIZE SYNCHRONISATION IN OUR DRILLS?
THROUGH THE CROSS NON COGNITIVE SKILLS WILL BE TRAINED

Self-control and cognition: attention and concentration

- You never can perform on your own.
- You also have to check how your teammates move into space (passing a cue is the sign to move together with another player).
- Arriving at the same time at the center cone and turning simultaneously.
THROUGH THE CROSS NON COGNITIVE SKILLS WILL BE TRAINED

Persistence

- There is no individual learning without the others.
- Your persistence is endorsed by the team.
- They will encourage you to participate.
- They will approve your efforts.

Applauding and praising THE PLAYERS’ EFFORTS
Mental endurance

- We try to exclude too much thinking.
- We concentrate on many repetitions and try to avoid interruptions.
- A weak performance must be overruled by many good performances.
- Guide players into the performance flow.
Often called the best woman soccer player in the world, Mia Hamm says she was always asked, “Mia, what is the most important thing for a soccer player to have?” With no hesitation, she answered, “Mental toughness.”
THROUGH **THE CROSS** NON COGNITIVE SKILLS WILL BE TRAINED

**Curiosity**

- We build up our drills in a way that we can add new parts without removing the learnt structures.
- We use different strategies (memorize a drill bound to a number) in a way that moving and thinking goes together.
- Sometimes we use instructions that can not be performed.
Conscientiousness

- We challenge our players to prove they are progressing.
- We emphasis more the group progress than the individual progress.
- We don’t use standardized results to measure the level of performance.
- We focus on a growth mindset.

THROUGH THE CROSS NON COGNITIVE SKILLS WILL BE TRAINED

Crosswise positions + synchronization

How many passes during 2 minutes with 3 players?
Jackie Joyner-Kersee: “For me the joy of athletics has never resided in winning, I derive just as much happiness from the process as from the results. I don’t mind losing as long as I see improvement or I feel I’ve done as well as I possibly could. If I lose, I just go back to the track and work some more.”
Grit

- We organize internal tournaments where players have to play with players that do not have the same skillfulness.
- We challenge our players to show their creativeness (time of ball possession, number of created scoring opportunities).
- Drills with cues to prove high level of precision.

THROUGH THE CROSS NON COGNITIVE SKILLS WILL BE TRAINED

Crosswise positions + synchronization
Self-confidence: self-belief fuels confidence. Belief develops from hard work, quality work, great visualization and great thinking.
Soccer Tough, Dan Abrahams

- We use strong images (cross, diamond, squares, grids).
- We externalize learning processes (cues).
- We work hard through many repetitions.
- We don’t weaken our thinking by only thinking of winning, we focus on progress while learning.

It is your memory, perception and imagination that drives your soccer image and subsequently your self-belief.
Even when players have developed new skills and competencies sufficient to perform a task with adult assistance, it may not mean that tomorrow they will be ready to perform the task independently. For most players, the transition from assisted to independent learning is a gradual process that involves moving from using a great deal of assistance to slowly taking over until eventually no assistance is needed. To facilitate this transition, a teacher/coach needs to scaffold a child/player’s learning by first designing and then following a plan for providing and withdrawing appropriate amounts of assistance at appropriate times.
THE MEMORY

- The working memory: go to automated unconscious performance

- The long term memory: make use of your visual memory and your spatial navigation capacity both situated in the right part of the hippocampus
High performance in sports is understanding how to use **the working memory** during performance and when to switch it off!!!

Performance requires two principles:
- « being in the zone », performing technical skills without thinking and unconsciously
- switch on the working memory to analyse a game situation, to find an anticipating strategy
HOW DOES THE WORKING MEMORY HELP YOU TO PERFORM BETTER

• Master the **priority** of information
• Helps you **concentrating** on what is the most important
• Delivers very **fast** the **correct answer**
• Helps you taking **risks** in a **smarter way**
• **Eases learning** at school, in any learning environment
• **Fast decisions**
• **Adapt** to new situations
• **Stay motivated** acquiring long term goals
• Helps you to go on **thinking positively** in a gray situation
• Helps you to follow your **moral compass**
• Helps you to be a **better athlete**.
Explaining too much, a coach talking too much will block the brain zones coordinating movements and balance.
THE MOTORIAL WORKING MEMORY LOOP

WORKING MEMORY (PFC) → CEREBELLUM → MOTOR CORTEX

- Prefrontal cortex
- Hippocampus
- Cerebellum
How does it work?

1. You hear a number of instructions that are going to be processed by the cognitive center of the brain, **the prefrontal cortex**.
2. Your PFC fires a number of instructions to **the cerebellum**, the coordination center of the brain, to repeat the movements mentally.
3. Finally your cerebellum sends the instructions to **the motor cortex** that instructs your muscles to move according to the instructions.
Brain Centred Training

How can you go into the zone learning a skill?

1. **Don’t talk too much** or don’t give a checklist of instructions
2. Go straight to the cerebellum – motor cortex loop to create a feeling regarding the movement while performing
3. Make use of analog learning (kicking a ball in between two cones – external cues will help the brain to look for the correct performance – use the SENSEBALL program) and ‘JUST DO IT’. You don’t need mentally insight!
4. The working memory is not involved in the learning process!

**USING THE CEREBELLUM-MOTOR CORTEX LOOP = GOING INTO THE ZONE**
Brain Centred Training

Learning with the motorial working memory loop = explicit learning. What can go wrong???


Learning a technical skill: 1. One group got a detailed explanation regarding the skill. They needed the motor working memory loop to memorize the verbal instruction = explicit learning
2. Second group got no instruction. They had to practice the skill and each time they heard the TUNE OF A METRONOME they had to say random letters. In that way the working memory was diverted and not available while learning.
Brain Centred Training

Learning with the motorial working memory loop = explicit learning. What can go wrong???

**Training program**: 5 days a skill session with 100 repetitions

**Final test**: adding stress = good performance rewarded with money – expert would assess their performance

**Result**: both groups were under stress, but ‘explicit learning group’ showed a decrease of learning. Other group could use his working memory to keep control over their stress and their performance remained the same
Brain Centred Training

Learning a new skill without the **INVolvement** of THE WORKING MEMORY

A TRAINING METHOD

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The Basic skills factor: research Vandervert, L. R., Schimpf, P. H., Liu, H. 2007

‘How working Memory and the Cerebellum Collaborate to Produce Creativity and Innovation’ Creativity Research Journal 9:1-18

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Learn each **skill** separately and **implant it in your brain till you feel it**. Conscious learning of a separate skill drills it into the motor cortex. Next the cerebellum learns these routines through many repetitions and creates learning layers. These layers will be built and piled up. In that way the skill will be automated and you can make use of it in an efficient way! (the myelination process)

**TO DO THIS YOU DON’T NEED TO MAKE USE OF YOUR WORKING MEMORY!**

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IN A GAME YOU USE YOUR WORKING MEMORY TO CHOOSE THE RIGHT COMBINATION UNDER STRESS
The long term memory

Research Free University Amsterdam

Messi has not got a better perception than other players or he perceives more than others. He simply has more solutions in his memory!

How can we put more soccer solutions in the brain?
Football players having an excellent memory for game situations will go to the highest level, The Art and Science of Remembering Everything, 2011 Joshua Foer

DO WE TRAIN MEMORY IN FOOTBALL?
THE BRAIN AND LT MEMORY

- Sensory Memory
- Attention
- Short-Term Memory
- Rehearsal
- Long-Term Memory
- Forgetting
Every sensorial impression that according to the attention system is interesting, goes first to the short term memory. Further storing depends on the rate of attention and the number of times someone concentrates on the same impression. In that way you create a pattern of solid connexions, the so called engrams = long term memory.
Learning skills is simply a matter of memorizing them.

According to Anders Ericsson expertize is what we could call an assembly of big quantities of knowledge, pattern recognition and planning mechanism a human being has built out during years in a particular field.

An exceptional memory is not a by-product of expertise or competence, IT IS THE CORE OF EXPERTISE!!!
HOW COULD WE ENDORSE MEMORIZING DURING TRAINING SESSIONS?

- **REPETITIONS WITH VARIATIONS**
- **It’s about chunking**: breaking down a skill into its component parts, and practicing and repeating each action involved in that skill. It’s about the systematic firing of the signals that build the trusty high-speed skill circuits you’re using to PERFORM in general!
CREATE A NETWORK OF PATTERNS (Visual structures) TO STORE YOUR EXPERIENCES IN YOUR BRAIN.

THE MORE ASSOCIATIVE HOOKS NEW TASKS OR MOVEMENTS HAVE THE BETTER THEY WILL BE STORED IN THE BRAIN. IN THIS WAY YOU CREATE RETRIEVAL STRUCTURES THAT MAKE IT POSSIBLE TO SPEED UP YOUR DECISION MAKING!!
KEEP IN MIND THAT THE MEMORY WORKS THE BEST AS THE ENVIRONMENTAL CONDITIONS DURING REMEMBERING ARE A COPY OF THE ENVIRONMENTAL CONDITIONS YOU USED WHEN YOU WERE STORING YOUR MOVEMENTS, SKILLS, INFORMATION.
Moving correctly and you will produce BDNF

**BDNF** (brain-derived neurotrophic factor= the switch system of the cells, the infrastructure, the uninterrupted connexion of new brain cells) creates an important biological link between **thoughts**, **emotions** and **movements**. BDNF has also got influence on the memory and learning in general!

**BDNF** is produced during **AEROBIC** moving and complex activities. **BDNF** is the FERTILIZER of the brain.

No one produces **BDNF during heavy physical performances!!**
Running **20 minutes on a treadmill** at high intensity of about 70 to 80% of your maximal heart rate, you are going to perform **POORLY** while **testing complex learning**.

**High physical load and learning** (memorizing) do not go together well.

In 2007 German researchers discovered that people after they had moved, were going to learn new vocabulary 20% faster than before and the learning speed was straight bound to the level of BDNF they had produced!!!
- No continuous high physical load (intermittent working) → be sure BDNF is produced
- Using visual cues → patterns that continuously come back
- Always create the same environmental conditions
- Make use of CHUNKING
- Repeat your skills with variations – stimulate the production of MYELIN
- Be aware of the effect of associations
Chunking: the hooks in our spatial organisation
# The Brain and Long-term Memory

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THE BRAIN AND LT MEMORY

Moving

Angle

Timing
THE BRAIN AND LT MEMORY
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