



The Senseball program: integrating neuro didactical  
advises into a ball mastery program





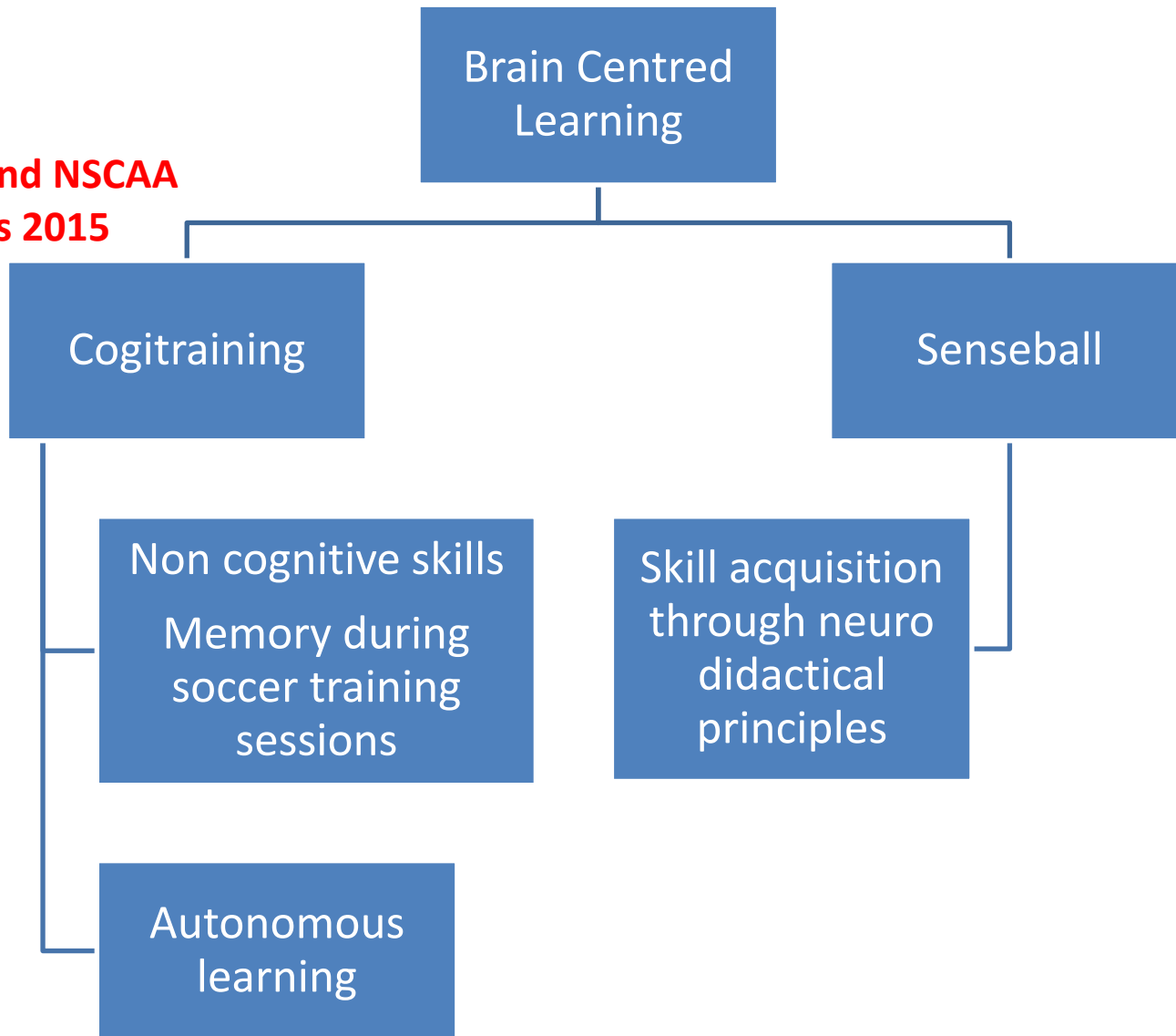
**WELLINGTON SOCCER CLUB**  
**ROYAL PALM BEACH FLORIDA**  
**is the US Cogitraining-Senseball**  
**referential club**

**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](http://WWW.WELLINGTONSOCCER.COM)**

**US SOCCER and NSCAA  
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# COGITRAINING WITH THE Senseball A first impression



# STRUCTURE CONTENTS PRESENTATION

## Skill acquisition through neuro didactical principles

1. Test: learner or non learner?
2. What is **NEW** in this skill acquisition program – the Senseball program
  - a) The metronome principle (rhythm, timing)
  - b) Synchronization
  - c) Moving organizes the brain
  - d) What about the influence of seeing skills
  - e) The role of the working memory
  - f) A myelination process
  - g) Deliberate practice, non linear dynamics and differential learning
3. Practical training levers:

Cueing – analog learning – faultless learning – non linear dynamics (synaptogenesis) – immediate and continuous feedback – autonomous learning – teambuilding – the exhaustion factor – self-regulation – external focus – automated, unconscious performing – double tasking – link with COGITRAINING

**TEST**

**LEARNER OR NON-LEARNER  
during workshops**

# **THE METRONOME PRINCIPLE RHYTHM AND TIMING during Senseball training sessions**



**The Senseball can be used as a metronome to have an influence on temporal processing of movements. We actually continuously insist that players perform the drills in a rhythmic way to enhance the typical soccer skill acquisition**



## THE IMPORTANCE OF RHYTHM AND TIMING

The brain has an “**internal clock**” that keeps time. And that it does so at various intervals: microseconds, milliseconds, seconds, minutes, and hours?

**Timing in the brain** (or what scientists call “**temporal processing**”) is **responsible for** detecting where a sound is coming from as sound hits one ear microseconds before the other, for waking up and putting to sleep our brain every 12 hours or so, and **for focusing attention**, reading comprehension, **remembering information**, processing speech, **motor coordination**, and several other human capabilities.. The metronome principle we use in the SenseBall drills can influence learning and rehabilitation processes.

## THE IMPORTANCE OF RHYTHM AND TIMING

Complex motor skill often consists of a fixed sequence of movements. **Recent studies show that a stereotyped temporal pattern or rhythm emerges as we learn to perform a motor sequence.** This is because the sequence is reorganized during learning as serial chunks of movements in both a sequence- specific and subject-specific manner. On the basis of human imaging studies we propose that the formation of chunk patterns is controlled by the cerebellum, its posterior and anterior lobes contributing, respectively, to the temporal patterns before and after chunk formation. **The motor rhythm can assist the motor networks in the cerebral cortex to control automatic movements within chunks and the cognitive networks to control non-automatic movements between chunks, respectively. In this way, organized motor skill can be performed automatically and flexibly.**

[Katsuyuki Sakai<sup>a</sup>](#), [Okihide Hikosaka<sup>b</sup>](#), [Kae Nakamura<sup>b</sup>](#)

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# **SYNCHRONISATION DURING SENSEBALL TRAINING SESSIONS**



# 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.)

## SYNCHRONISATION

**During the Senseball training sessions we urge our players to perform in the same rhythm. The synchronized drills with or without the Senseball (to prepare synchronized movements with the ball) enhance the social interaction and group learning.**



**Moving organizes the brain,  
improves brain functioning and  
creates new neuronal networks**

**The Senseball program offers a  
lot of NEW MOVING PATTERNS in  
the aerobic performance zone**

# The Senseball program offers a lot of **NEW MOVING PATTERNS** in the aerobic performance zone



# What did neuro scientists discover regarding moving?

## **Moving improves LEARNING at 3 levels:**

- It optimizes your thinking to improve your alertness, attention and motivation
- It prepares and elevates brain cells to connect with each other, being the cellular foundation to process new information
- It stimulates the development of new brain cells of stem cells in the hippocampus (the memory)





# Moving, cognitive flexibility and creativity



**Cognitive flexibility** = an important executive function (much too few developed at school) that mirrors your capacity to think in a different way, to produce a lot of creative thoughts and answers instead of using the standard reactions.

**Experiment**: cognitive flexibility after 35 minutes on a treadmill at 60 à 70% of the Hmax improves. Test with adults of 50 to 64 years old: 2 groups of 20: 1 group treadmill – 1 group film

Question: Why would you be using a newspaper?

The runners improved their Cog Flex and the processing speed in a striking way – the group watching a film did not change!!

# What do we aim at while moving?

- Aerobic moving delivers an increment of the number of neurotransmitters (signal substances), the building of new blood vessels that take along growth factors and produces new cells
- Complex movements (Senseball combines many skills) ensure that all this material is used for reinforcing and extending the networks.

**THE MORE COMPLEX THE MOVEMENTS ARE , THE MORE COMPLEX THE SYNAPTIC CONNECTIONS WILL BE**  
(=connections between neurons)

# What do we aim at while moving?

- **IS THERE A TRANSFER WITH THIS STRATEGY TO OTHER FIELDS???** Absolutely, YES!
- The through moving built circuits can be used by other brain regions and are usable while thinking.

**This explains why children playing the piano have less effort to learn mathematics..**

- In brain language : the prefrontal cortex ( the zone in front of your brain responsible for planning, organizing and structuring of activities and thoughts) will incorporate the mental power of the PHYSICAL SKILLS and use it in other regions (for learning).

# What about the influence of seeing skills

# Can we speed up learning?

## Do we have a fixed mindset about learning and talent?

### INNATE TALENT

### IS ARTISTIC TALENT – here DRAWING – AN INNATE ENDOWMENT?

How is it possible that a number of students taking part of a test period of 5 days could change their self-portrait in such a remarkable way???

1<sup>st</sup> drawing



5 days later



1<sup>st</sup> drawing



5 days later



# Do we have a fixed mindset about learning and talent

**Explanation: DRAWING on the RIGHT SIDE of the BRAIN**

Most people view “drawing” as a magical ability, that only a select few will ever possess. But this is because people don’t understand the components – the learnable components – of drawing. They are not drawing skills at all, but seeing skills: they are the ability to perceive edges, spaces, relationships, lights and shadows, and the whole. Drawing requires us to learn each component skill and then combine them into one process. Some people simply pick up these skills in the natural course of their lives, whereas others have to work to learn them and put them together!!!! **AND WHAT ABOUT FOOTBALL???**

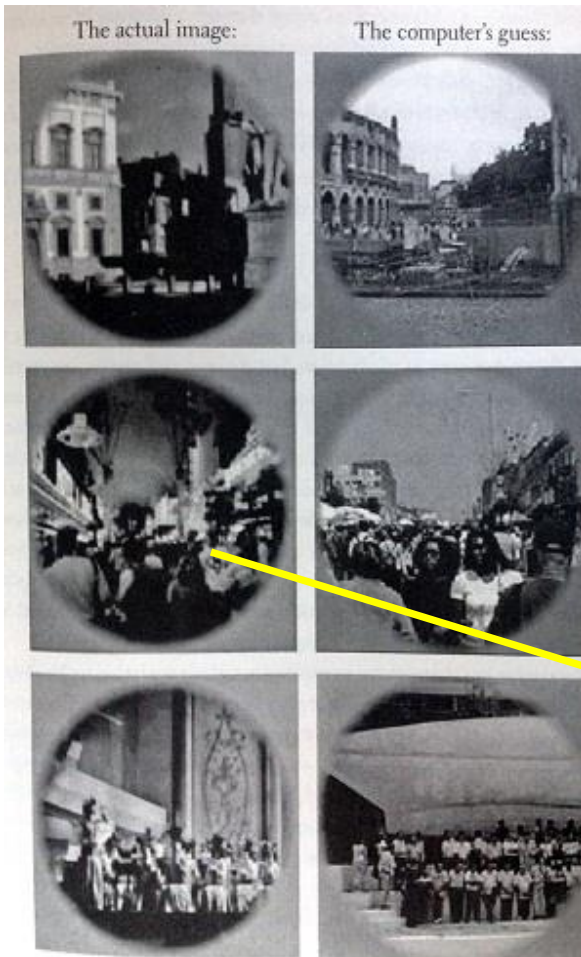


# The brain and perception or seeing skills

Football is a **STRONG VISUAL** activity  
(seeing skills)

**BUT**

**Does the brain capture enough information  
so that a learning process can develop in an  
adequate and correct way??**



The information arriving in the brain .  
Reconstruction of the image with fMRI  
scan.

The information the brain delivers to us or  
the interpretation of the brain!

**CONCLUSION: REINFORCE THE  
INFORMATION THROUGH BETTER  
VISUALIZATION**

# The brain and correct perception



How many slats? 3 or 4????

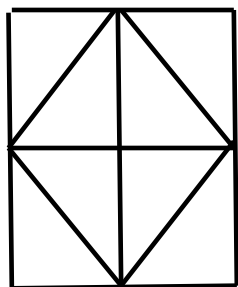


# The brain and perception or seeing skills



Where are the visual retrieval structures?

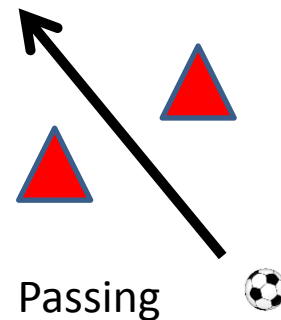
Where are the visual retrieval structures?



Game organization

## RECOGNITION PRIMED DECISIONS

If the coach doesn't present his information in a strong VISUAL WAY, the learning process will be weak!!!  
**FOCUS ON SEEING SKILLS!!!**



Passing

# The role of the working memory

High performance in sports is understanding how to use the working memory during performance and when to switch it off!!!

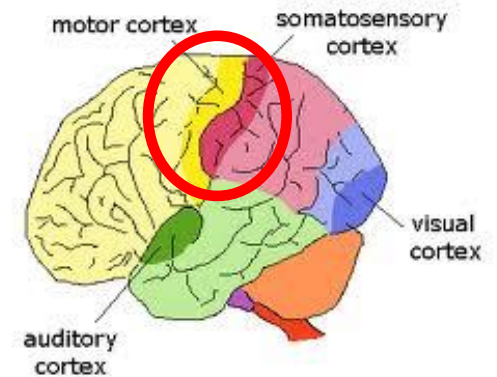
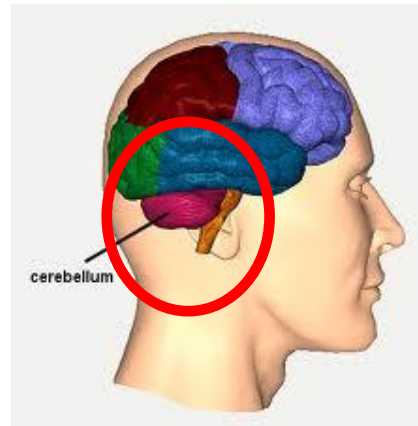
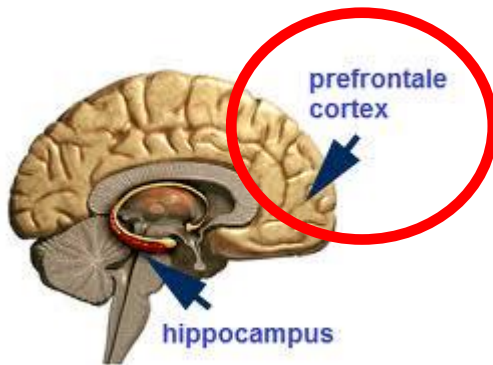
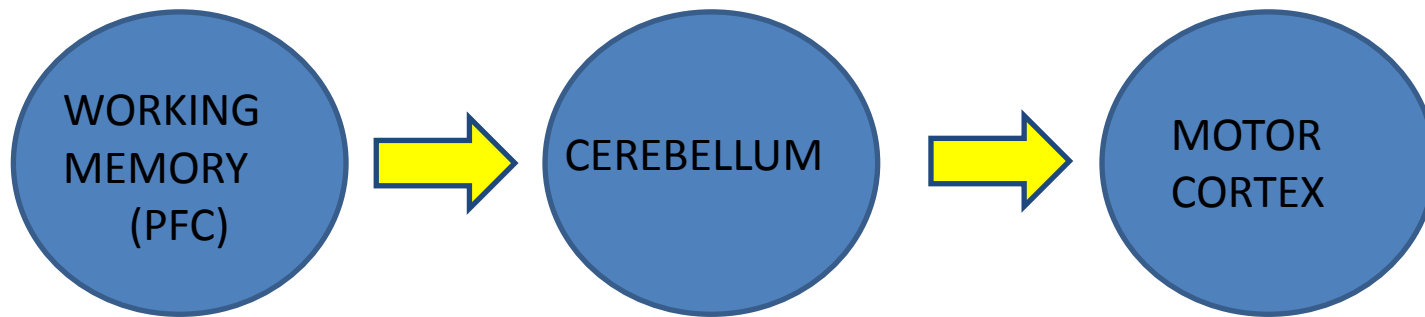
Performance requires two principles:

- « being in the zone », performing technical skills without thinking and unconsciously
- switch on the working memory to analyze a game situation, to find an anticipating strategy

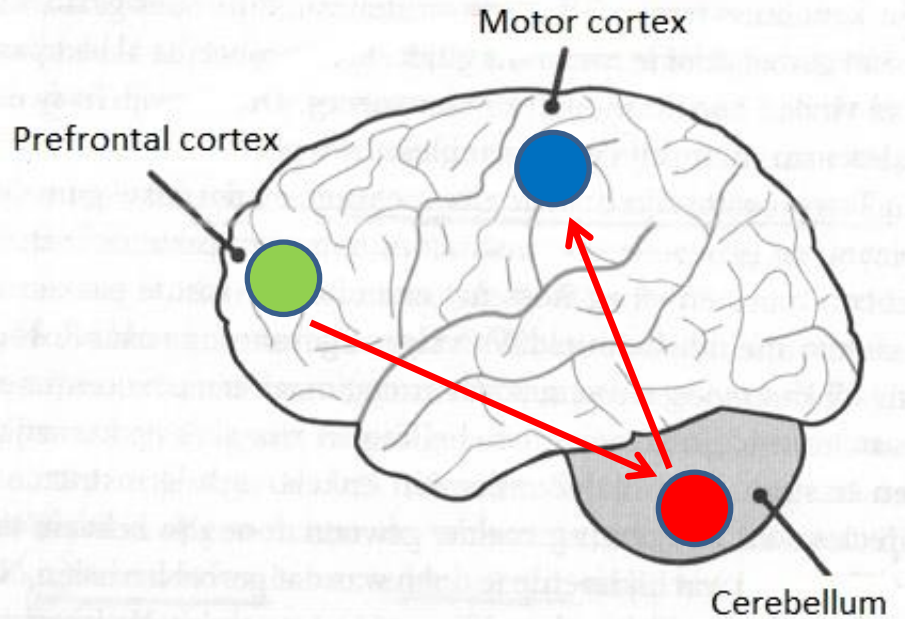
Explaining too much, a coach talking too much will block the brain zones coordinating movements and balance



## THE MOTORIAL WORKING MEMORY LOOP



# Brain Centred Training



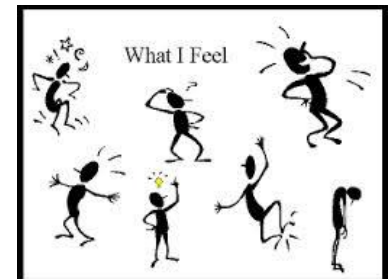
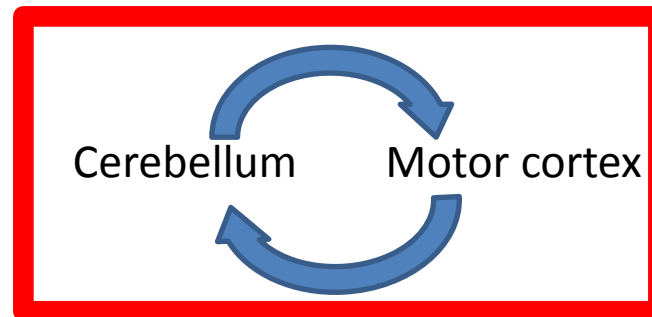
## How does it work?

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

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**



THE WORKING MEMORY IS THE KEY FACTOR IN **CREATIVITY**, BECAUSE IT IS DEVELOPED TO REACT IN UNEXPECTED SITUATIONS AND FIND SOLUTIONS.

**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**

## THE FORECASTING MODEL

1. THE **CEREBELLUM-MOTOR CORTEX LOOP** DELIVERS A LESS VULNERABLE FOR STRESS, AND MORE ADEQUATE SKILL LEARNING PROCESS.
2. **THE WORKING MEMORY** IS ONLY GOING TO BE INVOLVED TO DETERMINE THE BEST WAY OF ACTING WHEN SOMETHING UNEXPECTED IS HAPPENING OR YOU NEED A SOLUTION FOR A PARTICULAR GAME SITUATION





# Brain Centred Training



**BEING CREATIVE= AUTOMATE YOUR TECHNICAL SKILLS  
THROUGH THE C+MC LOOP (unconscious use) + USE  
WM AT THE CORRECT MOMENT**



# Brain Centred Training



Learning a new skill without the INVOLVEMENT of THE WORKING MEMORY

## A TRAINING METHOD

**The EXHAUSTION FACTOR:** research Terry McMorris, University College Chichester United Kingdom

When you are **exhausted** or very tired your **working memory is functioning less good**. So your learning process goes straight to the cerebellum-motor cortex loop. This is very favorable to learn A NEW COMPLETE SKILL or you want to add a new skill to your performances.

**ORGANIZE SENSEBALL TRAINING DRILLS AT THE END OF A TRAINING SESSION!!**

## THE POWER OF RHYTHM AND THE BARE FEET EFFECT (Prof. Liberman, Harvard)

Saito, S. 2001. 'The Phonological Loop and Memory for Rhythms. An Individual Differences Approach.' *Memory* 94:313-322

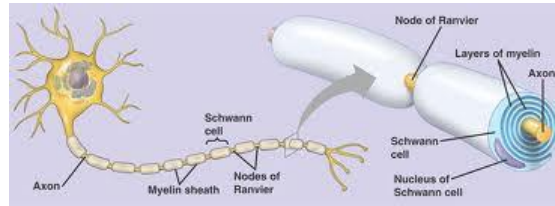


**Rhythm goes together with the working memory. The functioning of the working memory will be optimal if the learning process is supported by rhythmic patterns. Memorizing and processing of information will go better and improve a lot.**

# THE MYELINATION PROCESS

# SenseBall=myelinating

WHY?



**The holy grail of acquiring skill= a revolutionary scientific discovery involving a neural insulator called MYELIN.**

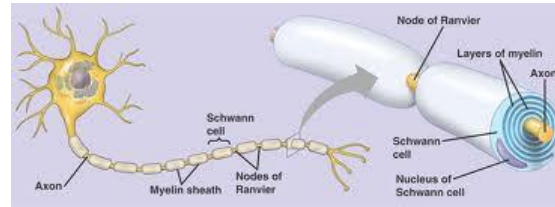
**Skill is a cellular insulation that wraps neural circuits and that grows in response to certain signals.**

**Rule one: chunk it up (divide in parts). Absorb the whole thing, break it into chunks and slow it down.**

**Rule two: repeat it, but stay in attentively building and honing (vary during repeating). When you pick up the right timing repeating can go down.**

**Rule three: learn to feel it and feeling is experiencing concentration**

# SenseBall = myelinating



**FOR MYELINATING REPETITION IS FUNDMANTAL**



# **Deliberate practice, non linear dynamics and differential learning**

Individual and collective Deliberate practice and RHYTHM

**K. Anders Ericsson**

**Deliberate practice or GOAL ORIENTED PRACTISING.** For this one uses 3 strategies:

- Concentrate on your skills
- Go on focusing your goal
- Provide yourself continuously feedback regarding your performance

URGE YOURSELF TO STAY IN THE COGNITIVE PHASE (CONSCIOUS LEARNING) AND GOAL ORIENTED PRACTISING, AND IT HAS TO BE DIFFICULT!! To improve , we have to experience our failures and learn from our mistakes. To get yourself out of the autonomic phase , you have to go so far that your are going to make mistakes

**RHYTHM (metronome ← and EFFORT- TIME ORIENTED TESTS)**

By increasing the performance rhythm, you are going to make mistakes (conscious control) and after some time you will elevate and perfect your performance!

**CUES (to mark out space) and EFFORT- and SPACE ORIENTED TESTS**

Playing the SenseBall through space that is progressively becoming smaller



## NON LINEAR DYNAMICS: DELIBERATE PRACTICE

Schöllhorn introduced an innovative practice concept termed **differential training**, which appears to improve skill acquisition. In differential training, "**noise**" (**random irrelevant movements**) is introduced during practice of a target skill. An example of a differential training drill was provided where **soccer players** in a **shooting** drill were asked to make a different unrelated action (e.g., **hop, skip or jump**) while preparing to shoot the ball. The aim of differential training is to induce continuous changes in movement executions by avoiding repetitions, removing corrective instructions and emphasizing discovery practice. Positive benefits of differential training (largely by Schöllhorn and colleagues) have been reported with shot putting, soccer skills, basketball and skiing.

In accordance with neuroscientific evidence, the self-similarity of the brain, findings in computer science and system dynamics that support the importance of noise in living systems in general **makes it plausible to apply the same approach to physical rehabilitation therapies and exercise prescription for counteracting effects of disease and illness**

# COGITRAINING with the SenseBall

The new SensebBall is available on **SENSEBALL.COM**



## THE SENSEBALL TRAININGSPROGRAM

TRAIN YOUR BALL MASTERY IN A WAY YOU  
CAN USE YOUR TECHNICAL SKILLS IN AN  
AUTOMATED AND UNCONSCIOUS WAY  
DURING A SCRIMMAGE

with the SenseBall= individual and collective  
DELIBERATE PRACTICE

## Scientific background

**What:** training with a small (different sizes and colors) ball with a string and a handle in a **RHYTHMIC WAY (metronome principle)**.

**Why:**

- **Introduce neuro didactical advises in your ball mastery program**
- **Automate** your technical skills and use them in an unconscious way
- Perfect **two-footed** performances
- Better **body** and **ball mastery** (less injuries)
- Millions of **ball touches** (myelinate and train kinesthetic capacity)
- Improve **learning readiness** (concentration and attention)
- Improve **team building**
- Can be used during **rehabilitation**
- **An effort directed training program (focus on the effort and not the result)**



# COGITRAINING with the SenseBall

## BRAIN CENTRED LEARNING DURING SENSEBALL TRAINING SESSIONS

### TO REMEMBER!

The brain is the best in remembering things that are going to be **REPEATED**, are **RHYTHMIC**, **MERGE**, are **STRUCTURED** and **MOST OF ALL** are being strongly **VISUALISED**.

Moonwalking with Einstein, Joshua Foer

# **The levers of the SENSEBALL program**

# COGITRAINING with the SenseBall

First impression of the different training principles



# Senseball

## VISUALIZE RHYTHM



When can the ball go into the free space?



When can the player move into the free space?

## Cueing

Visualize the pathway of the pass

**External focus**



Test: reduce the space and speed up the performance in a particular time (each player registers his results!!)



## Cueing

Visualize the  
pathway of the  
MOVEMENT

**External focus**



# SENSEBALL

Only learning with the C and MC loop

THE POWER OF **ANALOG LEARNING**

JUST DO IT AND FEEL WHAT YOU ARE DOING

## Carving



Pulling a cord to learn and feel the correct position



## Backhand tennis

FROM  
FRISBEE



TO TENNIS





# SENSEBALL

**SENSEBALL: learning with the C and MC loop**



## THE SUCCESS OF SENSEBALL TRAINING SESSIONS

**THE POWER OF IMITATING SKILLS = ANALOG LEARNING**

PERFORMING THE SKILLS WHILE COUNTING

1, 2, 3 or 2, 4, 6 or 12, 9, 6 ..... ref. research **Maxwell, J., Masters, R., Eves, F., 2003.**

**EXCLUDE THE INTERVENTION OF THE WORKING M**



**VISUAL CUES MAKE IT POSSIBLE FOR THE PLAYER TO GET IMMEDIATE FEEDBACK ON HIS PERFORMANCE. NO DETAILED TECHNICAL EXPLANATION!!!!**



**Non linear dynamics:** create noise while performing= when can the right foot be moved forward!



# Senseball



## TRAINING CORRECT FEET POSITION



AND **IMMEDIATE AND CONTINUOUS FEEDBACK**

# SENSEBALL

## TEAMBUILDING



# SENSEBALL

## MULTITASKING



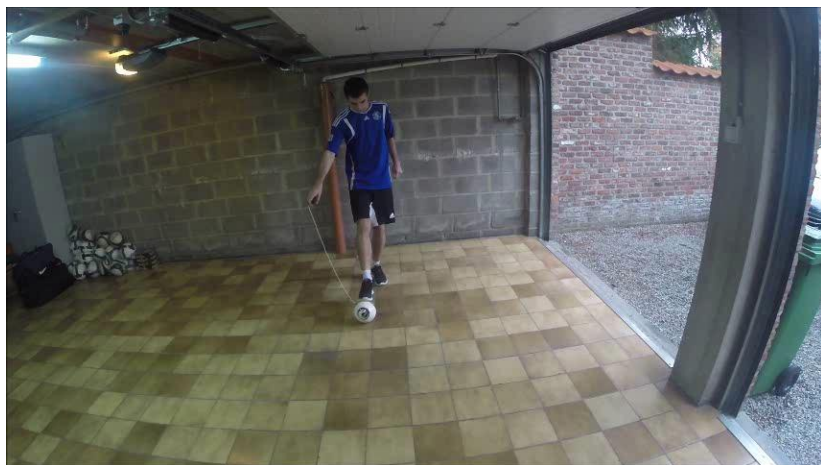
# AUTOMATED UNCONSCIOUS USE OF BALL MASTERY SKILLS WITH SENSEBALL



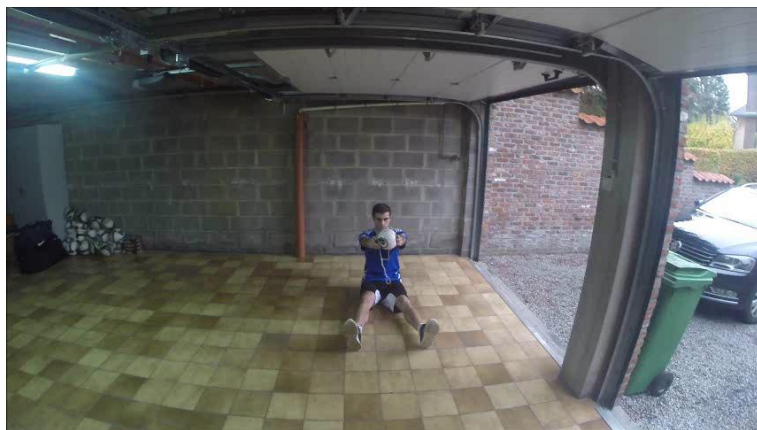


# SENSEBALL

## Preparing free juggling with the SENSEBALL



## Preparing heading with the SENSEBALL



# DRIES MERTENS SC NAPOLI IN ACTION





# RESEARCH

# TESTING

THE KICKING VELOCITY OF BOTH  
FEET!!!

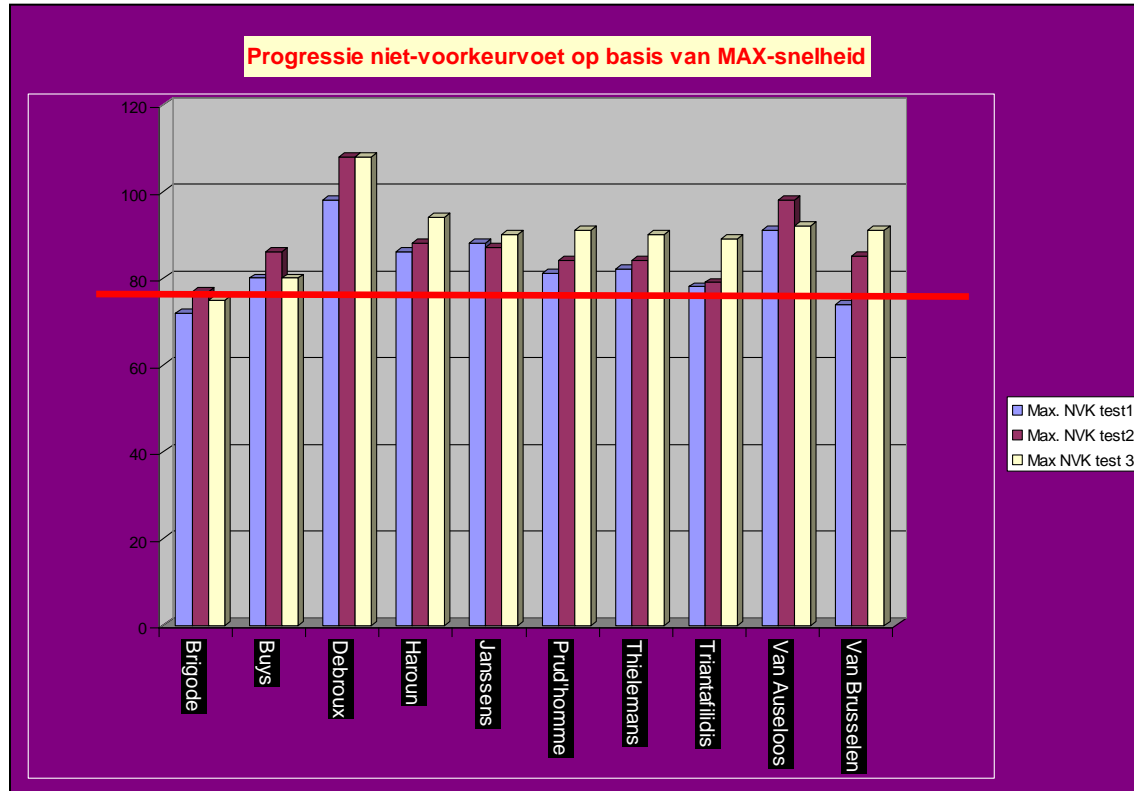


# SCIENTIFICALLY RESEARCH ON SENSEBALL



# The effect of SENSEBALL training sessions in the KBVB Academy at the University of Leuven

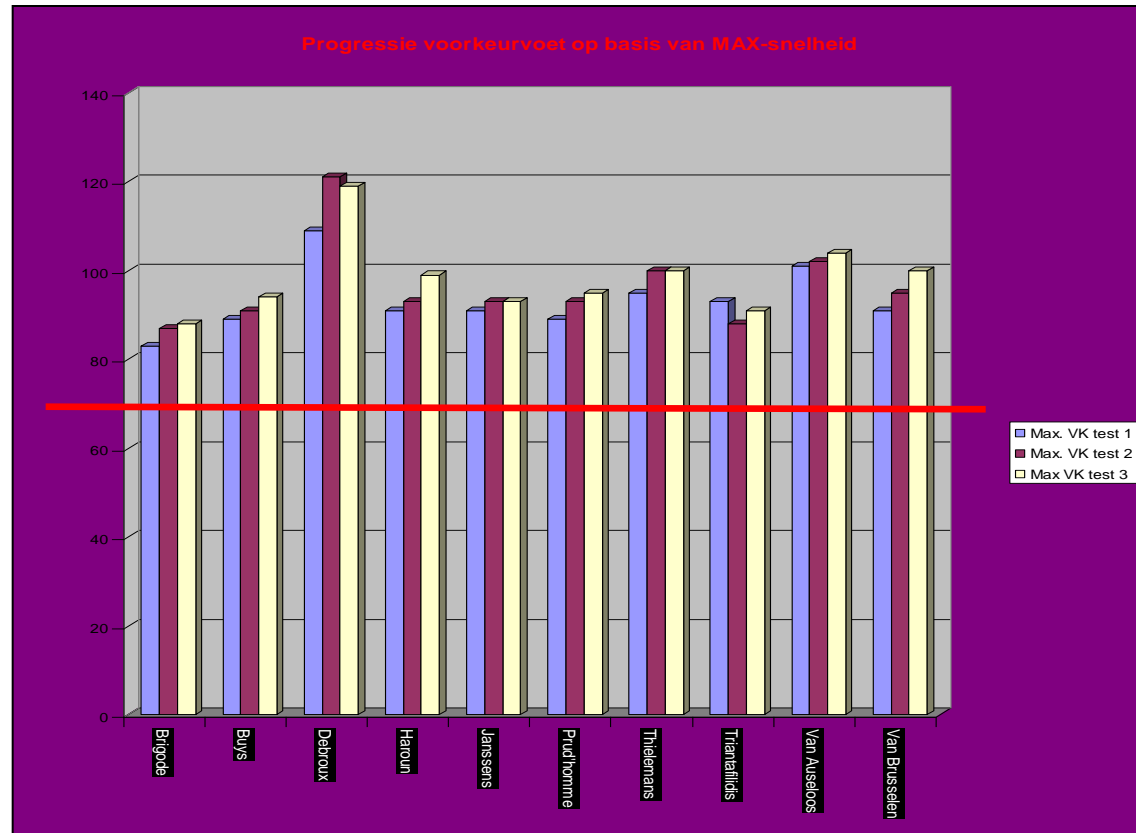
**KICKING VELOCITY**  
 120 KM  
 0 KM



**PROGRESSION OF THE NON-PREFERRED FOOT AFTER 8 WEEKS OF TRAINING SESSIONS WITH ABOUT 50.000 TO 60.000 BALL TOUCHES**

# The effect of SENSEBALL training sessions in the KBVB Academy at the University of Leuven

**KICKING**  
**VELOCITY**  
 120 KM  
 0 KM



**PROGRESSION OF THE PREFERRED FOOT AFTER 8 WEEKS OF TRAINING SESSIONS WITH ABOUT 50.000 TO 60.000 BALL TOUCHES**



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**[WWW.WELLINGTONSOCCER.COM](http://WWW.WELLINGTONSOCCER.COM)**



**PROMOTIONAL PRICES  
DURING WORKSHOPS**

**SOON 8 HOURS  
WORKSHOPS AVAILABLE**



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