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Coordinative Optimization for Sports Skills

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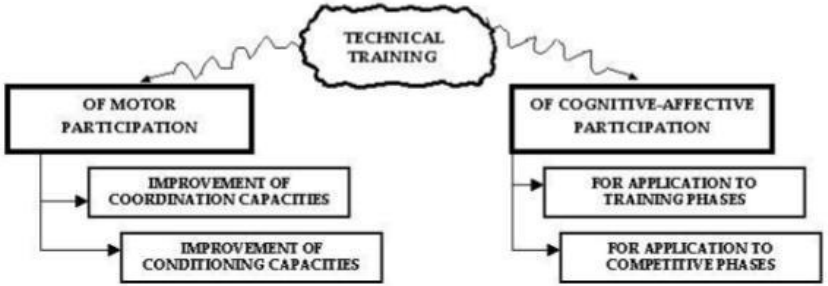

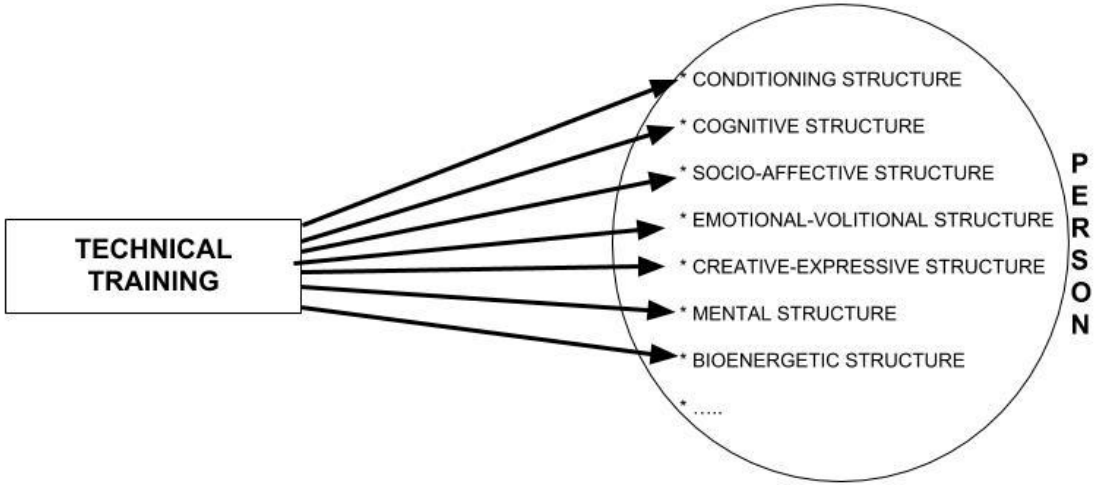

Complex dynamic systems conception of technical training by Seirul·lo since 1987

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

Prof. Francisco Seirul·lo Vargas

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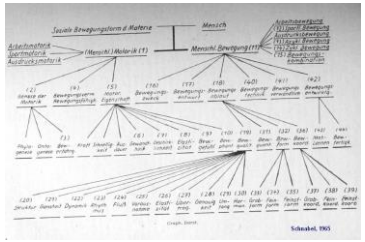
COORDINATION CAPACITIES

Selected Authors



Schnabel (1965-76)

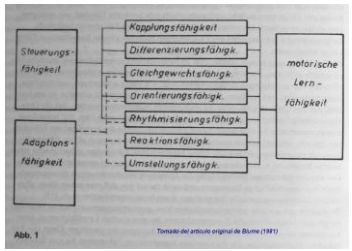
3 general coordinative capacities:

- 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.



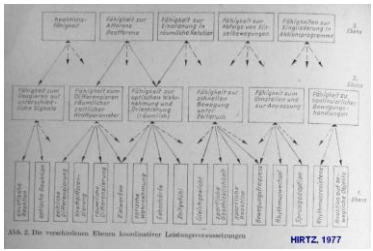
Blume (1978-81)

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 capabilities:

- coordinative speed
- coordinative resistance

3 superior coordinative capacities:

- motor control,
- motor adaptation,
- motor learning

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COORDINATION CAPACITIES

Francisco Seirul·lo Vargas (1985)

MOVEMENT CONTROL	SPATIAL IMPLEMENTATION	TEMPORAL ADEQUACY
Kinästhetik Discrimination	Orientation	Reaction-Anticipation
Segmentary Differentiation	Directionality	Rhythmical Differentiation
Variability of Movement	Localization	Rhythmical Variability
Combination of Movements	Situation (placement)	Rhythmical or Temporal Adaptation
Guided Control of Movement	Static-Dynamic Balance	Rhythmical Sense (Temporal Creativity)
Fluidity and Relaxation of Movement		
Amplitude of Movement		

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.

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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**.

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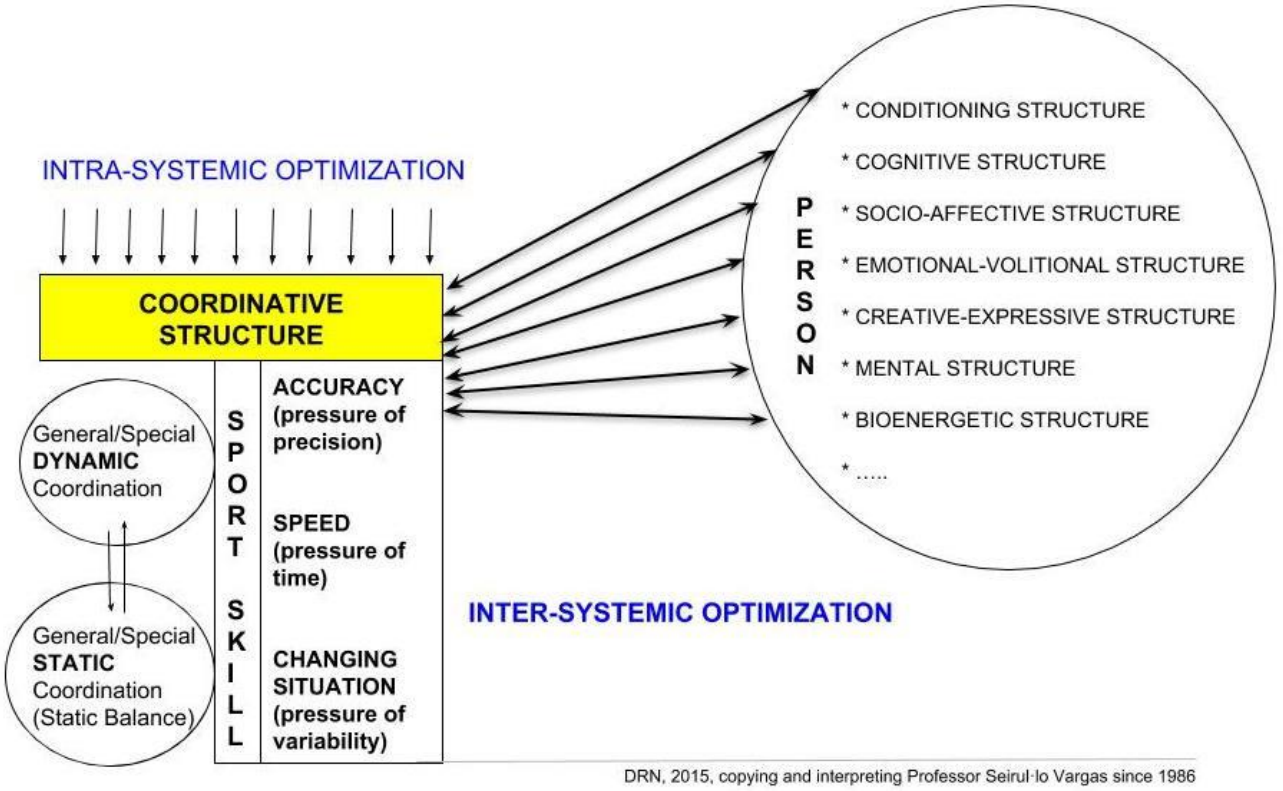
INTRA-SYSTEMIC AND INTER-SYSTEMIC COORDINATIVE OPTIMIZATION



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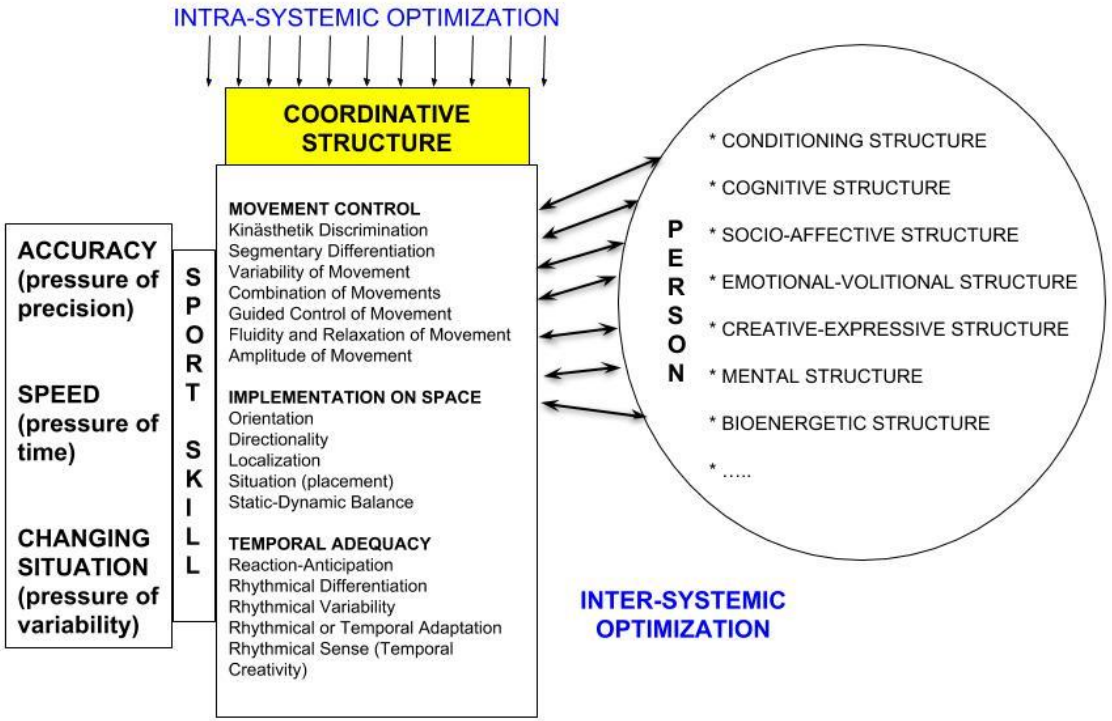
INTRA-SYSTEMIC COORDINATIVE OPTIMIZATION



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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

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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

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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

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EXAMPLE 2c

INTRA-SYSTEMIC OPTIMIZATION

COORDINATIVE STRUCTURE

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)

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

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EXAMPLE 3

INTRA-SYSTEMIC OPTIMIZATION

COORDINATIVE STRUCTURE

MOVEMENT CONTROL	IMPLEMENTATION ON SPACE	TEMPORAL ADEQUACY
Kinästhetik Discrimination	Orientation	Reaction-Anticipation
Segmentary Differentiation	Directionality	Rhythmical Differentiation
Variability of Movement	Localization	Rhythmical Variability
Combination of Movements	Situation (placement)	Rhythmical or Temporal Adaptation
Guided Control of Movement	Static-Dynamic Balance	Rhythmical Sense (Temporal Creativity)
Fluidity and Relaxation of Movement		
Amplitude of Movement		

+ (between Combination of Movements and Static-Dynamic Balance)

+ (between Static-Dynamic Balance and Rhythmical Sense)

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

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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

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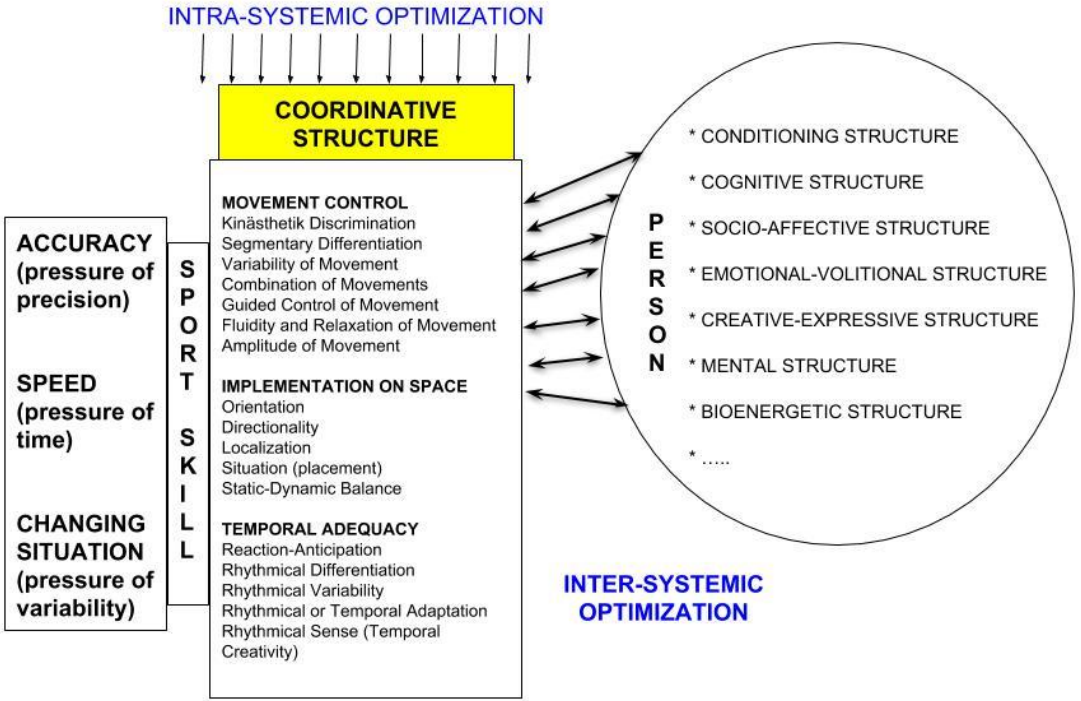
INTER-SYSTEMIC COORDINATIVE OPTIMIZATION



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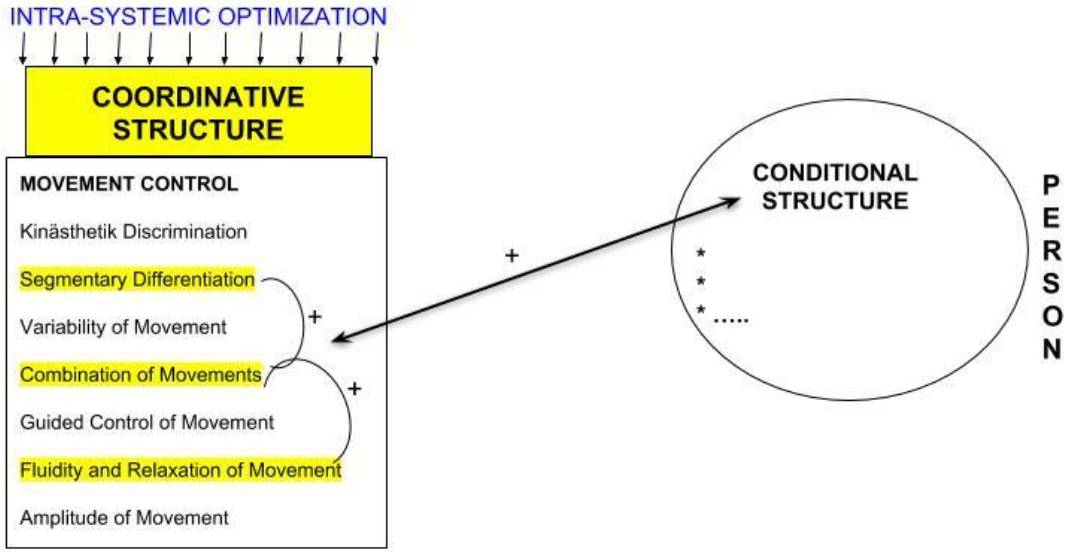
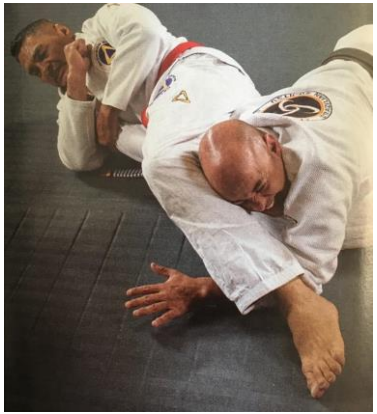
EXAMPLE 1A

INTER-SYSTEMIC OPTIMIZATION



Preferential Coordinative interactions **with** Conditional Structure



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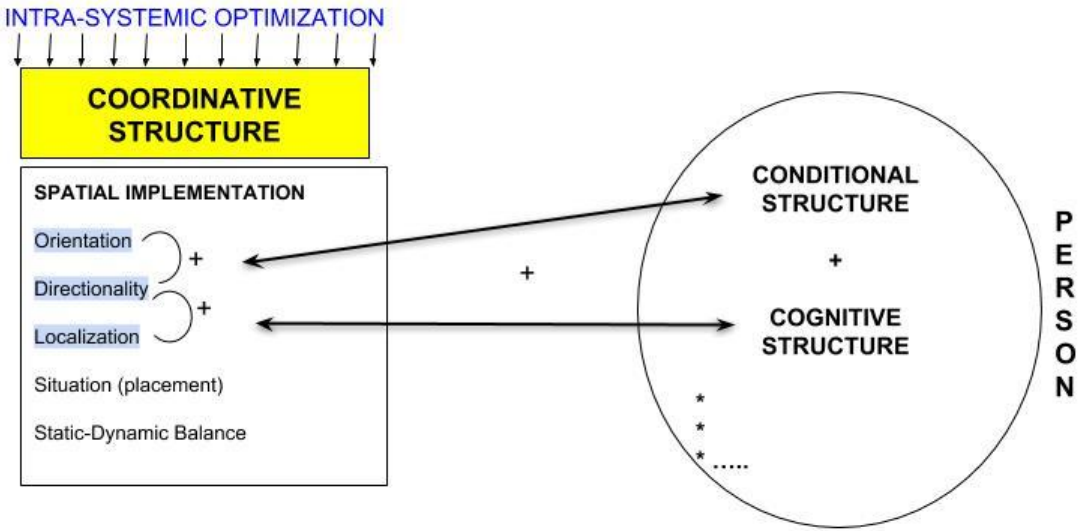
EXAMPLE 1B

INTER-SYSTEMIC OPTIMIZATION



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

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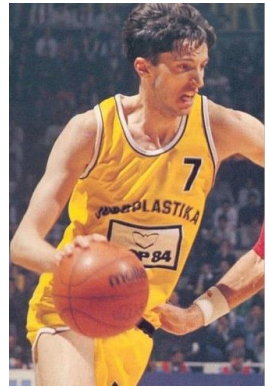
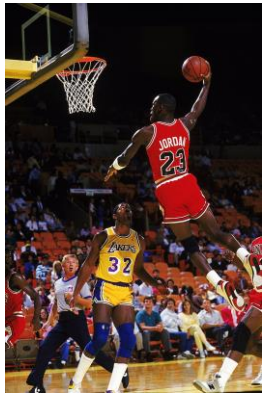
EXAMPLE 1C

INTER-SYSTEMIC OPTIMIZATION





INTRA-SYSTEMIC OPTIMIZATION

COORDINATIVE STRUCTURE

TEMPORAL ADEQUACY

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

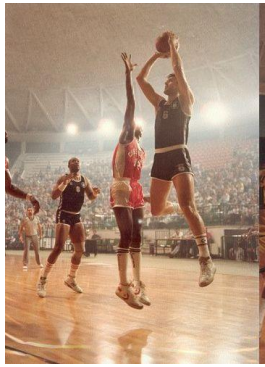
CONDITIONAL STRUCTURE

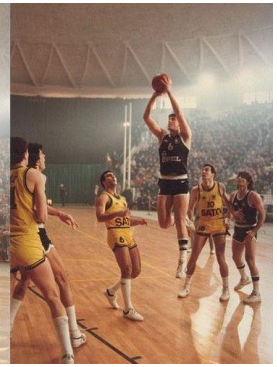
COGNITIVE STRUCTURE

SOCIO-AFFECTIVE STRUCTURE

* * * .....

PERSON





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

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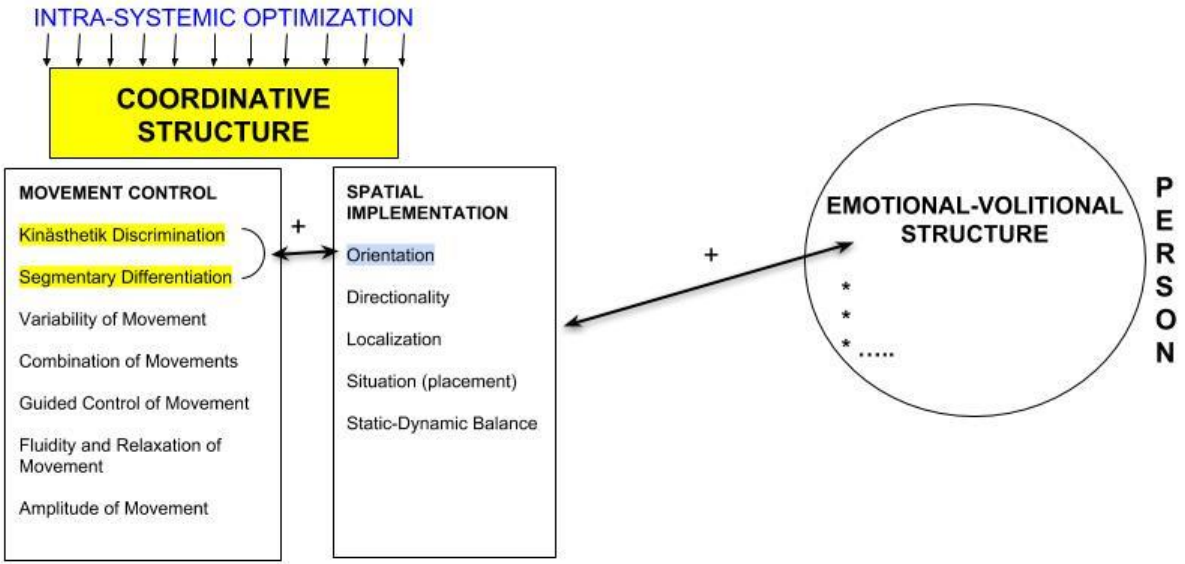
EXAMPLE 2A

INTER-SYSTEMIC OPTIMIZATION



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

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EXAMPLE 2B

INTER-SYSTEMIC OPTIMIZATION

INTRA-SYSTEMIC OPTIMIZATION

COORDINATIVE STRUCTURE

SPATIAL IMPLEMENTATION

- Orientation
- Directionality
- Localization
- Situation (placement)
- Static-Dynamic Balance

TEMPORAL ADEQUACY

- Reaction-Anticipation
- Rhythmical Differentiation
- Rhythmical Variability
- Rhythmical Adaptation
- Rhythmical Sense

CONDITIONAL STRUCTURE

+

COGNITIVE STRUCTURE

* * * .....

PERSON

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

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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

*
*
* .....

PERSON

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

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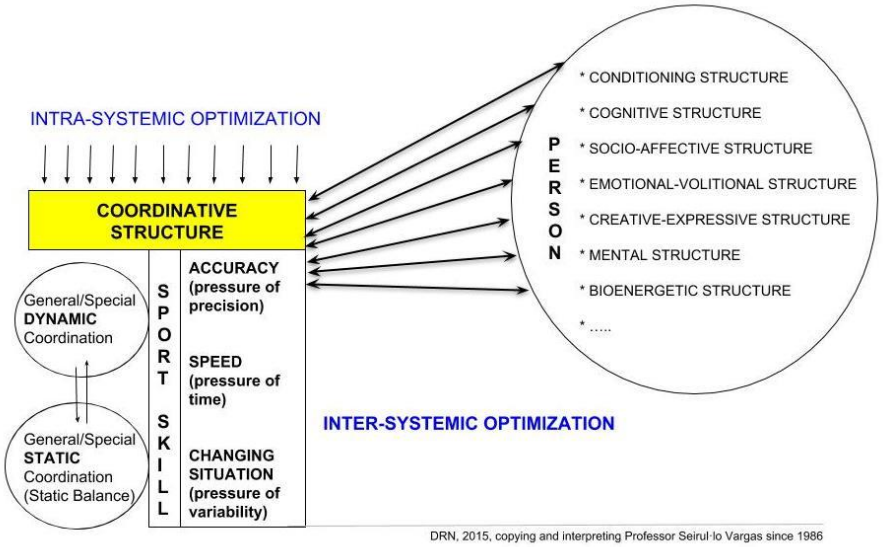
NUMBER OF INTER-SYSTEMIC COORDINATIVE INTERACTIONS

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 that 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



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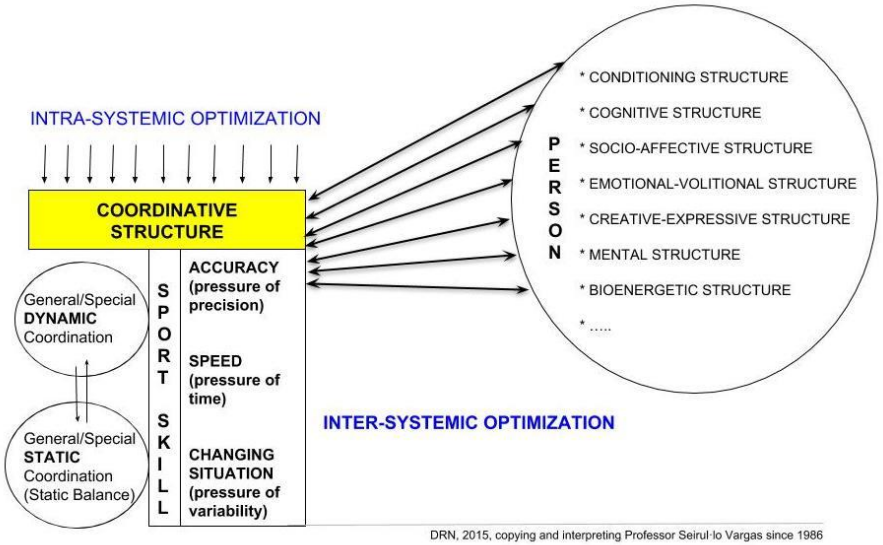
COORDINATIVE OPTIMIZATION AS PART OF A TRAINING SESSION

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:

a) Intra-systemic Conditional + **Inter-systemic Coordinative**.
b) Intra-systemic Cognitive and Emotional-Volitional + **Inter-systemic Coordinative**
c) Intra-systemic Socio-Affective + **Inter-systemic Coordinative** + Intra-systemic Conditional



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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.

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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.

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