Coordinative Optimization for Sports Skills

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In honor of my friend
Vladimir Psalman
Complex dynamic systems conception of technical training by Seirul-lo since 1987

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

COORDINATIVE STRUCTURE

MOVEMENT CONTROL
- Kinesthetic Discrimination
- Segmentary Differentiation
- Variability of Movement
- Combination of Movements
- Guided Control of Movement
- Fluidity and Relaxation of Movement
- Amplitude of Movement

IMPLEMENTATION ON SPACE
- Orientation
- Directionality
- Localization
- Situation (placement)
- Static-Dynamic Balance

TEMPORAL ADEQUACY
- Reaction-Anticipation
- Rhythmic Differentiation
- Rhythmic Variability
- Rhythmic or Temporal Adaptation
- Rhythmic Sense (Temporal Creativity)

INTRA-SYSTEMIC OPTIMIZATION

* CONDITIONING STRUCTURE
* COGNITIVE STRUCTURE
* SOCIO-AFFECTIVE STRUCTURE
* EMOTIONAL-VOLITIONAL STRUCTURE
* CREATIVE-EXPRESSIVE STRUCTURE
* MENTAL STRUCTURE
* BIOENERGETIC STRUCTURE
* ....

INTER-SYSTEMIC OPTIMIZATION

SPORT SKILL

ACCURACY (pressure of precision)
SPEED (pressure of time)
CHANGING SITUATION (pressure of variability)

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EXAMPLE 1

INTRA-SYSTEMIC OPTIMIZATION

COORDINATIVE STRUCTURE

Example 1a

MOVEMENT CONTROL
- Kinesthetic 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
- Rhythmic Discrimination
- Rhythmic Variability
- Rhythmic or Temporal Adaptation
- Rhythmic Sense (Temporal Creativity)

Preferential interactions within one type of coordination capacities

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Preferential interactions between two types of coordination capacities
Preferential interactions between two types of coordination capacities
EXAMPLE 2c

INTRA-SYSTEMIC OPTIMIZATION

COORDINATIVE STRUCTURE

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

TEMPORAL ADEQUACY
Reaction-Anticipation
Rhythmic Differentiation
Rhythmic Variability
Rhythmic or Temporal Adaptation
Rhythmic Sense (Temporal Creativity)

Preferential interactions **between** two types of coordination capacities
EXAMPLE 3

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

IMPLEMENTATION ON SPACE
- Orientation
- Directionality
- Localization
- Situation (placement)
- Static-Dynamic Balance

TEMPORAL ADEQUACY
- Reaction-Anticipation
- Rhythrical Differentiation
- Rhythrical Variability
- Rhythical or Temporal Adaptation
- Rhythical Sense (Temporal Creativity)

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
INTER-SYSTEMIC COORDINATIVE OPTIMIZATION
EXAMPLE 1A

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

CONDITIONAL STRUCTURE

Preferential Coordinative interactions with Conditional Structure

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EXAMPLE 1B

INTER-SYSTEMIC OPTIMIZATION

INTRA-SYSTEMIC OPTIMIZATION

COORDINATIVE STRUCTURE

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

CONDITIONAL STRUCTURE

COGNITIVE STRUCTURE

Preferential Coordinative interactions with Conditional and Cognitive Structures

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EXAMPLE 1C

INTER-SYSTEMIC OPTIMIZATION

INTRA-SYSTEMIC OPTIMIZATION

COORDINATIVE STRUCTURE

CONDITIONAL STRUCTURE

COGNITIVE STRUCTURE

SOCIO-AFFECTIVE STRUCTURE

TEMPORAL ADEQUACY

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

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

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EXAMPLE 2A

INTER-SYSTEMIC OPTIMIZATION

INTRA-SYSTEMIC OPTIMIZATION

COORDINATIVE STRUCTURE

MOBMENT CONTROL
- Kinesthesia 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

EMOTIONAL-VOLITIONAL STRUCTURE

* * * * * *

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

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Inter-systemic Optimization

Intra-systemic Optimization

Coordinative Structure

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

Skeletal Adequacy
- Reaction-Anticipation
- Rhythmic Differentiation
- Rhythmic Variability
- Rhythmic Adaptation
- Rhythmic Sense

Conditional Structure + Cognitive Structure

* ...

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

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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 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
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
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.

<table>
<thead>
<tr>
<th>SITUATIONS FOR INTRA-SYSTEMIC COORDINATIVE OPTIMIZATION</th>
<th>PRIORITY INTER-SYSTEMIC OPTIMIZATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
<td>Space-Time Cognitive in interaction with Conditional.</td>
</tr>
<tr>
<td>New interactions among all structures.</td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td>Emotional-Volitional in interaction with variability of environment conditions.</td>
</tr>
<tr>
<td>New interactions among all structures.</td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td>Cognitive in interaction with Socio-Affective.</td>
</tr>
<tr>
<td>New interactions among all structures.</td>
<td></td>
</tr>
</tbody>
</table>
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.
THANK YOU FOR YOUR ATTENTION

I hope you have liked !!

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