Motor-Skill Development
Athletics in India

Volker Herrmann, 2020

ATHLETES DEVELOPMENT

Psycho-social (mental, emotional, cognitive development)

Motor-skills / technique (rough-model / basic-model / advanced-model)

Conditioning / physical

Volker Herrmann, 2020

COORDINATIVE ABILITIES

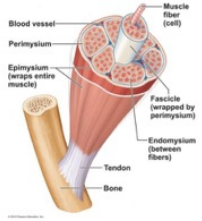
- Coordinative abilities only come into effect if combined with remaining motor-skills
- Precise motor-control ensures a likewise efficient and economic movement.
- Similar movements will be executed faster and / or with lesser force production.

→ Coordination determines the quality of your physical skills

MOVEMENT CONTROL

The level of coordinative abilities depends on five main analysers (receptors). As better the athlete is able to ‚capture' his environment using these analysers, as better will be his ability to react and adapt to (sport-)specific tasks.

MUSCLE-TENDON UNIT



SKIN

SENSE OF BALANCE

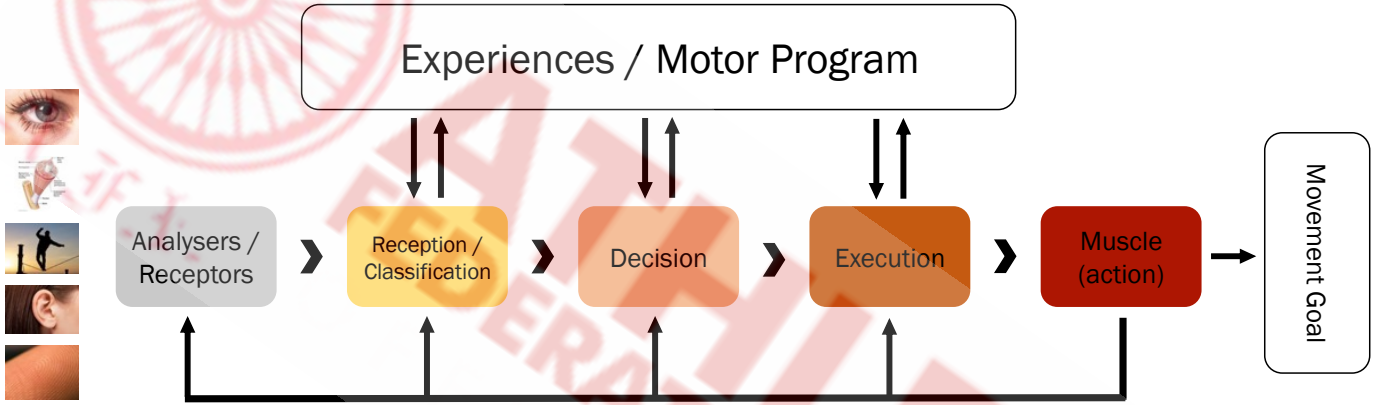
EYES

EARS

Volker Herrmann, 2020

ANATOMY of MOVEMENT CONTROL

1. Reception of information via sense organs (receptors)
2. Anticipation and programming of motor-actions in consideration of previous movement experiences or existing movement patterns.
3. Innervation / activation of muscles
4. Constant feedback
5. Correction, if necessary

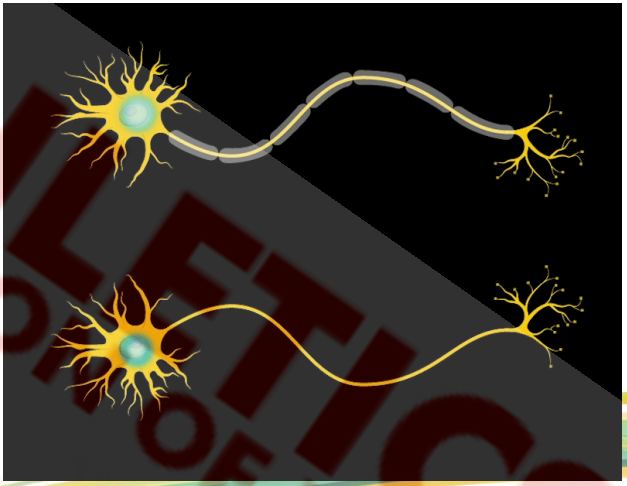

Experiences / Motor Program
Analysers / Receptors
Reception / Classification
Decision
Execution
Muscle (action)
Movement Goal


DOHA2019

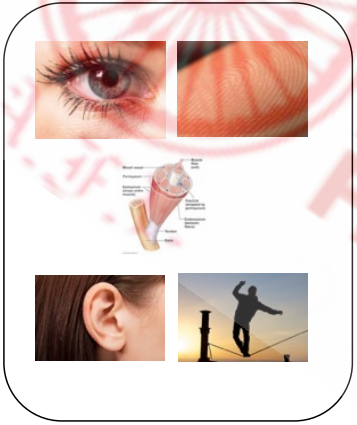
MYELINISATION

- Occurs already during infancy, increasing number of axons requires myelin sheets ‘sensitive phases’
- Continues through adolescence and early adulthood
- Possible throughout life in ‘grey matter regions’

- It increases the speed of electrical impulses along the fibers (axons)
- ‘Hopping’ instead of continuous wave motion
- Insulates the axons (nerve fibers)



GIF: McGovern Institute

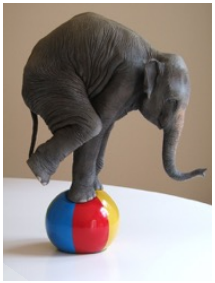


analysers
(afferent)

X

pressure conditions

=



motor-skills
(coordination)

PRESSURE CONDITIONS

SITUATION
Variability / Complexity of Information

PRECISION
Outcome / Repetitions / Progression

COMPLEXITY
Simultaneous / Succession / Muscles

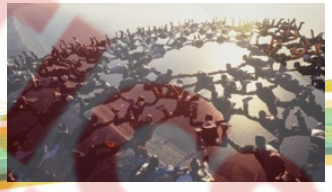
TIME
Start (Reaction) / Execution

LOAD
CNS / Metabolic / Mental









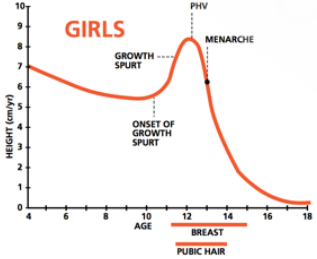
Volker Herrmann, 2020

COORDINATION and GROWTH / PUBERTY

Developmental age

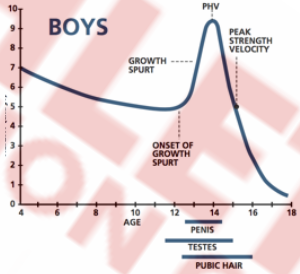
Sensitive periods of optimal trainability?

Figure 7: Maturity Events in Girls (Adapted and modified from Ross & Marfell-Jones, 1982)



Peak Height Velocity (PHV) in girls occurs at about 12 years of age. Usually the first physical sign of adolescence is breast budding, which occurs slightly after the onset of the growth spurt. Shortly thereafter, pubic hair begins to grow. Menarche, or the onset of menstruation, occurs rather late in the growth spurt, after PHV is achieved. Peak Strength Velocity (PSV) comes immediately after PHV, or at the onset of menarche (usually a year after PHV).The sequence of developmental events may normally occur two or even more years earlier or later than average.

gure 8: Maturity Events in Boys (Adapted and modified from Ross & Marfell-Jones, 1982)



PHV in boys is more intense than in girls and, on average, occurs about two years later. Growth of the testes, pubic hair and penis are related to the maturation process. PSV comes 12 to 18 months after PHV. Thus, there is pronounced late gain in strength characteristics of the male athlete. As with girls, the developmental sequence for male athletes may occur two or more years earlier or later than average. Early maturing boys may have as much as a four-year physiological advantage over their late-maturing peers. Eventually, the late maturers will catch up when they experience their growth spurt.

SPECIFICs for KIDS (5-8 years)

High plasticity of motor cortex
Repeat the same or similar exercises several times to stabilise movement patterns

Address all abilities, but focus on reaction, frequency and balance
Use simple exercises and slowly increase time pressure

SPECIFICs during PUBERTY

Pubescence (beginning of puberty)
Coordinative abilities will be negatively affected (growth)

Focus on stabilisation of (previously) known exercises / movement patterns

Teaching of new exercises might have to be limited

Adolescence (end of puberty)
Boys often show a higher sensitivity / learning aptitude for new movements

STRENGTH and COORDINATION

Increase the specificity of your exercises

- Slow towards fast
- General towards specific
- Double leg towards single-leg
- Isolated (single-joint) towards whole-body (multi-joint)

Volker Herrmann, 2020

PRACTICAL CONCLUSIONS

- Start to train / affect all coordinative abilities as early as possible
- Coordination has to precede strength and conditioning regarding the long term athletes development
- Increase the variety in your training,
- Look for new loads and new challenges, constantly get the athletes out of their comfort zone and increase the ‚pressure conditions'
- Ensure your athletes are well-recovered when affecting coordinative abilities
- Focus on the quality and avoid (repetitive) mistakes whilst conducting the exercises