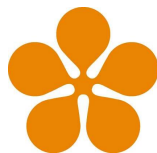


International Conference Disportare 2018 · 11-12th October 2018



Pedagogická
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University of South Bohemia
in České Budějovice

Coordinative Optimization for Sports Skills

David Ribera-Nebot

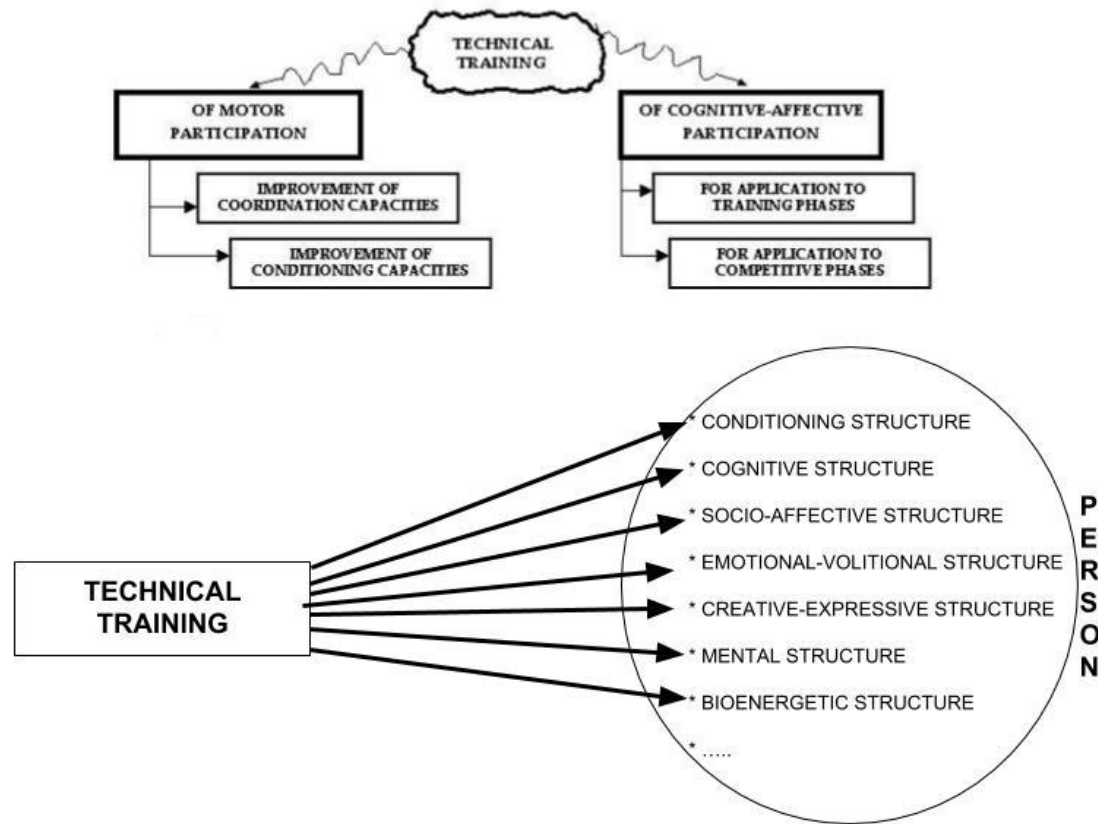
Sports Performance Institute



Sant Cugat del Vallès · Barcelona

In honor of my friend Vladimír Psalman





Prof. Francisco Seirul-lo Vargas

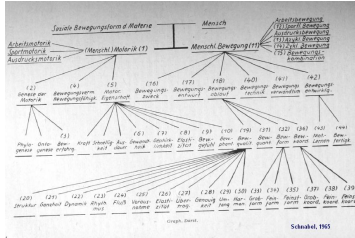
www.entrenamientodeportivo.org

Complex dynamic systems conception of technical training by Seirul-lo since 1987

DRN, 2015, copying and interpreting Professor Seirul-lo Vargas since 1987

COORDINATION CAPACITIES

Selected Authors



Schnabel (1965-76)

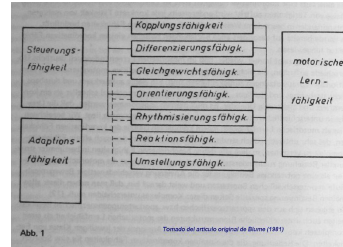
3 general coordinative capacities:

- motor control,
- adaptation of the movement,
- motor learning

5 special coordinative capacities:

- fine dexterity
- balance capacity,
- elasticity of movement,
- ability of motor combination
- movement fantasy

Joint mobility or amplitude as coordination-conditional capacity.



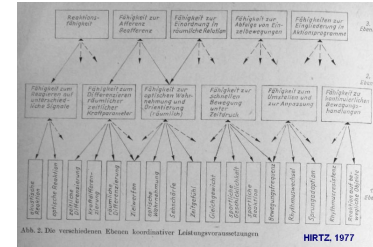
Blume (1978-81)

3 general coordinative capacities:

- motor control,
- adaptation of the movement,
- motor learning

7 coordinative capacities:

- differentiation
- coupling,
- reaction,
- orientation,
- preservation of balance,
- change
- rhythm



Hirtz (1977-81)

5 fundamental coordinative capacities:

- Spatial Orientation,
- kinesthetic differentiation,
- reaction,
- rhythm
- Balance.

2 power-conditional boundary capacities:

- coordinative speed
- coordinative resistance

3 superior coordinative capacities:

- motor control,
- motor adaptation,
- motor learning

COORDINATION CAPACITIES

Francisco Seirul-lo Vargas (1985)

MOVEMENT CONTROL

Kinästhetik Discrimination

Segmentary Differentiation

Variability of Movement

Combination of Movements

Guided Control of Movement

Fluidity and Relaxation of Movement

Amplitude of Movement

SPATIAL IMPLEMENTATION

Orientation

Directionality

Localization

Situation (placement)

Static-Dynamic Balance

TEMPORAL ADEQUACY

Reaction-Anticipation

Rhythmical Differentiation

Rhythmical Variability

Rhythmical or Temporal Adaptation

Rhythmical Sense (Temporal Creativity)

This structure of coordination capacities proposed by professor Seirul-lo is based on the person, thus it is applicable to movement education, sport initiation and high performance.

IMPORTANCE OF COORDINATIVE CAPACITIES

The coordinative capacities are important for the **development of the performance in all the sports** and the individual level of the particular capacities affects especially the **process of the technical-sport improvement** (Blume, 1981), being characterized by:

- ensures better, more rational-accelerated and higher-quality learning.
- facilitates the assimilation and mastery of extremely complicated exercises during years of training.
-allows a more rational assimilation of the corporal exercises for the general conditioning, the warm-up for high loads of training and competition and for the active recovery.
- contributes to a better selection of essentially talented athletes.



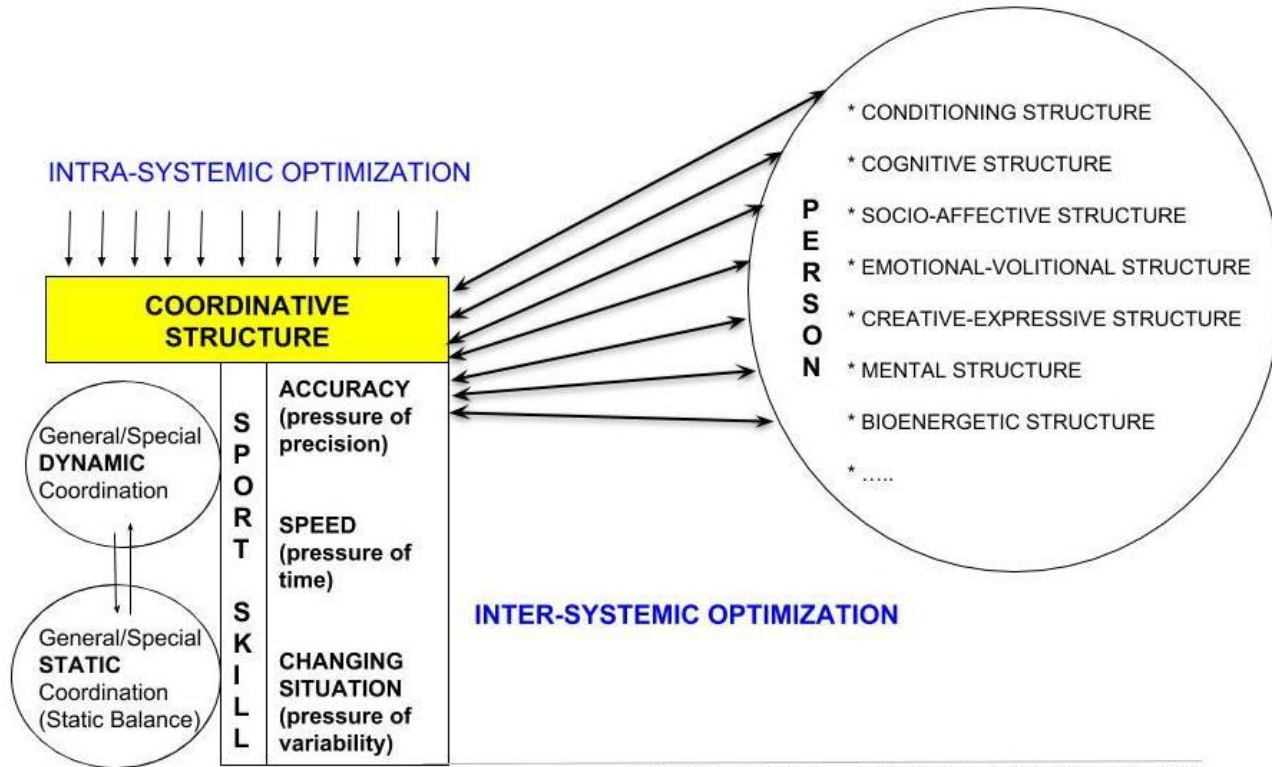
GENERAL METHODS FOR THE DEVELOPMENT OF COORDINATION

A starting point for coordinative optimization is the **general methods** used for the development of coordination, such as those proposed by **Blume (1981)**, summarized as follows:

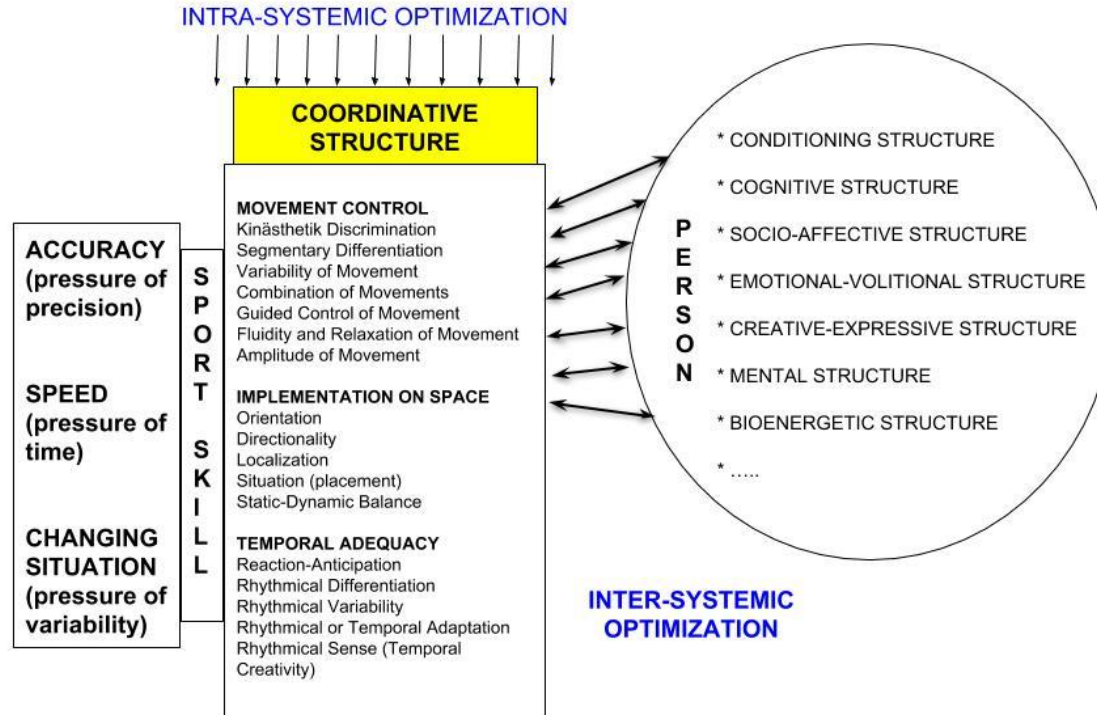
- (a) **Variations in the execution of movement** (unusual starting position, execution with opposite limb, change technical elements, supplementary movements, ...).
- (b) **Combination of movement skills** (global and segmentary, known with newly formed skills).
- (c) **Changes in the external conditions** (terrains, apparatus, vests, partners opposition or resistance, restrict or limit the space of performing skills, ...).
- (d) **Exercises under time pressure** (alter the speed or tempo/rhythm).
- (e) **Variations in the reception of information** (sensory variations).
- (f) **Exercises after a previous load.**



INTRA-SYSTEMIC AND INTER-SYSTEMIC COORDINATIVE OPTIMIZATION



INTRA-SYSTEMIC COORDINATIVE OPTIMIZATION



EXAMPLE 1

INTRA-SYSTEMIC OPTIMIZATION



COORDINATIVE STRUCTURE



Example 1a

MOVEMENT CONTROL

Kinästhetik Discrimination

Segmentary Differentiation

Variability of Movement

Combination of Movements

Guided Control of Movement

Fluidity and Relaxation of Movement

Amplitude of Movement

Example 1b

SPATIAL IMPLEMENTATION

Orientation

Directionality

Localization

Situation (placement)

Static-Dynamic Balance

Example 1c

TEMPORAL ADEQUACY

Reaction-Anticipation

Rhythmical Differentiation

Rhythmical Variability

Rhythmical or Temporal Adaptation

Rhythmical Sense (Temporal Creativity)



Preferential interactions **within** one type of coordination capacities

EXAMPLE 2a

INTRA-SYSTEMIC OPTIMIZATION



COORDINATIVE STRUCTURE

MOVEMENT CONTROL

Kinästhetik Discrimination

Segmentary Differentiation

Variability of Movement

Combination of Movements

Guided Control of Movement

Fluidity and Relaxation of Movement

Amplitude of Movement

+

SPATIAL IMPLEMENTATION

Orientation

Directionality

Localization

Situation (placement)

Static-Dynamic Balance



Preferential interactions **between** two types of coordination capacities

EXAMPLE 2b

INTRA-SYSTEMIC OPTIMIZATION



COORDINATIVE
STRUCTURE

MOVEMENT CONTROL

Kinästhetik Discrimination
Segmentary Differentiation
Variability of Movement
Combination of Movements
Guided Control of Movement
Fluidity and
Relaxation of Movement
Amplitude of Movement

TEMPORAL ADEQUACY

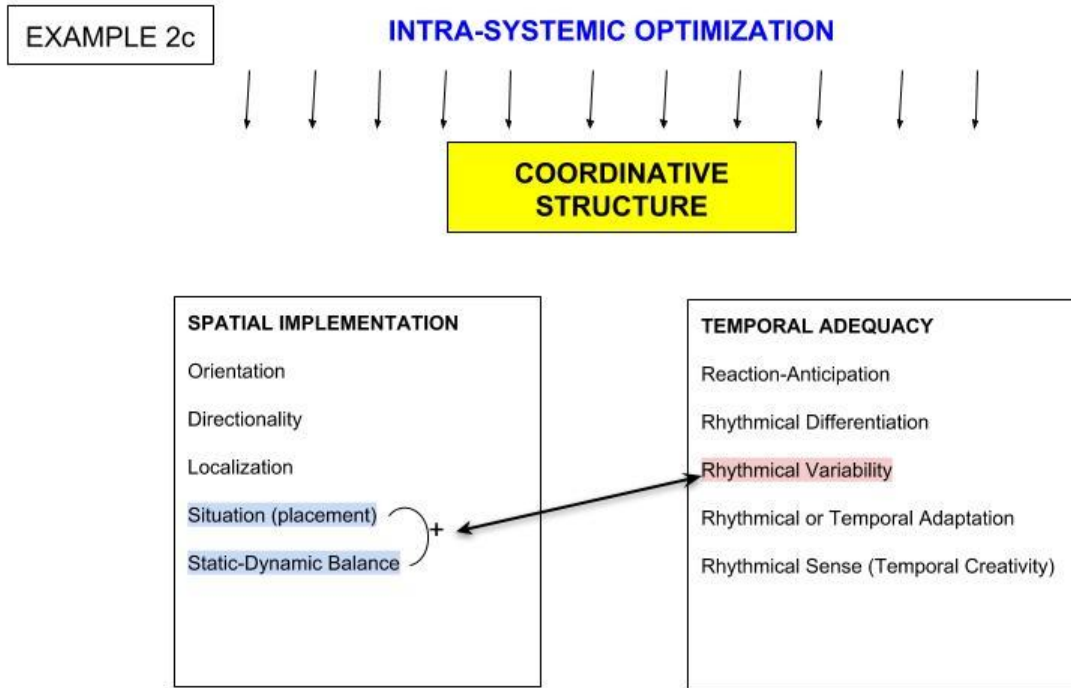
Reaction-Anticipation
Rhythmical Differentiation
Rhythmical Variability
Rhythmical or Temporal Adaptation
Rhythmical Sense (Temporal Creativity)

+

+

Preferential interactions **between** two types of coordination capacities



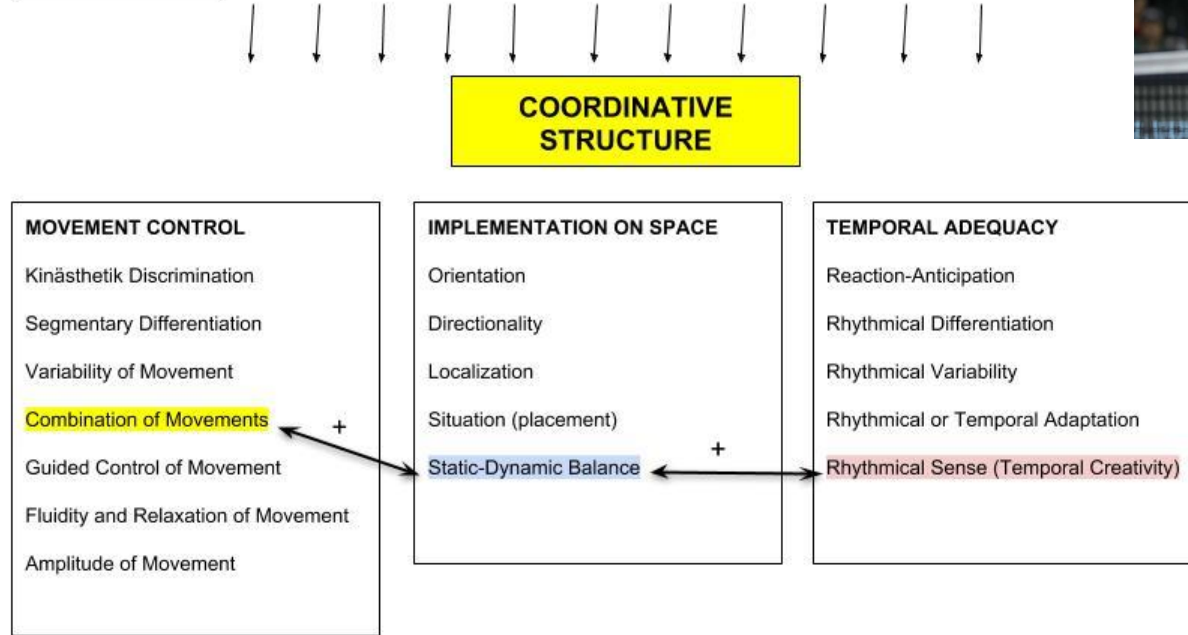


Preferential interactions **between** two types of coordination capacities



EXAMPLE 3

INTRA-SYSTEMIC OPTIMIZATION



Preferential interactions **among** three types of coordination capacities

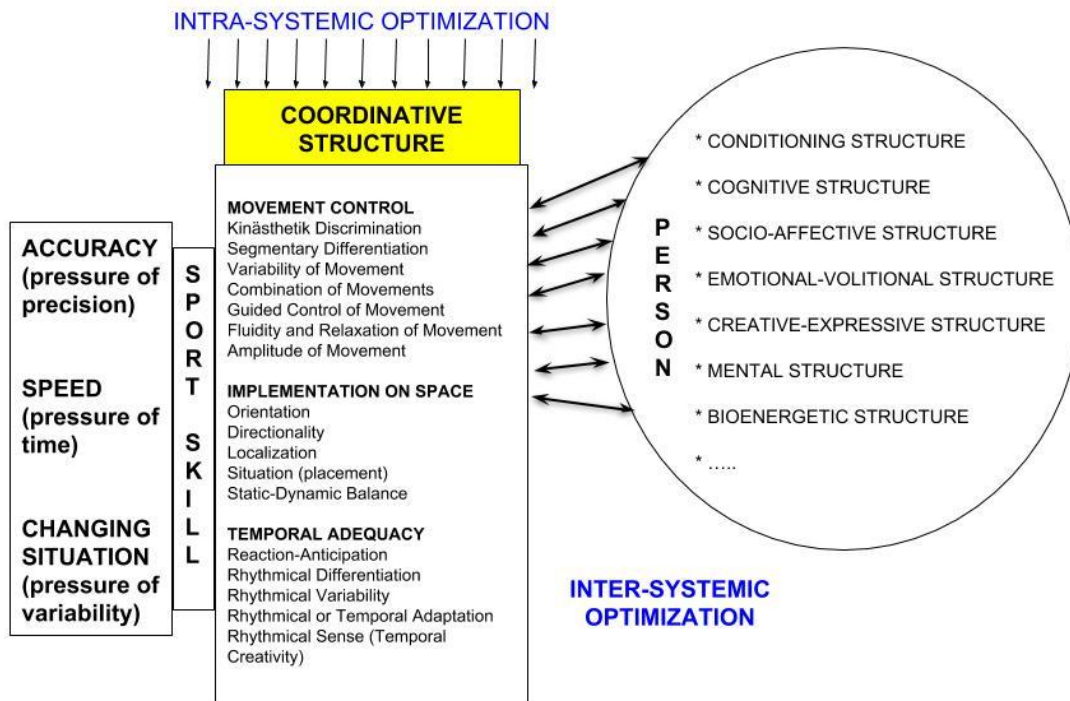
LINK TO AN ONLINE EXAMPLE



Coordinative Optimization in Tennis · Ex. 1 · Change direction - Footwork

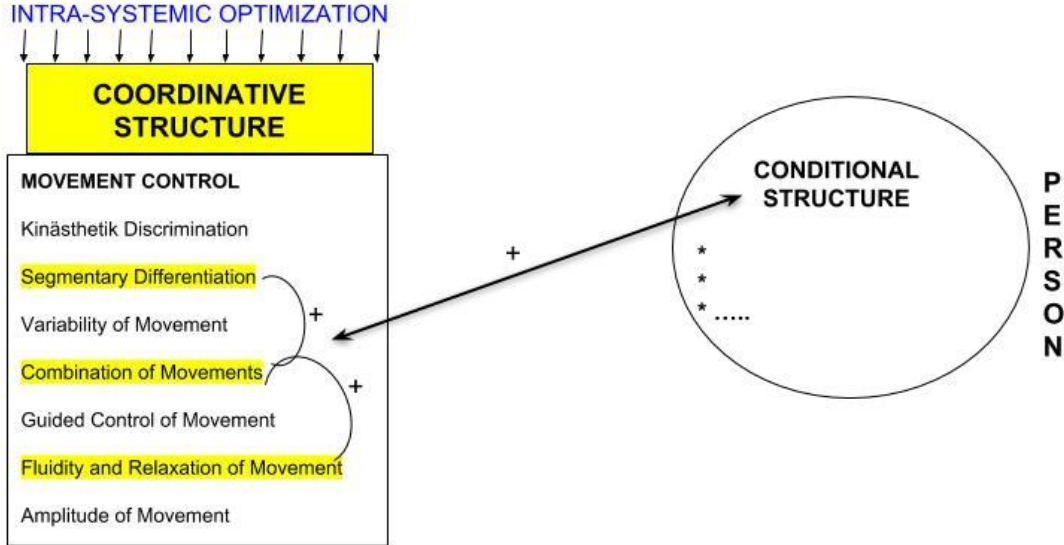
http://www.motricidadhumana.com/Coordinative_optimization_Tennis_example_1_change_direcc_footwork_by_DRN_2016_7.pdf

INTER-SYSTEMIC COORDINATIVE OPTIMIZATION

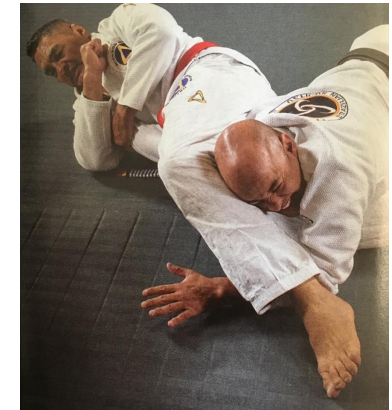
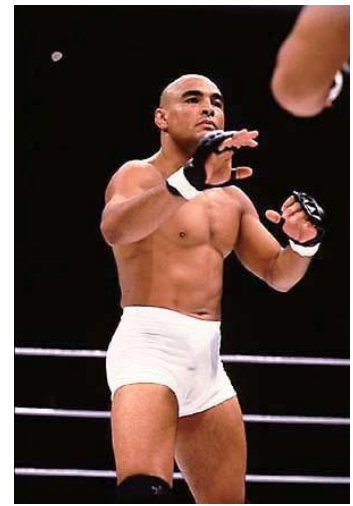


EXAMPLE 1A

INTER-SYSTEMIC OPTIMIZATION

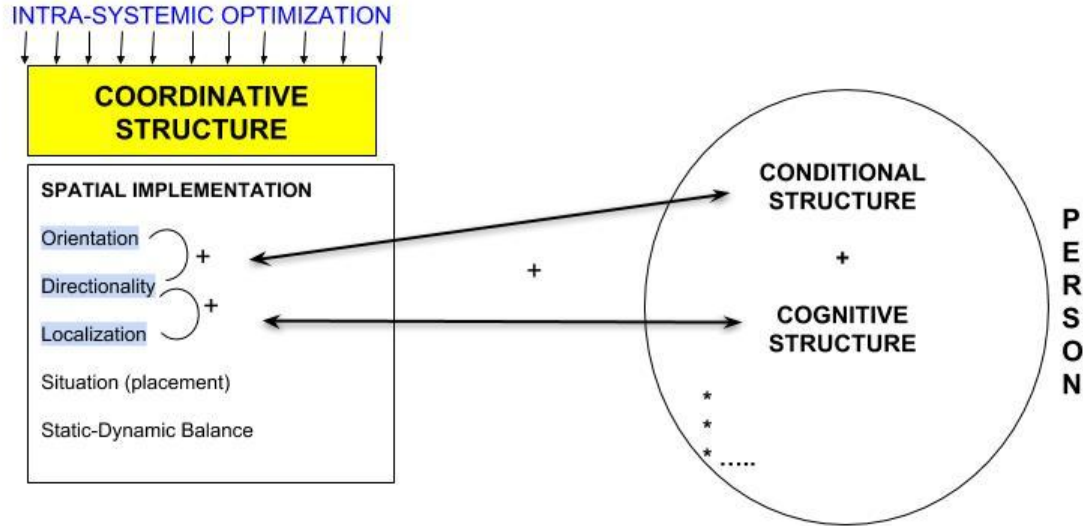


Preferential Coordinative interactions **with** Conditional Structure



EXAMPLE 1B

INTER-SYSTEMIC OPTIMIZATION



Preferential Coordinative interactions **with** Conditional and Cognitive Structures



EXAMPLE 1C

INTER-SYSTEMIC OPTIMIZATION

INTRA-SYSTEMIC OPTIMIZATION

COORDINATIVE STRUCTURE

TEMPORAL ADEQUACY

Reaction-Anticipation

Rhythmical Differentiation

Rhythmical Variability

Rhythmical or Temporal Adaptation

Rhythmical Sense (Temporal Creativity)

CONDITIONAL
STRUCTURE

+

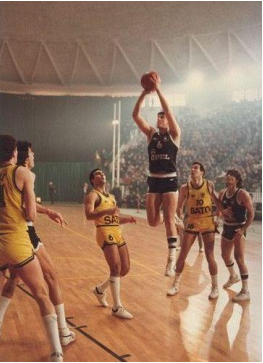
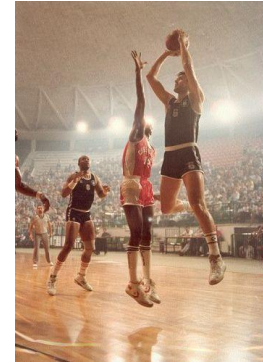
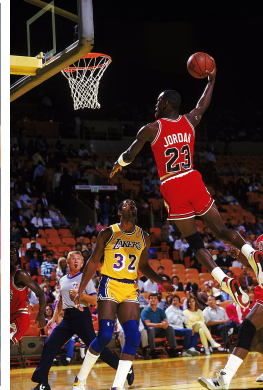
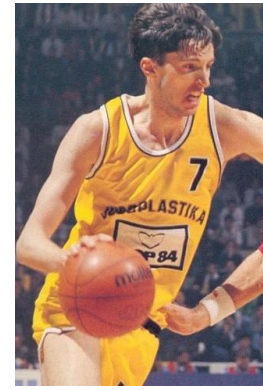
COGNITIVE
STRUCTURE

+

SOCIO-AFFECTIVE
STRUCTURE

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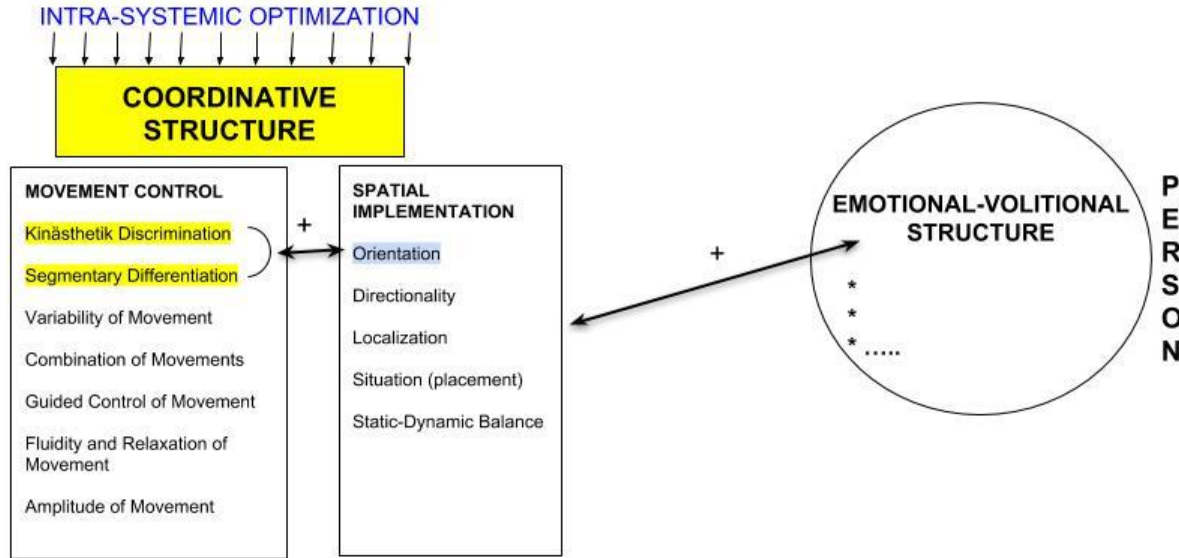
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Preferential Coordinative interactions **with** Conditional, Cognitive and Socio-Affective Structures

EXAMPLE 2A

INTER-SYSTEMIC OPTIMIZATION



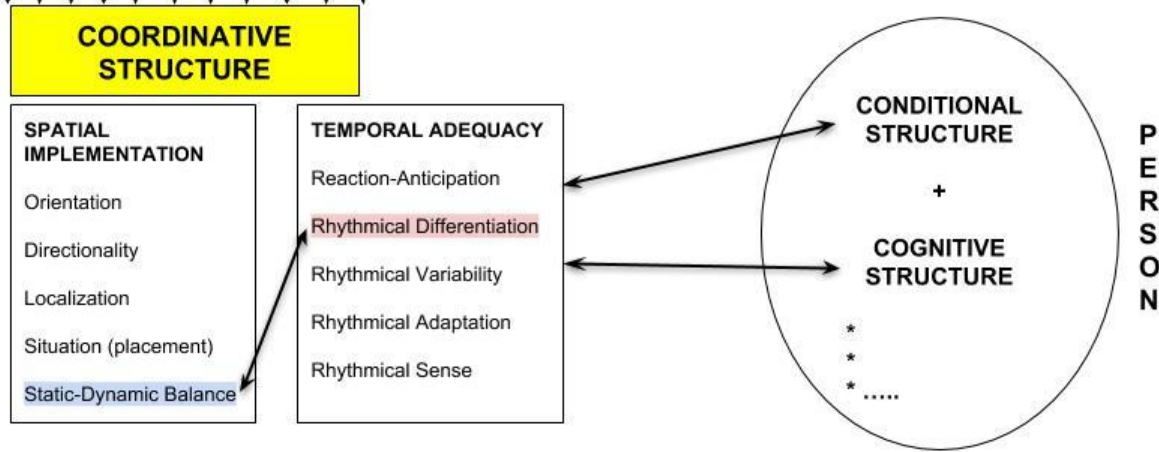
Preferential Coordinative (2 types) interactions **with** Emotional-Volitional Structure



EXAMPLE 2B

INTER-SYSTEMIC OPTIMIZATION

INTRA-SYSTEMIC OPTIMIZATION



Preferential Coordinative (2 types) interactions **with** Conditional and Cognitive Structures



EXAMPLE 3

INTER-SYSTEMIC OPTIMIZATION

INTRA-SYSTEMIC OPTIMIZATION

COORDINATIVE STRUCTURE

MOVEMENT CONTROL

Kinästhetik Discrimination
Segmentary Differentiation
Variability of Movement
Combination of Movements
Guided Control of Movement
Fluidity and Relaxation of Movement
Amplitude of Movement

SPATIAL IMPLEMENTATION

Orientation
Directionality
Localization
Situation (placement)
Static-Dynamic Balance

TEMPORAL ADEQUACY

Reaction-Anticipation
Rhythmical Differentiation
Rhythmical Variability
Rhythmical Adaptation
Rhythmical Sense

SOCIO-AFFECTIVE STRUCTURE

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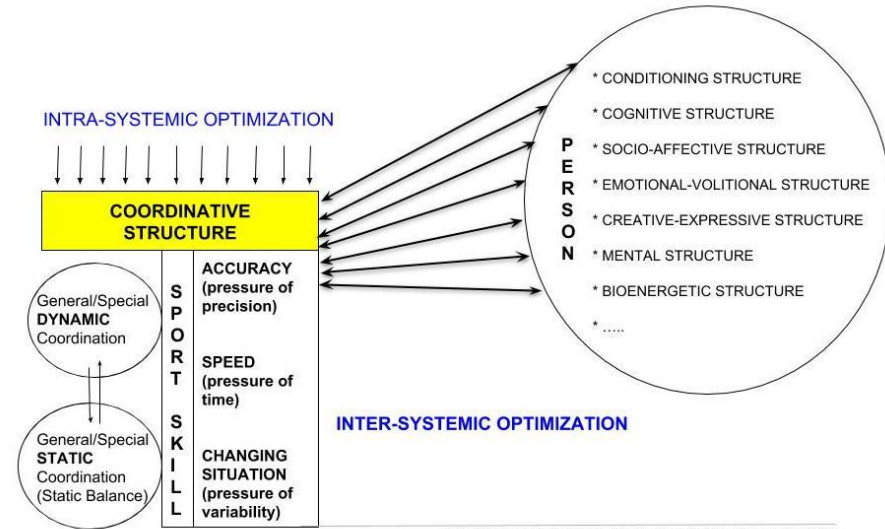
Preferential Coordinative (3 types) interactions **with** Socio-Affective Structure

NUMBER OF INTER-SYSTEMIC COORDINATIVE INTERACTIONS

Any number of inter-systemic coordinative interactions is possible but, in order to maintain a good level of quality preferential intra-systemic coordinative optimization and being practical, **no more than 1, 2 or even 3 inter-systemic interactions is recommended.**

Examples:

- a) **Intra-systemic Coordinative** + Inter-systemic Conditional
- b) **Intra-systemic Coordinative** + Inter-systemic Conditional + Inter-systemic Cognitive
- c) **Intra-systemic Coordinative** + Inter-systemic Conditional + Inter-systemic Cognitive + Inter-systemic Socio-Affective



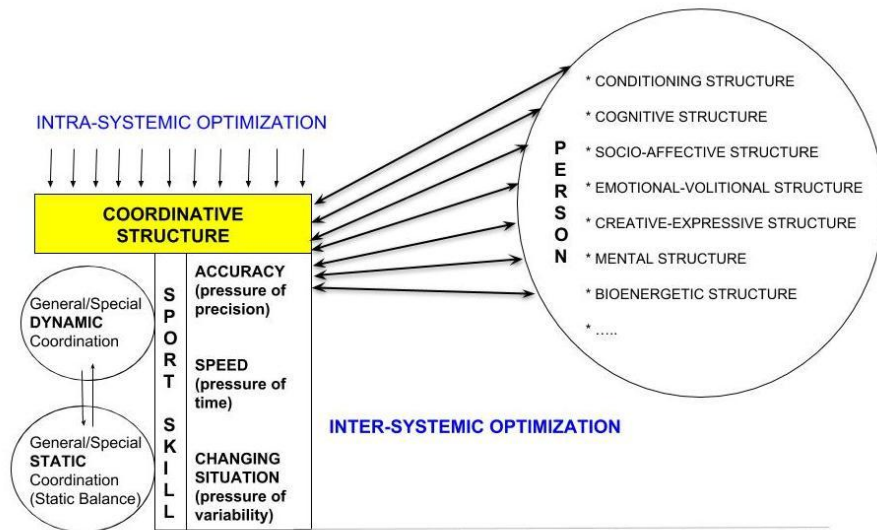
DRN, 2015, copying and interpreting Professor Seirul-lo Vargas since 1986

COORDINATIVE OPTIMIZATION AS PART OF A TRAINING SESSION

The Inter-systemic coordinative optimization can be proposed **after or between any other situation of preferential optimization of other structures** (cognitive, conditional, socio-affective, emotional-volitional, expressive-creative, ...). This will depend on how are the sequences of priorities optimizations designed in the training session.

Examples:

- Intra-systemic Conditional + **Inter-systemic Coordinative**.
- Intra-systemic Cognitive and Emotional-Volitional + **Inter-systemic Coordinative**
- Intra-systemic Socio-Affective + **Inter-systemic Coordinative** + Intra-systemic Conditional



DRN, 2015, copying and interpreting Professor Seirul-lo Vargas since 1986

TYPES OF SPORTS

CRITERIA FOR COORDINATIVE OPTIMIZATION

In all type of skills it is necessary to deal with real competition or as close as possible considering the complexity of the athlete

SITUATIONS FOR INTRA-SYSTEMIC COORDINATIVE OPTIMIZATION	PRIORITY INTER-SYSTEMIC OPTIMIZATION
In sports like athletics and gymnastics , the 1 on 0 situations are appropriated for intra-systemic coordinative optimization since is the reality of these type of sports.	Space-Time Cognitive in interaction with Conditional. New interactions among all structures.
In sports like mountain sports, mountain running trails, sailing sports , etc, the 1 on 0 situations are appropriated for intra-systemic coordinative optimization since is the reality of these type of sports.	Emotional-Volitional in interaction with variability of environment conditions. New interactions among all structures.
The 1 on 1 situations in duel and fighting sports and small group situations in team sports (1 on 2, 2 on 2, 3 on 2, 3 on 1, ...) would be the most appropriated for intra-systemic coordinative optimization, reducing or eliminating the practice of 1 on 0 situations since there are too far from reality.	Cognitive in interaction with Socio-Affective. New interactions among all structures.
	David Ribera-Nebot Sports Performance Institute 

CONCLUSION · COORDINATIVE OPTIMIZATION

The practical methodologies of coordinative optimization proposed by professor Seirul·lo Vargas provide insight into:

- (1) the identification of coordinative needs of a particular athlete in a structural criterion (motor control, spatial implementation and temporal adequacy),
- (2) the optimization of all aspects of coordinative structure in depth and in detail,
- (3) the creation of training methodologies that includes the complexity of the athlete, by intra-systemic and inter-systemic optimizations, and
- (4) the design of self-control and self-evaluation methods for a personalized proposal of an optimal training process.

