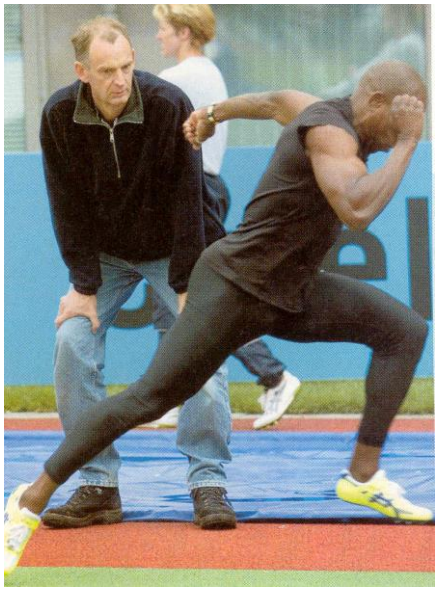
Program design in elite sports
Winning strategies to perform better

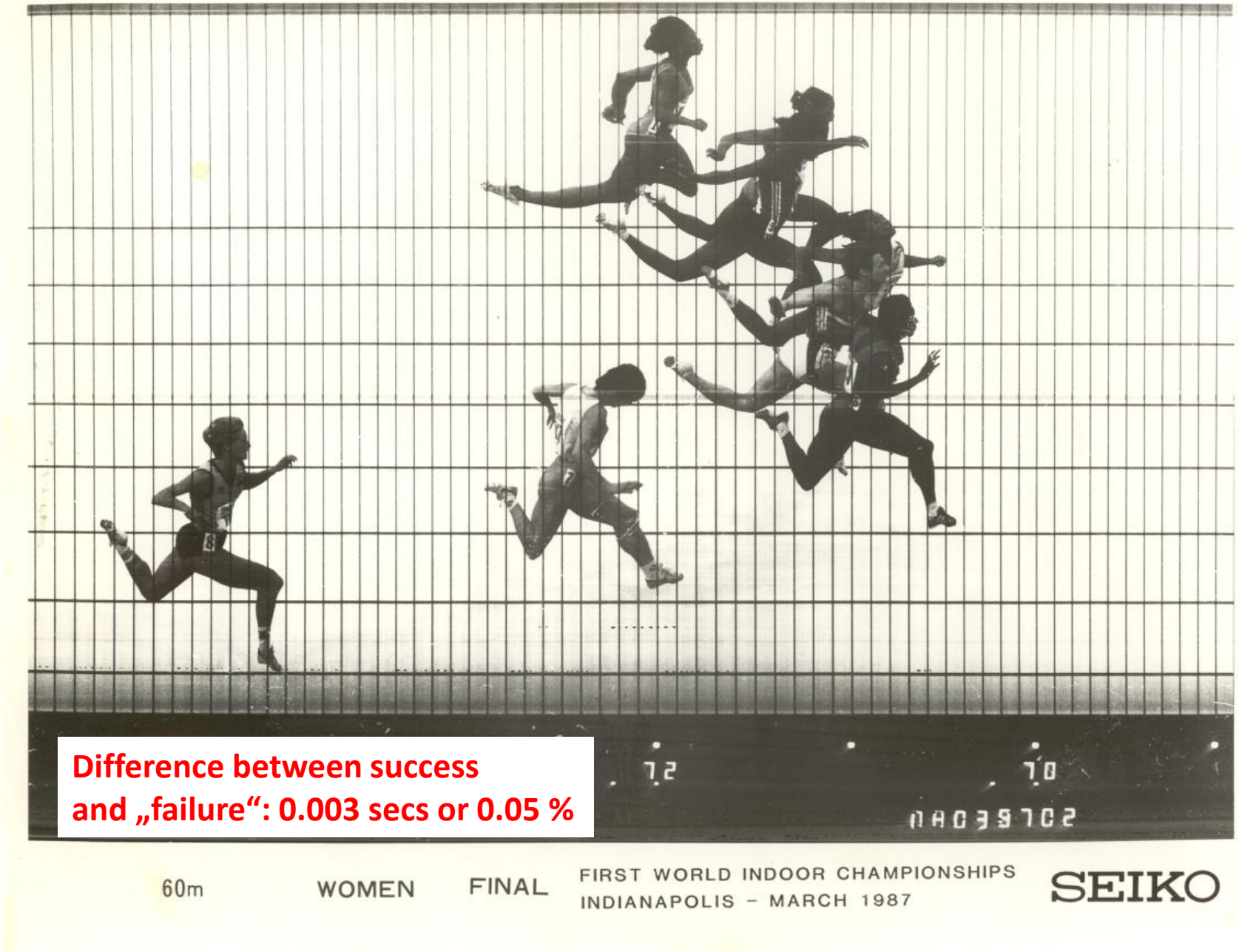
Henk Kraaijenhof

Vortx



Welcome to my world

- educated at the School of Hard Knocks
- graduated at the University of Harsh Reality


Difference between success
and „failure“: 0.003 secs or 0.05 %
7.2
7.0
60m
WOMEN
FINAL
FIRST WORLD INDOOR CHAMPIONSHIPS
INDIANAPOLIS – MARCH 1987
SEIKO

First basic questions to yourself:

Do I make the difference?

Am I as good as I can be?

Could I have better results?

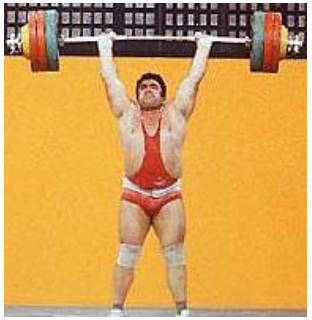
How?

How many times a week should my athletes train for optimum results?

What I learned

- There is no such thing as “being fit”, there is only “being fit for WHAT……?”






None of these athletes is fit to do the other’s task……

Functional training…

- What is the function you are looking for
- There is no overall, general, total function….
- It’s specifically related to a task….

?

Think beyond exercises!

?

A good soup is more than a bunch of ingredients thrown together!!

So, successful training is more than throwing a bunch of exercises at your athlete!

Think again

"Muscle is just a stupid piece of meat" - Dr.Guy Voyer

Would you agree?

Focus shift:

from Muscle to Fascia to Nervous systems (ANS and CNS)

Plan your work and work your plan

- athlete-typing
- goals(-s)
- which exercises and why
- which exercises not and why not
- how often (week)
- how long (months or years)
- how many different exercises in a workout
- sets, reps, intensity, rest
- order of exercises

Why elite sports as a model?

Always looking:

- efficiency (stuff that really works) under time pressure and: we can measure what works and what doesn't - little room or time for fads or "tools for fools"
- low risk (no injuries or overload)
- long-term vision
- no occupational therapy (Beschaftigungs-Therapie) we are paid for measurable RESULTS

From personal to personalized

- “Personalized” medicine, “personalized nutrition” (= every person gets his/her own individualized medication or nutrition program)
- But still “Personal” training (= one program applied to every client)
- “Personalized” training = a tailor-made program based on the **individual** goals, the capacities and the limitations of each client

New key components

- **Individualisation**:
  from “Personal” Training to “Personalized” Training

- **Profiling**: adapting the training to the individual qualities of the person e.g
  1. muscle fiber-typing (FT vs.ST)
  2. brain-typing
  3. chrono-typing
  4. stress-typing
  5. and more ……

New key components

- **Actualisation:** adjusting the daily training load to the **ACTUAL** status of the athlete (minimizing the difference between training load and adaptability = Belastung und Belastbarkeit)

- shift from static periodisation to fluid periodisation (= dynamic programming = dynamische Formsteuerung)

Individualization

Would you drive this car to compete in a Formula 1 race?

Why not?

Obvious ???

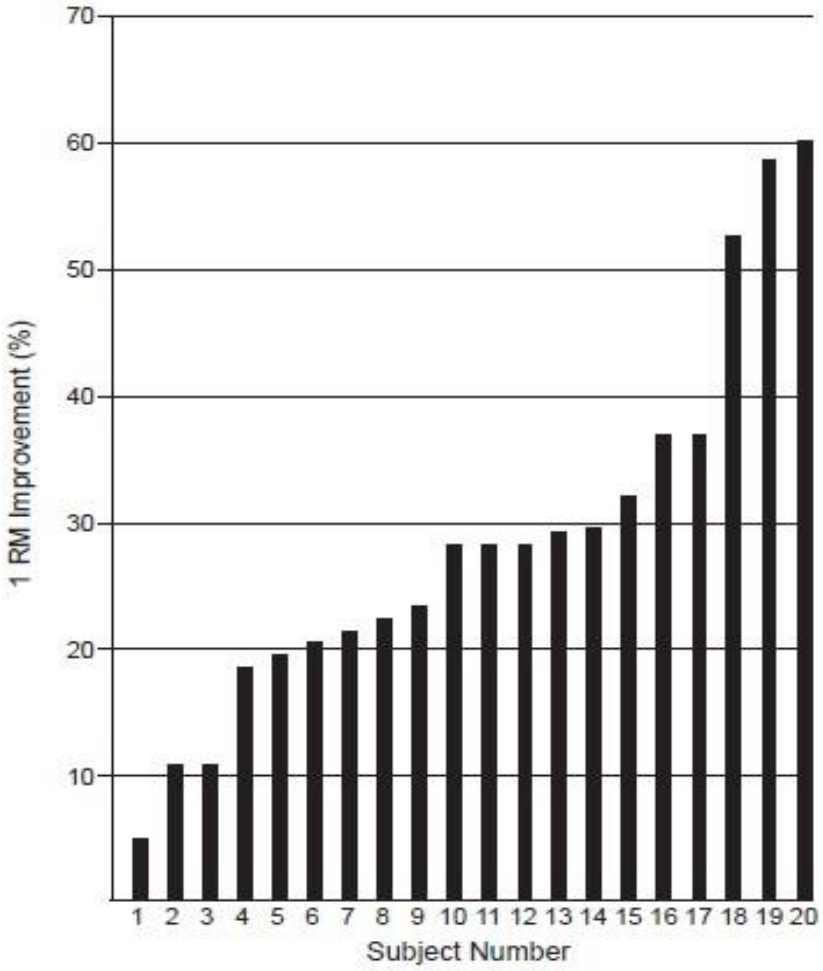
- not every body is “designed” for speed, for hypertrophy, for endurance, for flexibility, or …… to become an Olympic champion

Individualisation

Peter Tschiene

Die Individualisierung des Trainings:
eine vernachlässigte Leistungsreserve

Individuality



Individual changes in muscle strength in 20 children in response to eight weeks of strength training.

Individual effects of 20 weeks of strength training on strength increase in children

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Muscle fiber types

	TYPE I ST	TYPE II FT
Color	red	white
Contraction velocity	low	high
Mitochondrial density	high	low
Dominant energy sources	fats CHO	CHO
Dominant metabolites	CO2 + H2O	lactate
Oxygen processing	good	bad
Dominant working mode	volume (quantity)	intensity (quality)
Dominant quality	aerobic endurance	speed and power
Non-response to	speed and anaerobic training	aerobic training

Note: both types respond well to strength training at low velocity

Muscle fiber typing

Muscles designed for speed and power (type II or FT) or for (aerobic) endurance (Type I or ST) but always in a combination of both

Method 1:

- take a “marker “muscle” e.g. Vastus lateralis (represents the adaptation to the intensity of main propulsion methods (running, cycling, rowing, swimmming, speed skating)
- take a muscle biopsy

helping the best to get better

VORTX

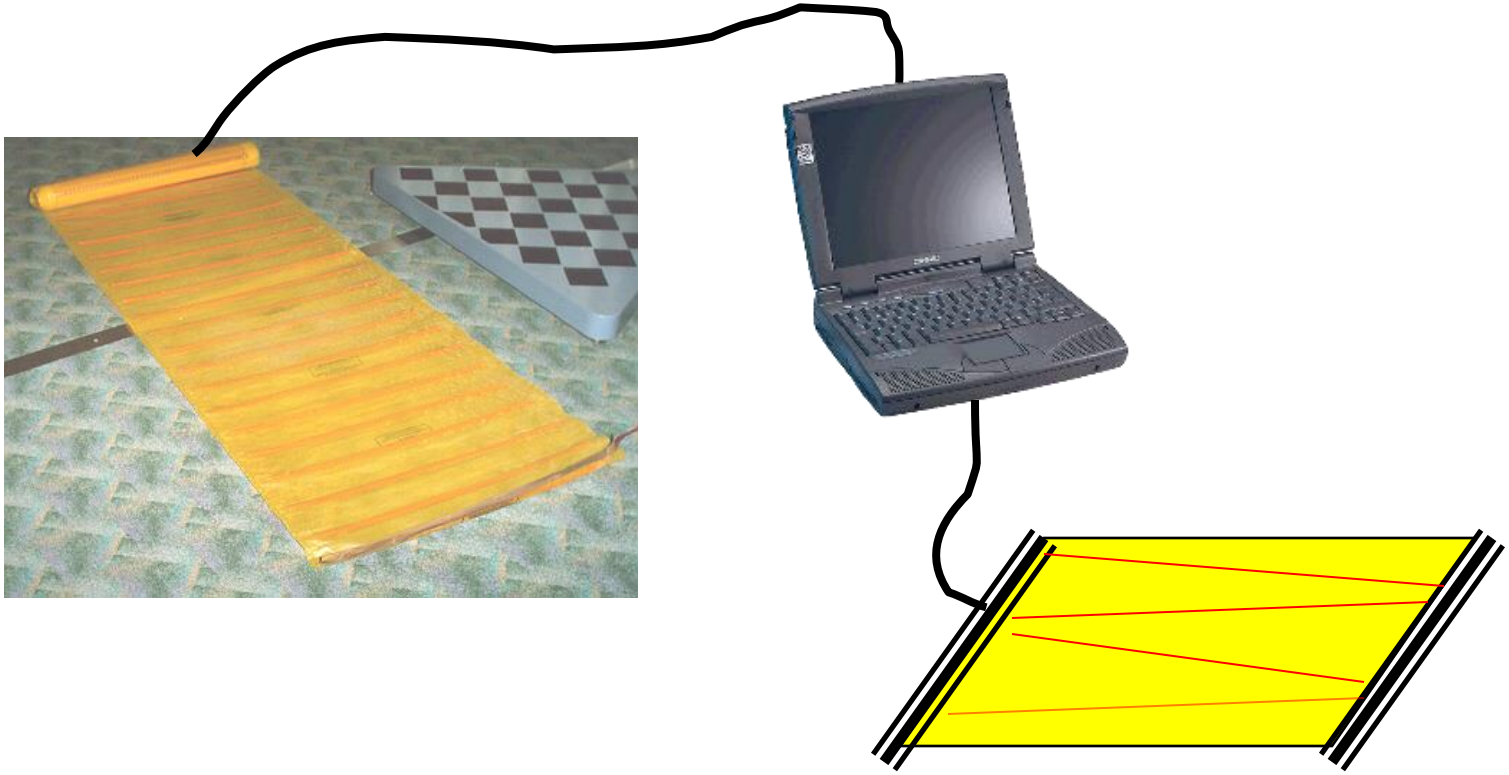
Muscle fiber typing

Method 2:

Bosco-jump test: estimating of muscle fiber type with very high reliability (1-2%)

1. **SJ** and 2. **CMJ**

Contact mat and light mat (Bosco-Ergojump)



Jump test - summary

Name	Date	Side	SJ [cm]	CMJ [cm]	Elastic [%]	CMJas [cm]	LJ bw [cm]	LJ bw [%]	LJ ½bw [cm]	LJ ½bw [%]	FT [%]
Maier, Hermann	9/02/2000	Both	42.9	49.5	13.2	57.7	0.0	0.0	0.0	0.0	55
Douglas, Troy	13/02/2001	Both	54.7	58.6	6.8	65.7	0.0	0.0	0.0	0.0	92
Stevens, Patrick	17/08/2000	Both	42.7	46.1	7.2	52.4	0.0	0.0	0.0	0.0	57
Jansen, Miguel	17/08/2000	Both	51.1	54.3	5.9	61.1	0.0	0.0	0.0	0.0	65
Gortzen, Guido	15/08/2000	Both	51.3	53.3	3.7	64.3	0.0	0.0	0.0	0.0	65
Van De Goor, Bas	15/08/2000	Both	40.4	42.4	4.6	48.7	0.0	0.0	0.0	0.0	46
Bosch, Edith	18/06/2000	Both	42.1	44.0	4.3	54.4	0.0	0.0	0.0	0.0	72
Huizinga, Mark	18/06/2000	Both	31.0	30.7	1.2	37.9	0.0	0.0	0.0	0.0	31
Timmer, Marianne	4/07/2000	Both	35.9	36.7	2.3	0.0	0.0	0.0	0.0	0.0	50
Timmer, Marianne	1/09/2000	Both	34.3	35.5	3.2	44.5	0.0	0.0	0.0	0.0	47
Kempes, Edwin	15/08/2000	Both	41.1	42.6	3.4	53.7	0.0	0.0	0.0	0.0	48
Wijmeersch, Erik	25/10/2000	Both	41.8	42.5	1.7	46.0	0.0	0.0	0.0	0.0	50
Wijmeersch, Erik	13/02/2001	Both	51.4	51.4	0.0	58.5	0.0	0.0	0.0	0.0	65
Bos, Jan	1/09/2000	Both	48.7	50.5	3.5	55.4	0.0	0.0	0.0	0.0	58
Postma, Ids	1/09/2000	Both	48.0	53.1	9.6	59.2	0.0	0.0	0.0	0.0	61
Davids, Edgar	10/09/2000	Both	33.3	35.8	6.9	46.4	0.0	0.0	0.0	0.0	37
Davids, Edgar	4/12/2000	Both	40.4	41.4	2.4	50.7	0.0	0.0	0.0	0.0	47
Verkerk, Martin	12/02/2001	Both	34.4	38.7	11.1	45.0	0.0	0.0	0.0	0.0	42
Average			42.5	44.8		53.0	0.0		0.0		55

Actualisation

- minimizing the time-lag between the planning and the execution of the program
- goal: minimizing the discrepancy between training load and adaptability (= Belastung und Belastbarkeit)
- why: this method of optimization of training will

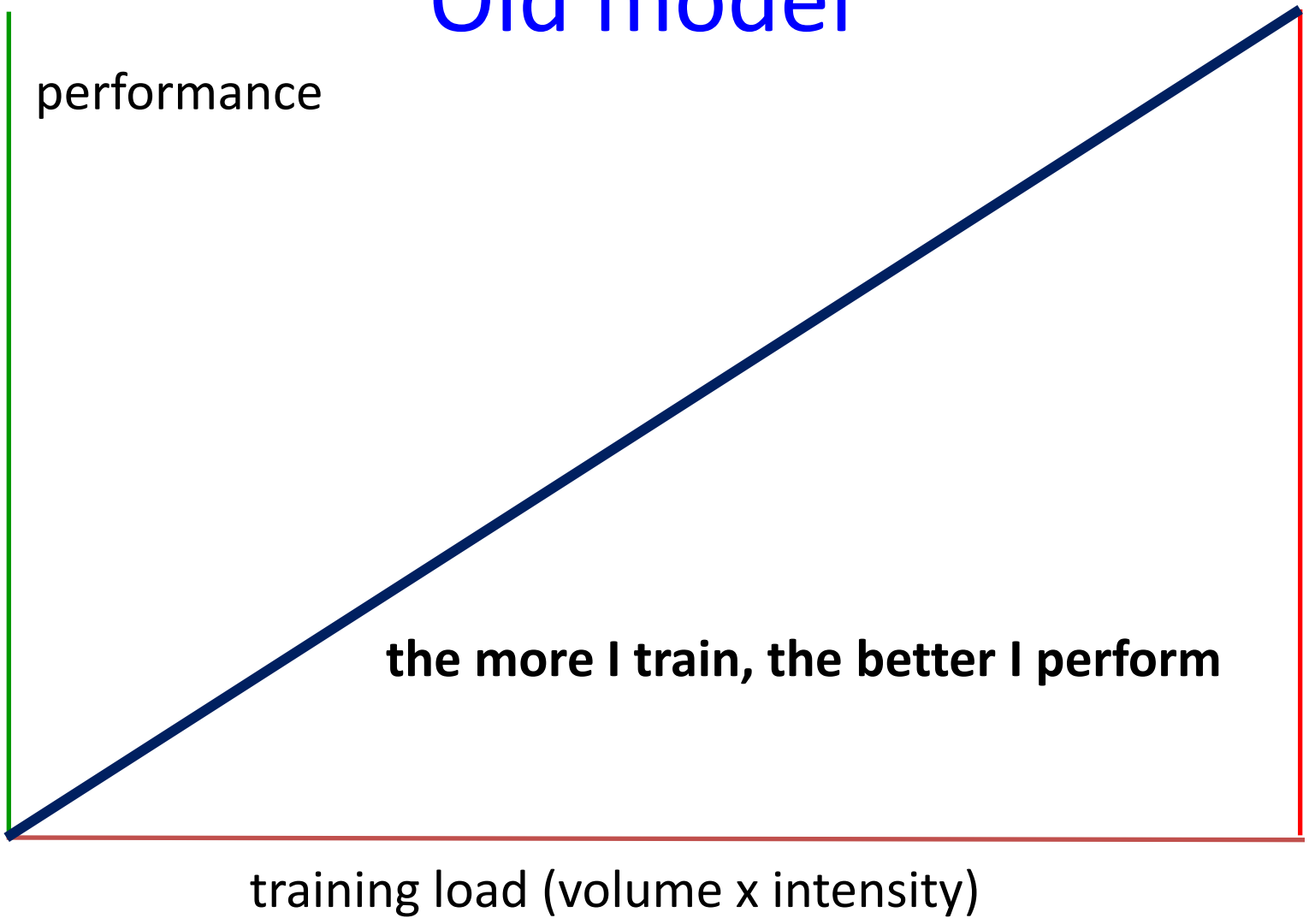
  - improve the quality of training (better results)
  - decrease the risk of overload:

    overtraining / acute injury / chronic injury
  - improve performance in competition

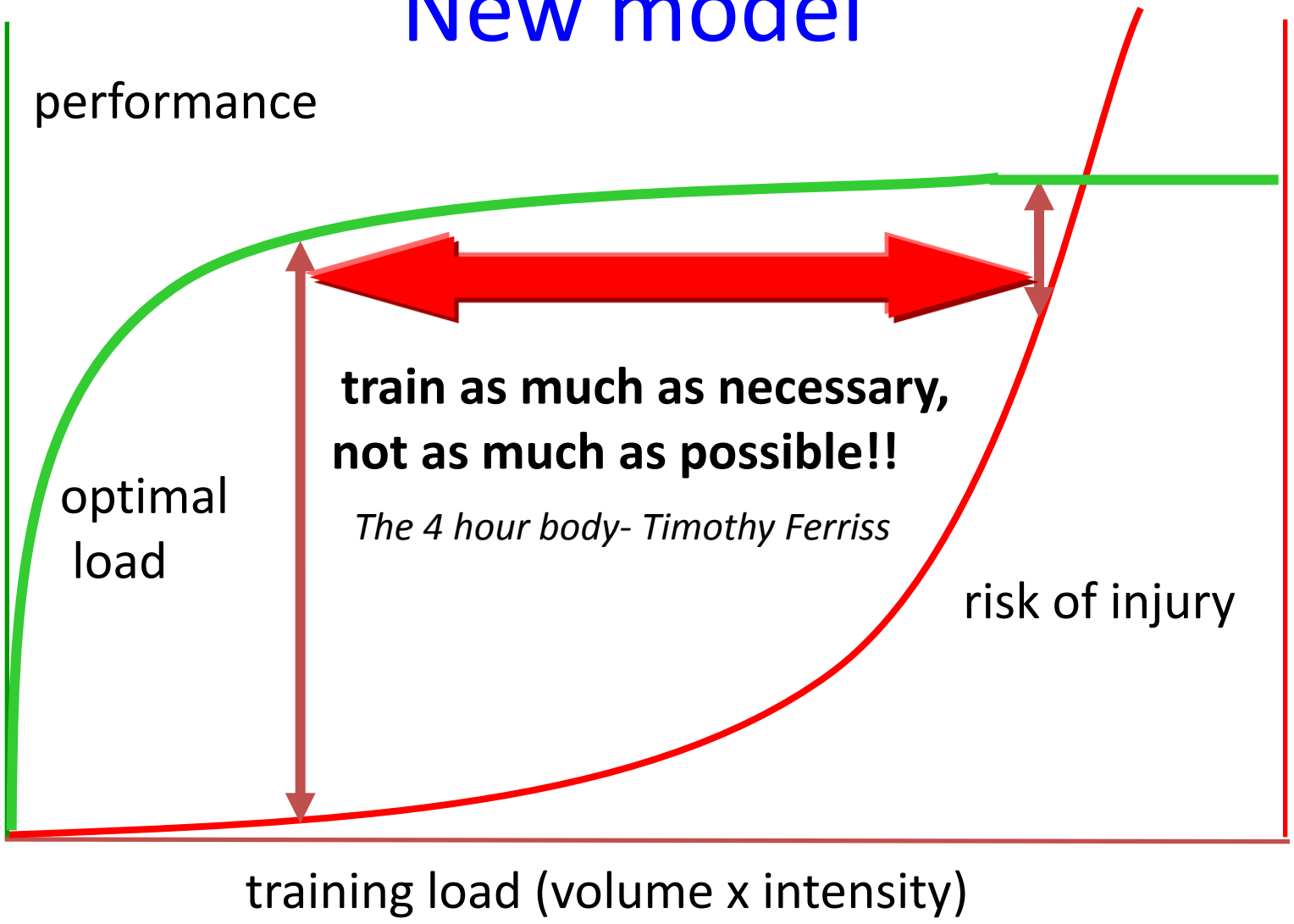
How to do that?

1. understand the difference between FITNESS and READINESS
2. test the athlete before each training-session to see the level of RECOVERY of the predominant physiological systems or to look at the WINDOWS OF TRAINABILITY

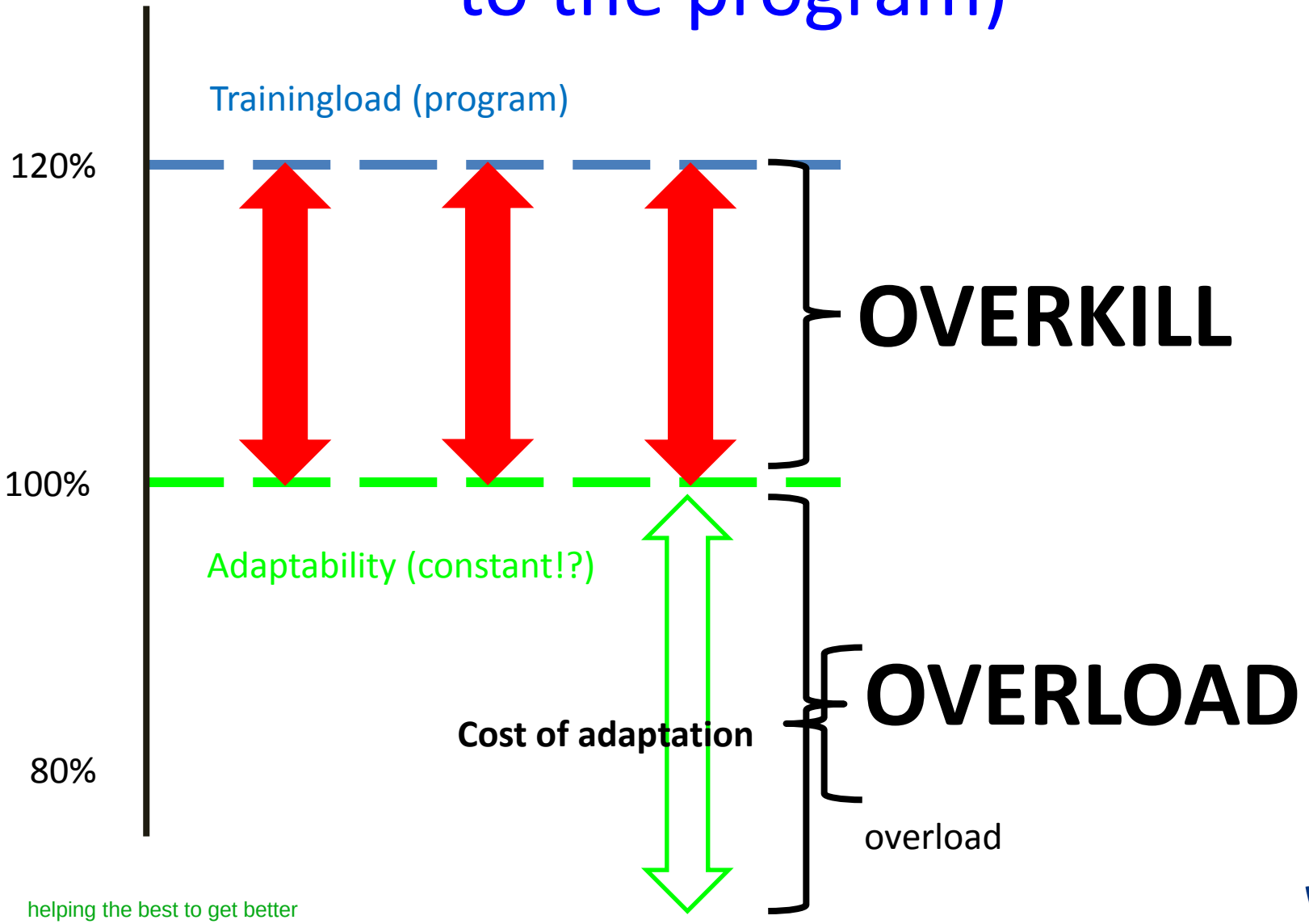
Old model


performance
the more I train, the better I perform
training load (volume x intensity)

New model


performance
train as much as necessary,
not as much as possible!!
The 4 hour body- Timothy Ferriss
optimal
load
risk of injury
training load (volume x intensity)

Classical model (train hard, according to the program)



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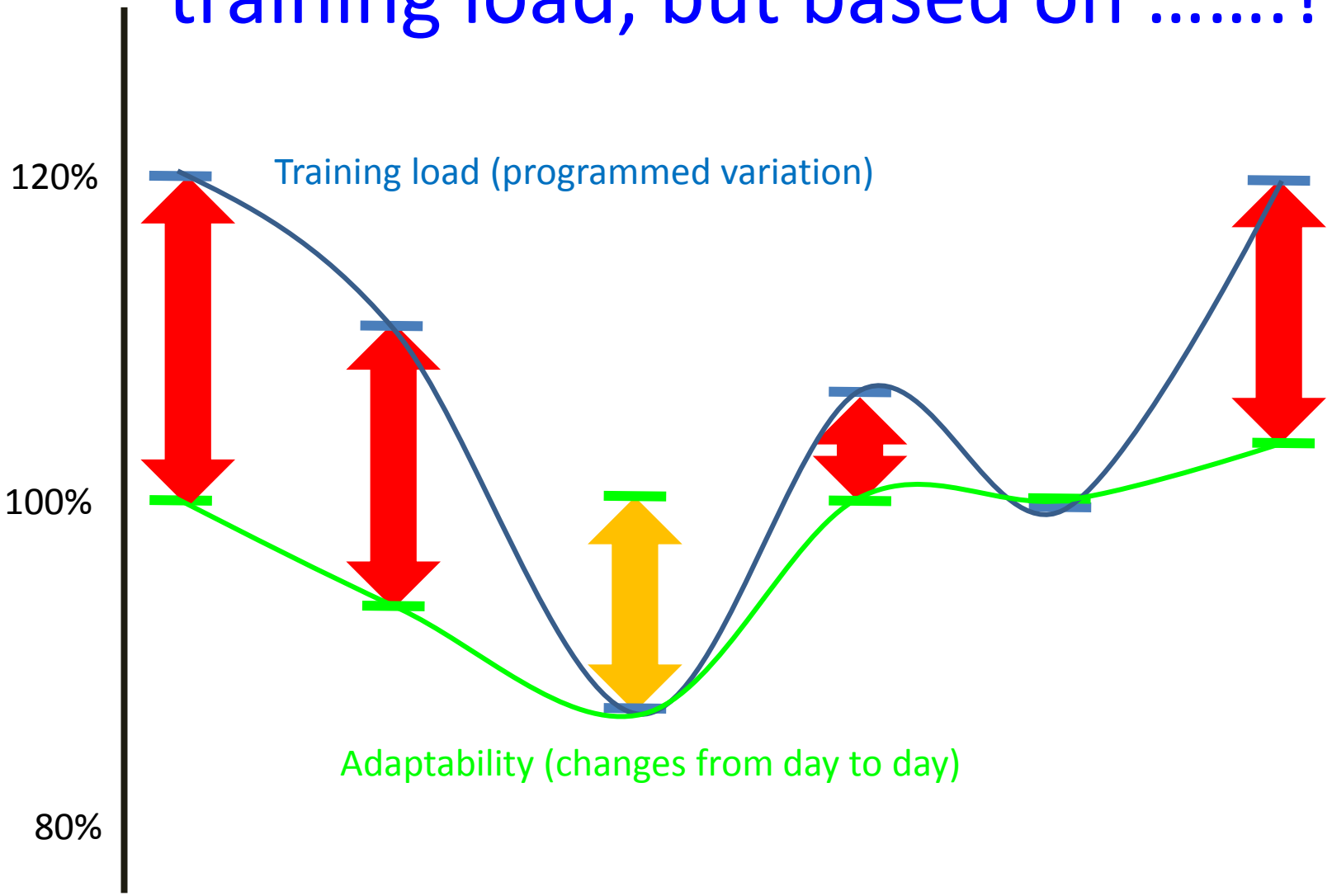
Improved model: adjustment of the training load, but based on …….?



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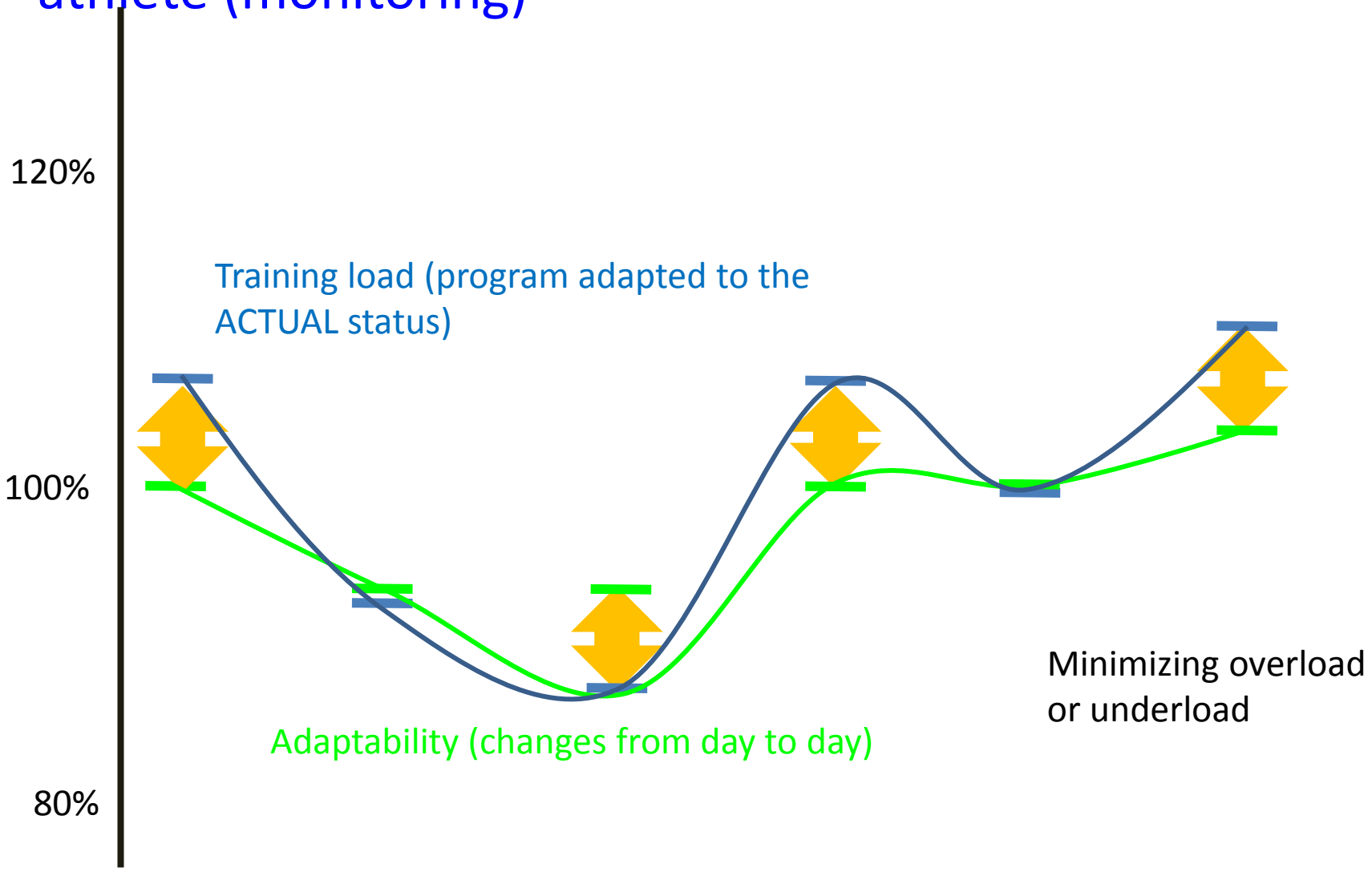
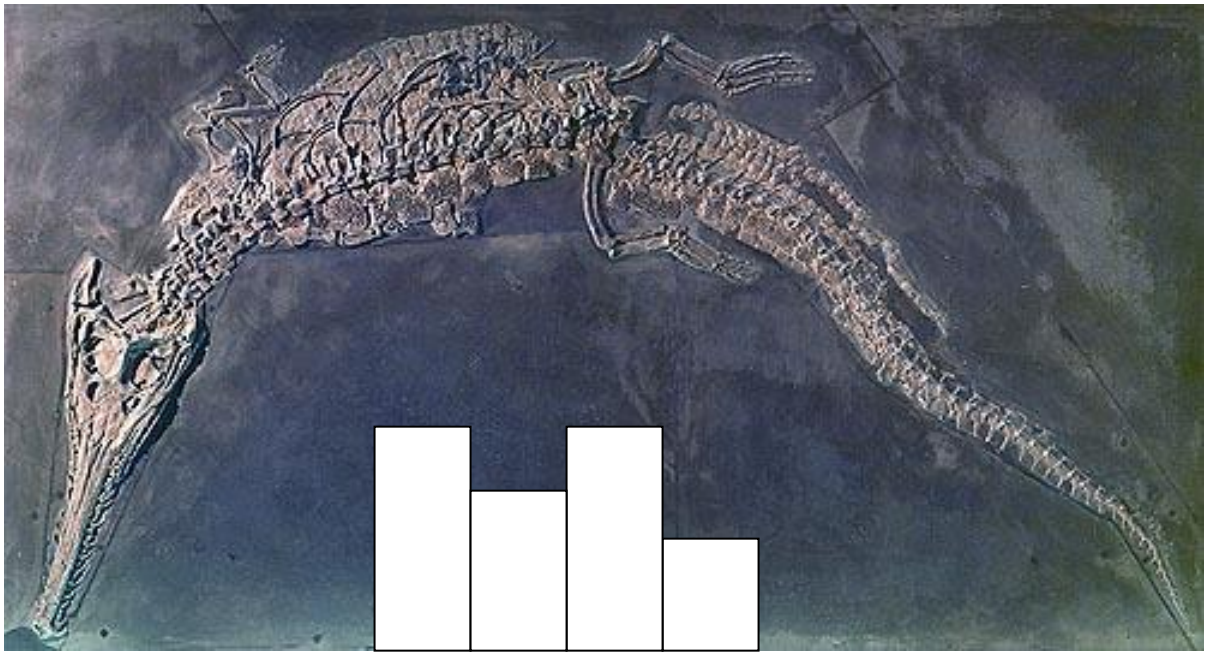
Fluid periodisation or dynamic programming: adjust each training load on a daily basis to the ACTUAL status of the athlete (monitoring)



Critical thinking on planning

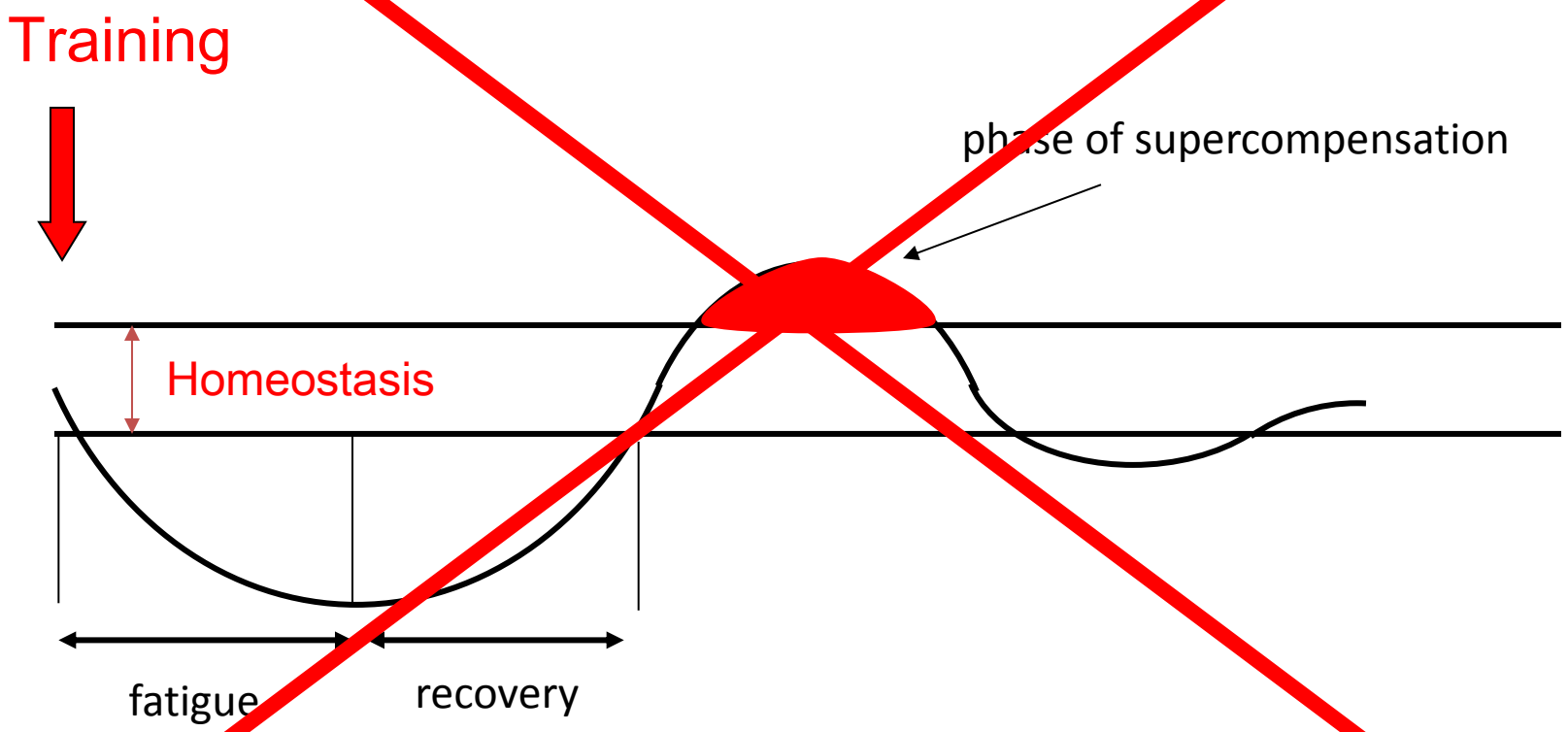
Periodisation: a fossile from the last century?

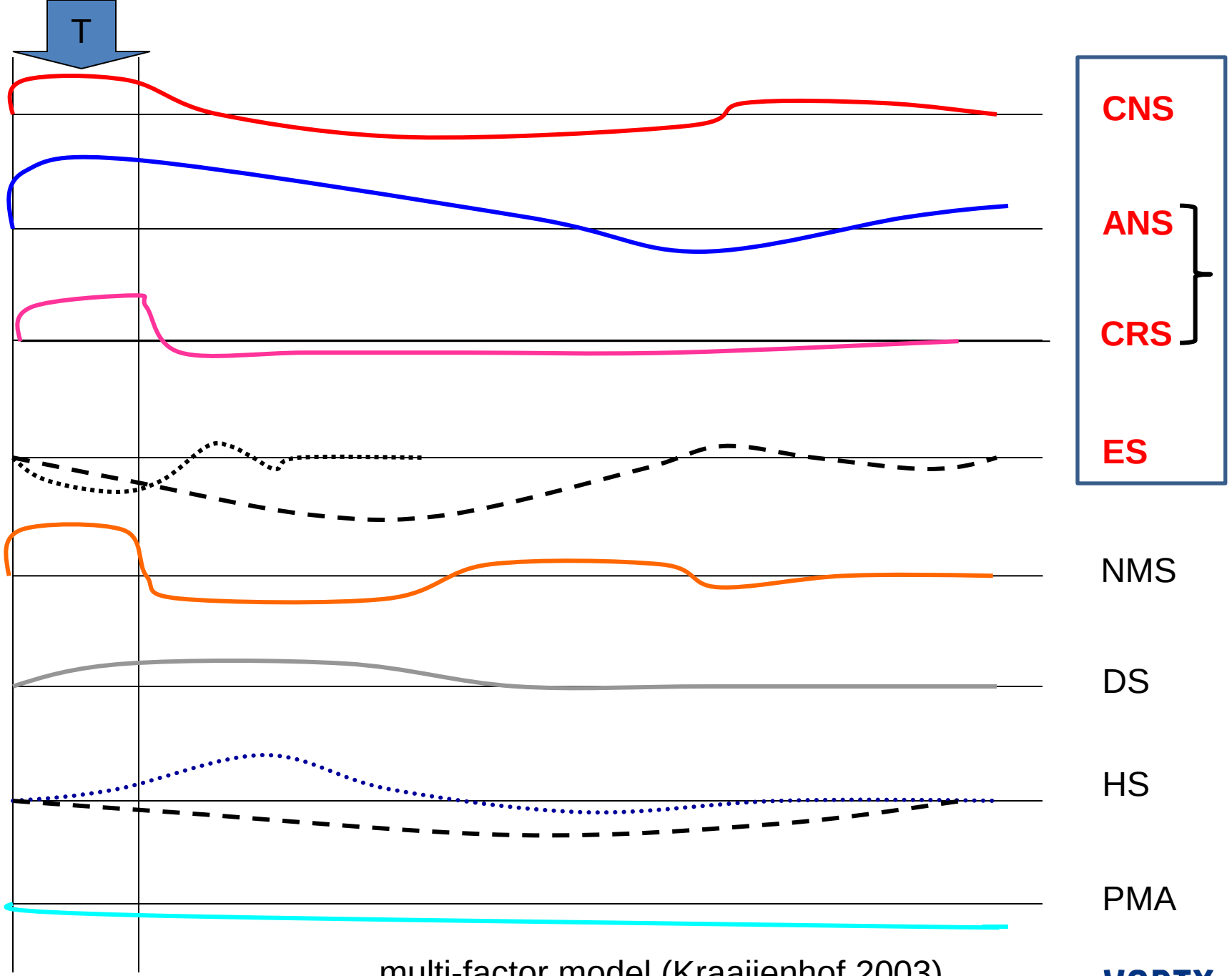
Henk Kraaijenhof



NOC*NSF Olympic Coach Platform OCP 13 september 2002

One-factor model of supercompensation



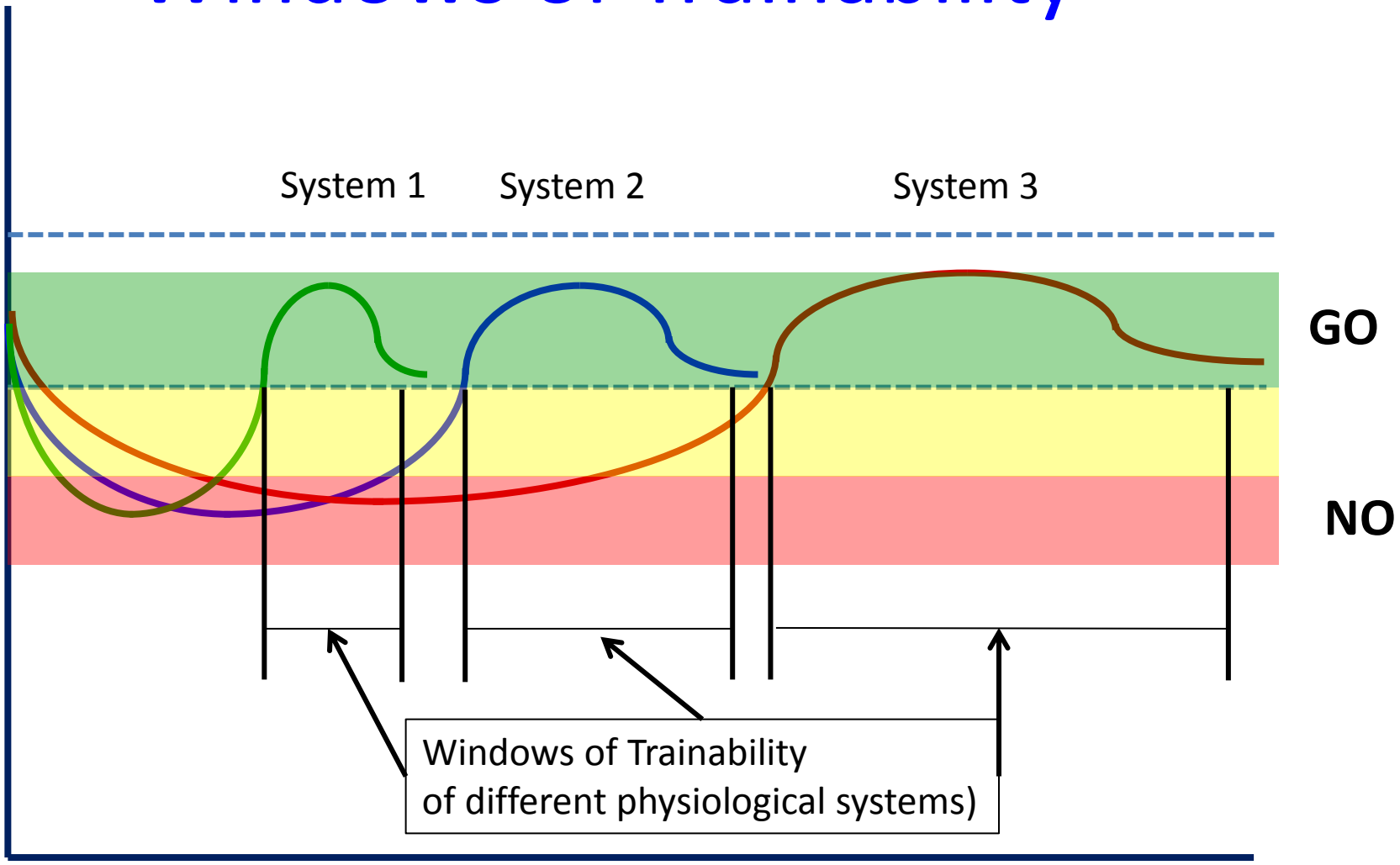


multi-factor model (Kraaijenhof 2003)

How to test?

- 5 minutes supine , no exercise

Windows of Trainability



Speed and power (explosiveness)

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Strength

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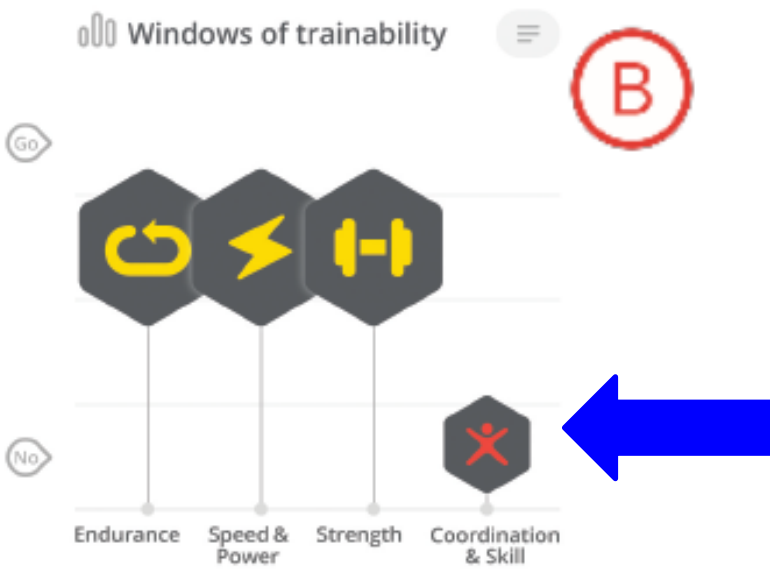
Coordination, skills and technique



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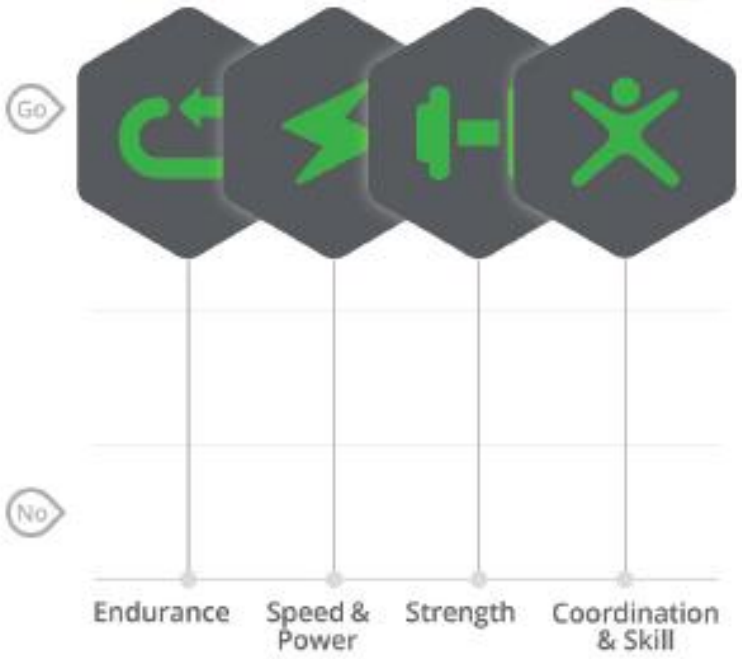
Windows of trainability



Training zones

Resting heart rate: 46 bpm

Anaerobic development
181–190

Anaerobic maintenance
172-182

Aerobic development
161-175

Aerobic maintenance
148-161

Recovery stimulation
118-148

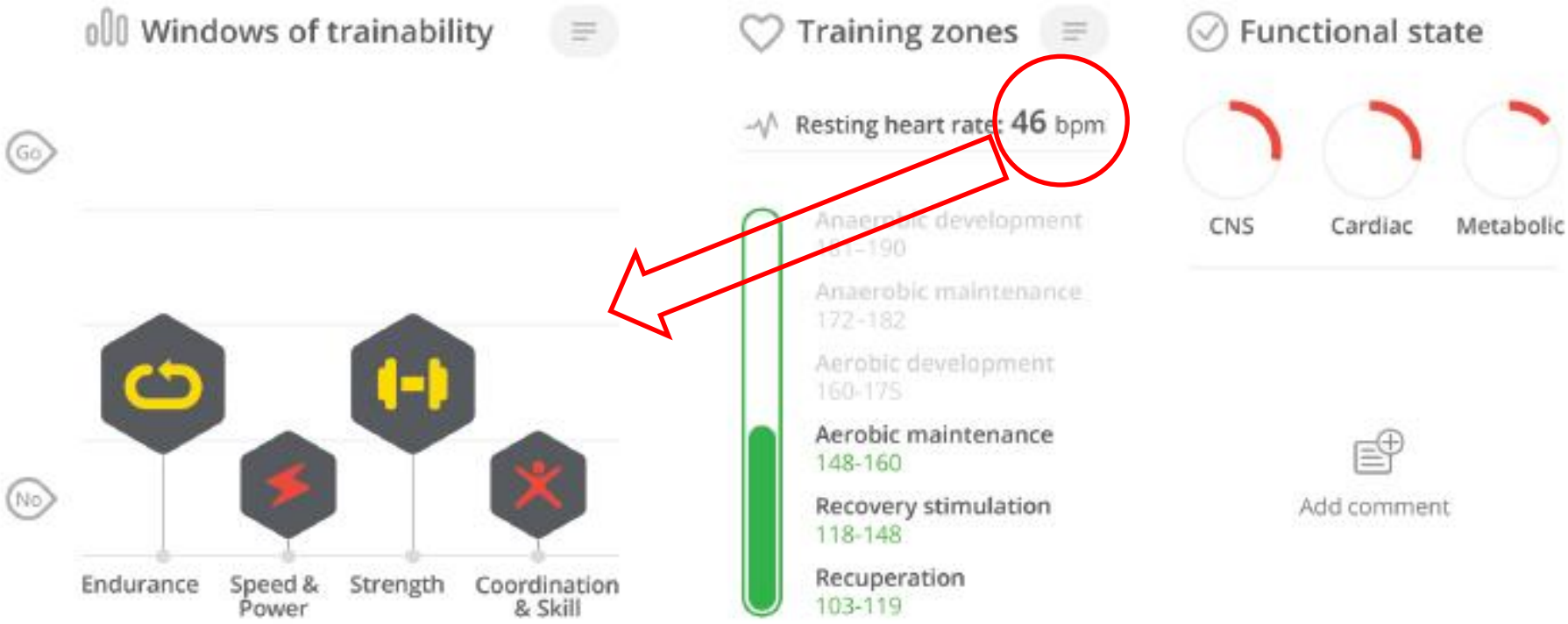
Recuperation
103-119

Functional state

CNS Cardiac Metabolic

Add comment

Overall readiness



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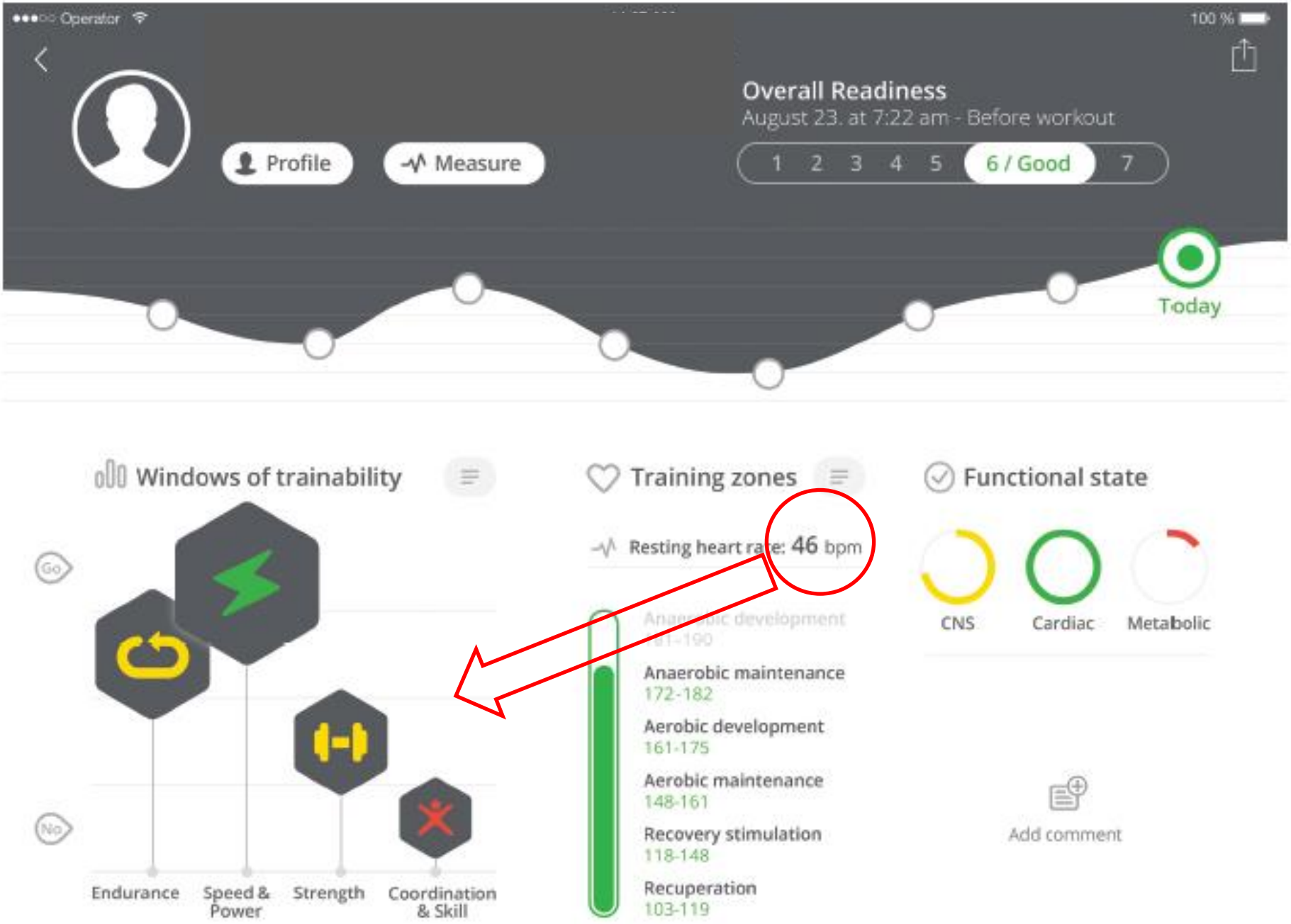

helping the best to get better

VORTX

FAQ…. Does this work in real life??

V.Starodubtsev: Individualization of athletic training for middle-and long-distance runners based on criteria of special preparation. Diss. Ped.Sci. Omsk, 1999.

	800 meter	3000 meter
Control group	-0.3 +/- 0.1 sec	-1.5 +/- 0.1 sec
Experimental group	-1.9 +/- 0.4 sec	-7.0 +/- 2.0 sec

PhD. thesis: The Effect of Fluid Periodization on Athletic Performance Outcomes in American Football Players - 59 players: 8 weeks of training

Control group: program executed as designed

Experimental group: program adapted according to the test results

Parameter	Control	Experimental	Percentage
Fat free mass (kg)	1.11	1.71	54%
Vertical jump (cm)	1.95	5.01	157%
Standing long jump (cm)	1.60	11.05	592%
Aerobe efficiency (BPM)	9.75	24.99	156%
Core training volume	22078	20078	-9.50%
Assessory training volume	10815	9478	-13.21%
Running volume	12493	12859	2.88%

Take home messages

- Think about what you want to accomplish and what is the best way to get there
- Think beyond the “cool”, “new” exercises: it’s not the ingredients that make the good soup….. It’s the chef that makes the difference
- Look at the individual
- Measure and monitor progress for optimum results
- Train as much as necessary, not as much as possible!

Thanks for your attention!
Go home and make the difference!

Any questions?

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