Fitness training in fotball

Sigmund B. Apold-Aasen

December 2009

Sigmund B. Apold-Aasen – background football

- Footballers from 6-16 years of age
- Minor in ball games specialising in football from University of Agder
- Major in sports biology from NIH, central and peripheral factors' limitations on performance
- Three years at the Norwegian National Council on Nutrition and Physical Activity
- Seven years at Norwegian Olympic Committee with responsibility for training Norwegian elite sport) – quality of the training process (rowing/ biathlon/football)
- Adviser on quality of the training process for various elite series clubs in Norway.
- Worked with the women's national team on physical training in preparation for the 2008 Olympics and 2009 European Championships
- 2009 Director of physiology for ”The Norwegian center of football excellence”

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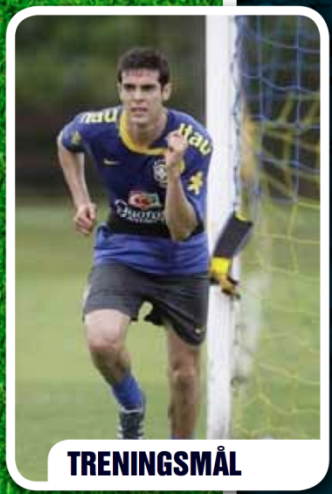


TRENINGSMÅL

MÅLING

TRENING


AJA 4
75:10 NAC 1

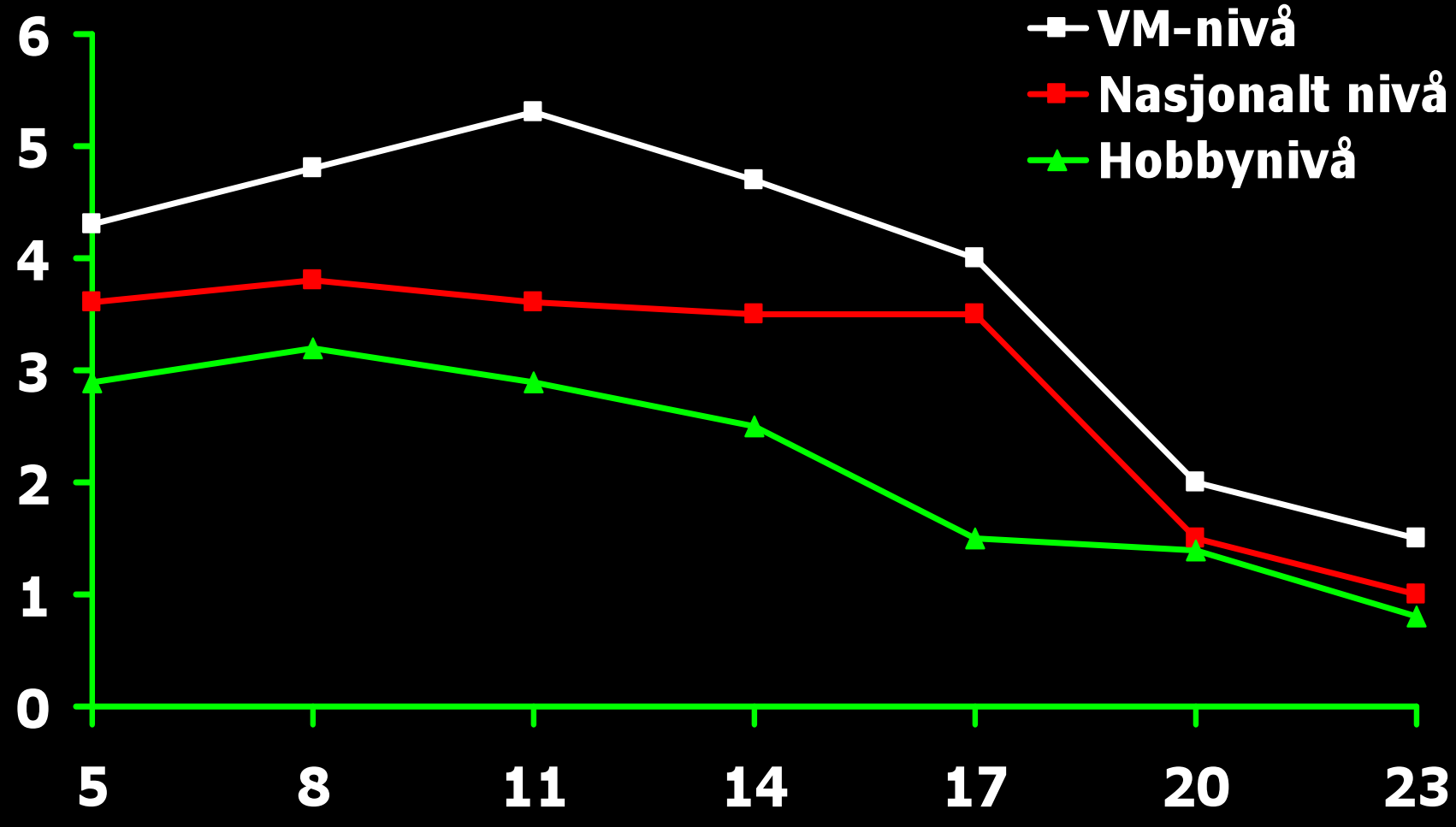
Amount of training

(Suzann Pettersen on training partner Tiger Woods, VG, 18th April 2009)

Tiger Woods

'The best thing about the training was that my father always made it fun!'

Own training



Helsen et al. (1998)

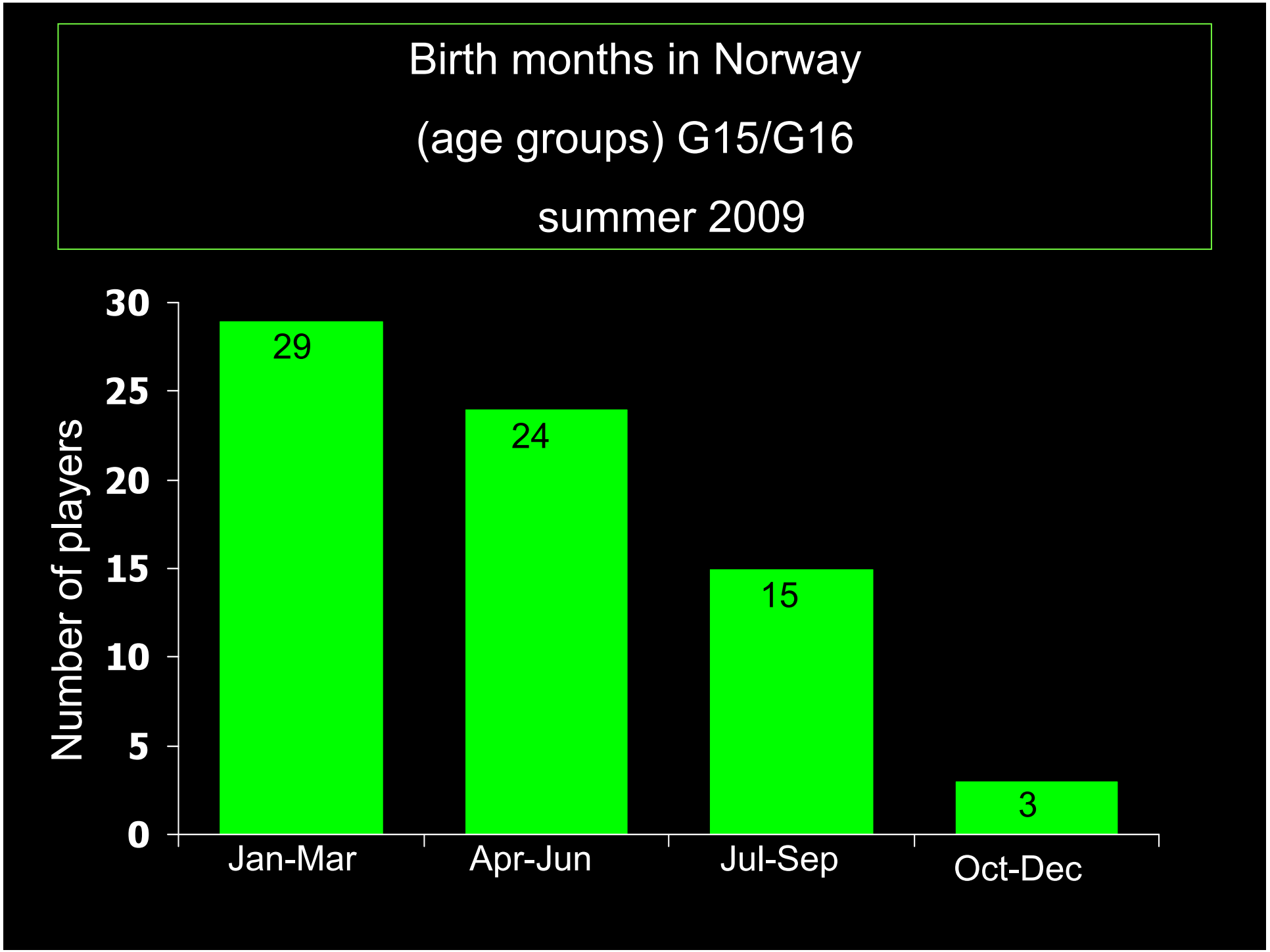
The indications are that the world's best 20 year olds in 2015 will have accumulated 12,000 hours of quality training!

Lionel Messi (5 years old)

’All the players at the highest level have mental discipline. Zola used to hit more than a hundred balls every day after training was finished at Chelsea. This is usual among the elite and rare among the ordinary players. Wayne Rooney does this when we are training with England and I do the same.’

(Frank Lampard, 2006, p. 10)

Training quality


Birth months in Norway
(age groups) G15/G16
summer 2009
Number of players
30
25
20
15
10
5
0
29
24
15
3
Jan-Mar
Apr-Jun
Jul-Sep
Oct-Dec

’Some months after selection the football school came for a match against us. THANK GOD, I prepared an attack. The night before I stayed awake, as I was afraid that sleep would make me soft, and therefore less angry. I could not wait. (...) The first whistle had the same effect on me as a bell at a boxing match. In every single tackle I took out all my frustration at being overlooked!’

(Steven Gerrard [born 30th May 1980, 4th quarter], 2006, p. 46)

’I always played with older players. It forced me to grow up quicker. And to not be afraid of playing with them.’

(Cristiano Ronaldo, 5th February 1985, youngest of 4)

’Some of the other players in Everton’s U10 side were much bigger than me. I also thought a couple of them were better than me; but by seeing those who were better than me meant that I tried even harder.’

(Wayne Rooney, 2006, p. 37-38)

’Was I good as a child? No. But my coaches saw a competitiveness in me which they constantly fired up by putting me up against superior opponents. On the whole I played with boys.’

(Mia Hamm, 1999, p. 4)

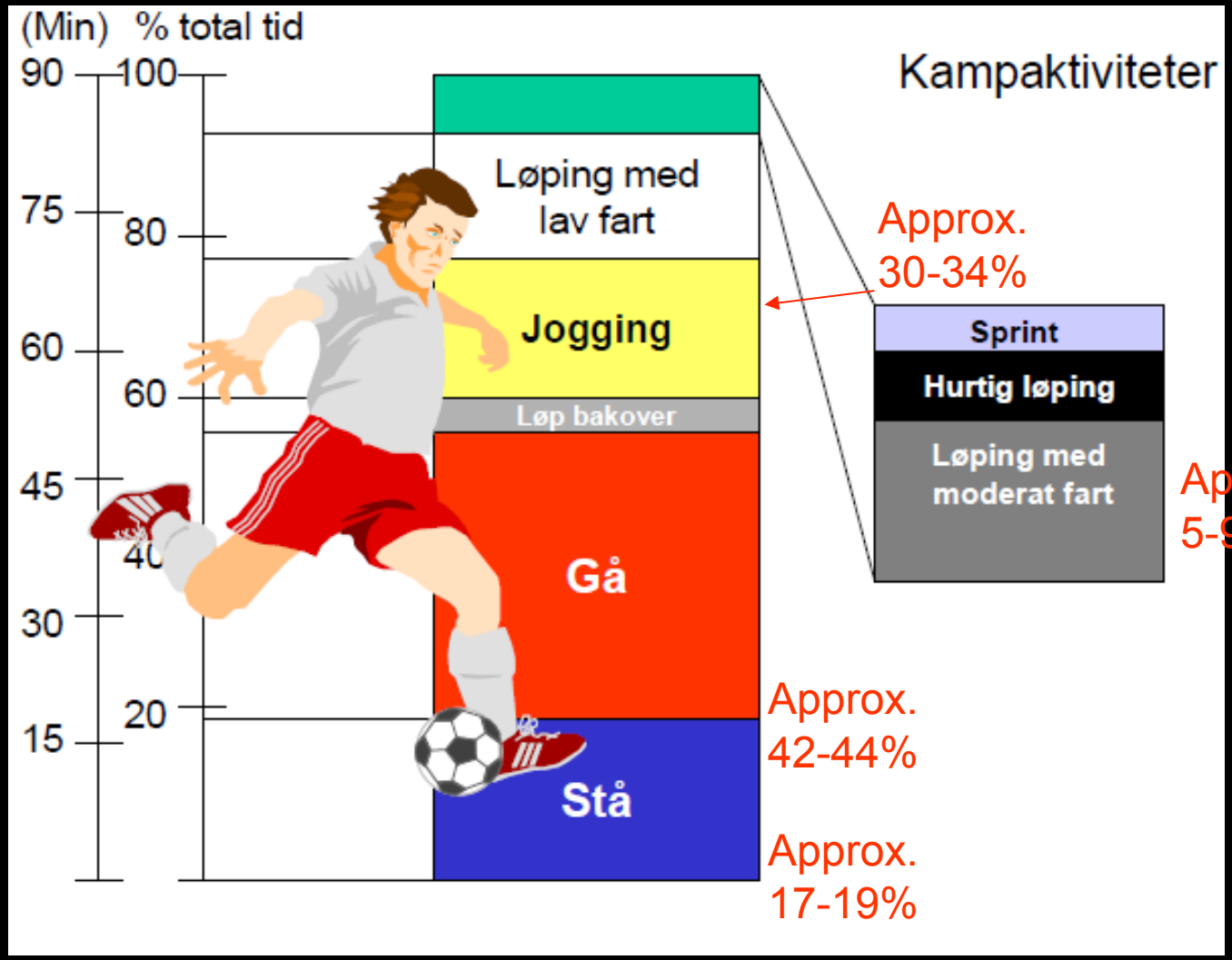

NRK1
NRK
Nyheter
19:20

‘I train in an extremely match-like way, using match situations. When I train I always try to do it at match pace and I often make it more difficult for myself by making an angle the target.’

(Ole Gunnar Solskjær, 2002)

How to develope world's class players?

Running patterns during a match



The level of high intensity is greater in the best players compared to poorer players

Physical Demands of Football

- 10-12 km walk/run per match [1], of which roughly 500-1,000 m sprinting [1]
- 5-10% reduced distance run in second half[1]
- Average intensity: 80-90% HF_{max} [1]
- But, over 90% of the time is spent standing, walking or running slowly → < 10 mins. fast running [2]

- NB: The average intensity is of no interest
- NB: Running greater distances is not necessarily a positive thing

1. Stolen T, Chamari K, Castagna C, Wisloff U. Physiology of soccer: an update. Sports Med 2005;35(6):501-36.
2. Hallén J. Fysisk trening i toppfotball. Norges Fotballforbund, Olympiatoppen, Norsk Toppfotball. 2008

Speed - working requirements

- 2-4 secs., every 90 secs. [1,2]
- 1-11% of the total distance run in a match [1]
- 0.5-3.0% of effective running time [1]
- Depending on position, tactics and tasks [1]
- An elite player changes activity around 1,500 times per match, new activity every 4 secs. [3]

- Acceleration important, but also to repeat sprints often and with short breaks [2] – i.e. enduring speed
- Deceleration [2]
- Change of direction [2]
- With/without ball [2]
- Knowing when you need to accelerate – reading the game [2]

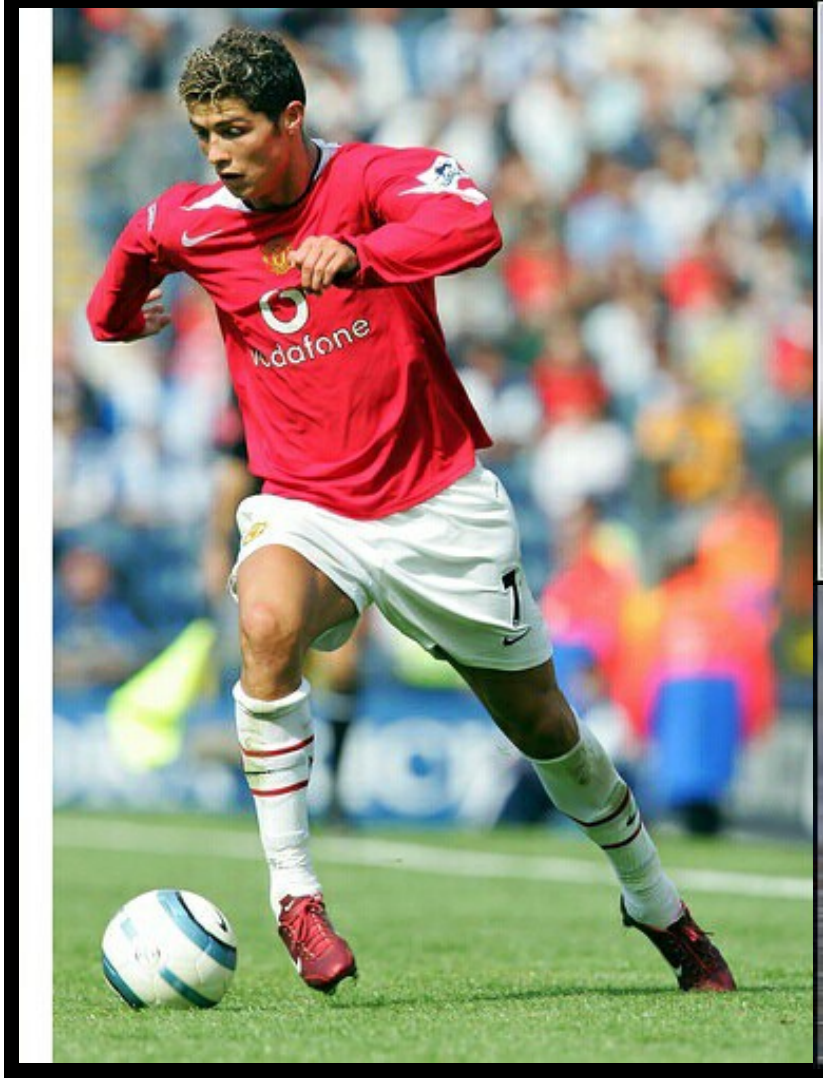
1. Stolen T, Chamari K, Castagna C, Wisloff U. Physiology of soccer: an update. Sports Med 2005;35(6):501-36.
2. Tonnessen E, Alnes L O, Aasen S B. Hurtighetstrening i fotball. Olympiatoppen. 2009. www.olympiatoppen.no
3. Krustrup P. 2005.

Summary of work requirements

- The performance level of a footballer is determined by:
  - fast football-related movements
  - high precision
  - good cooperation
- Athletes with physical core competences based on their own genetic preconditions
- Ability to execute skills/techniques and cooperation for 90 mins., with one to two matches a week over a period of many months
- Football speed must be FULLY developed
- Different requirements for the different positions on the pitch

Endurance

Aerobic capacity, VO2max, coefficient of utilisation and football endurance



Aerobic capacity

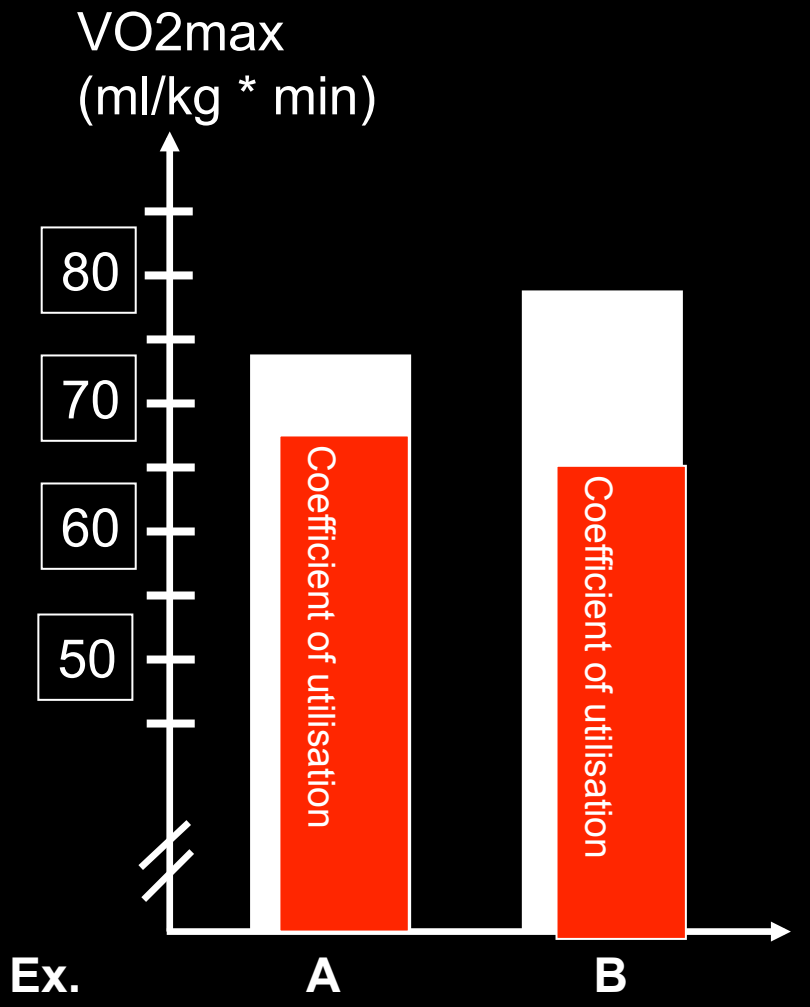
- Definition:

  the total aerobic energy turnover (oxygen uptake) during the competition
- In football, the aerobic capacity is the total quantity of oxygen a player takes up during a 90-minute match

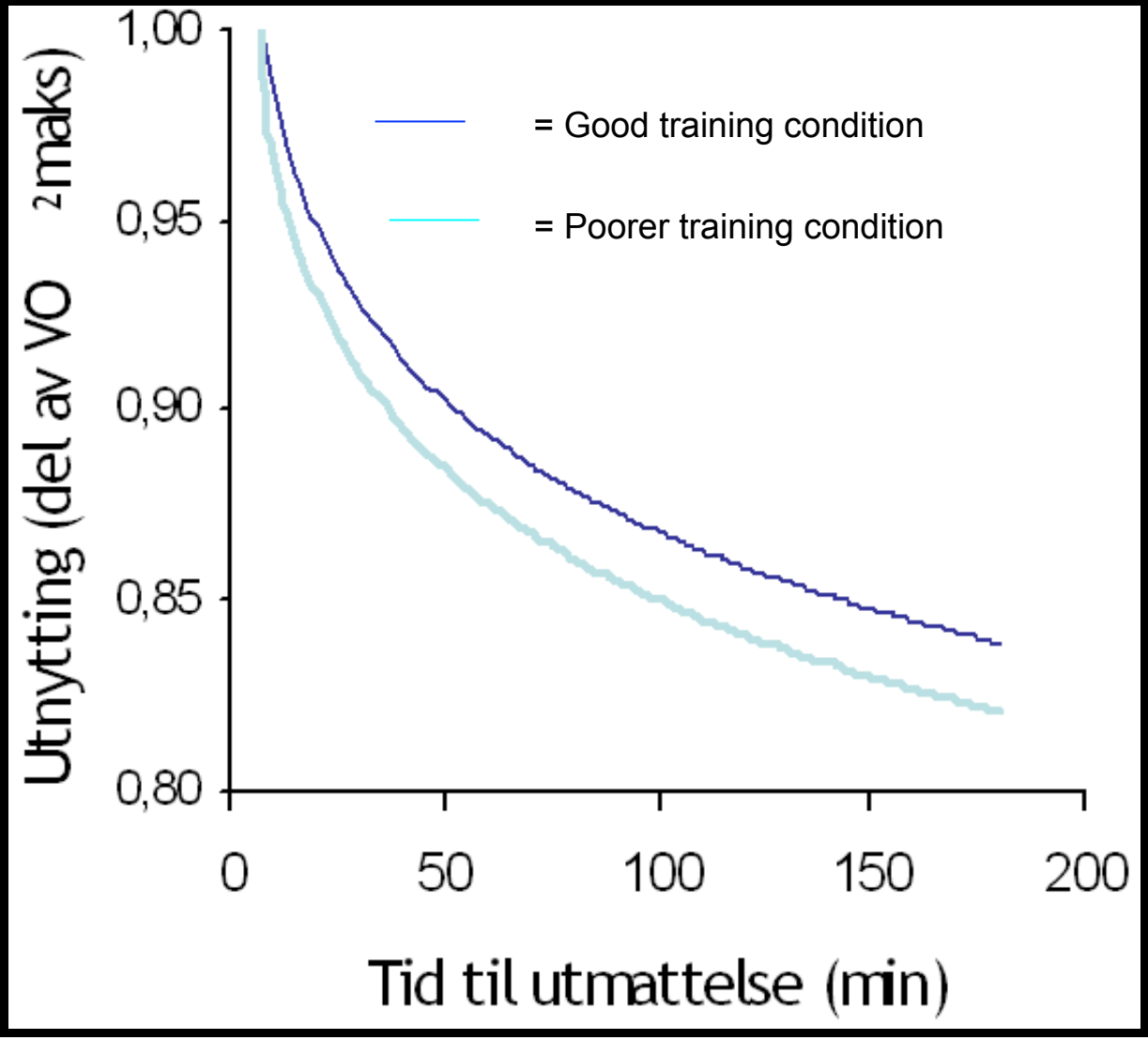
Aerobic capacity, VO2max and coefficient of utilisation

Aerobic capacity

- **VO2max**
- **Coefficient of utilisation**



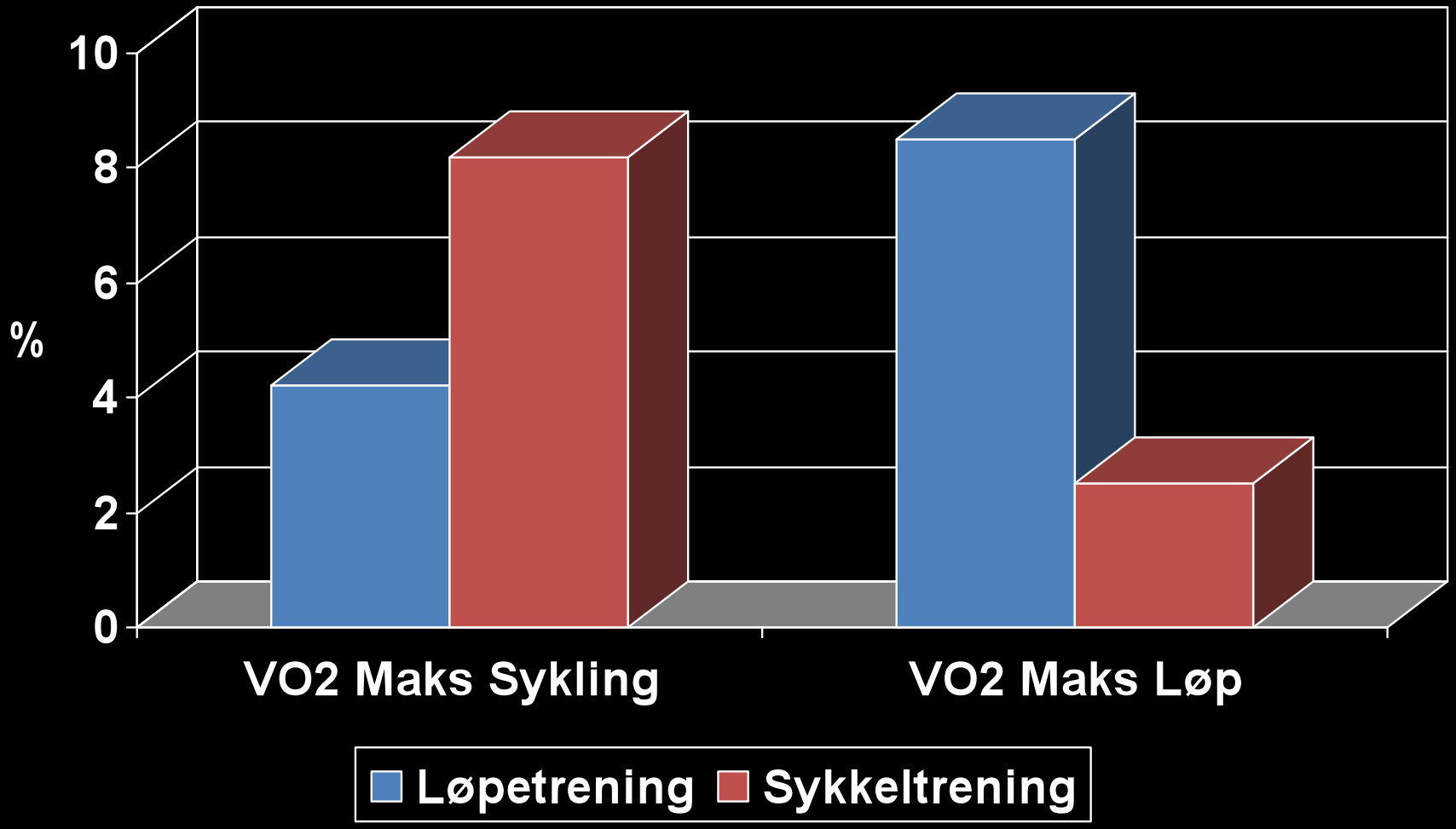
Coefficient of utilisation, time until exhaustion and training condition



VO_2max, Coefficient of utilisation, Specifity and Aerobic capacity

	Middle distance runner (age: 21, height: 1.73, weight: 58)		**Rower** (age: 25, height: 1.84, weight: 80)	
	Treadmill	Row-ergometer	Treadmill	Row-ergometer
Work completed	22 $km \cdot h^{-1}$	13 kJ	16 $km \cdot h^{-1}$	105 kJ
Maximal HF	210	166	174	188
Max. O_2 L/min	4,0	2,3	4,5	4,8
Max. O_2 ml/kg/min	69,7	39,7	56,5	61,4

Effect of running and training on bike on VO2max



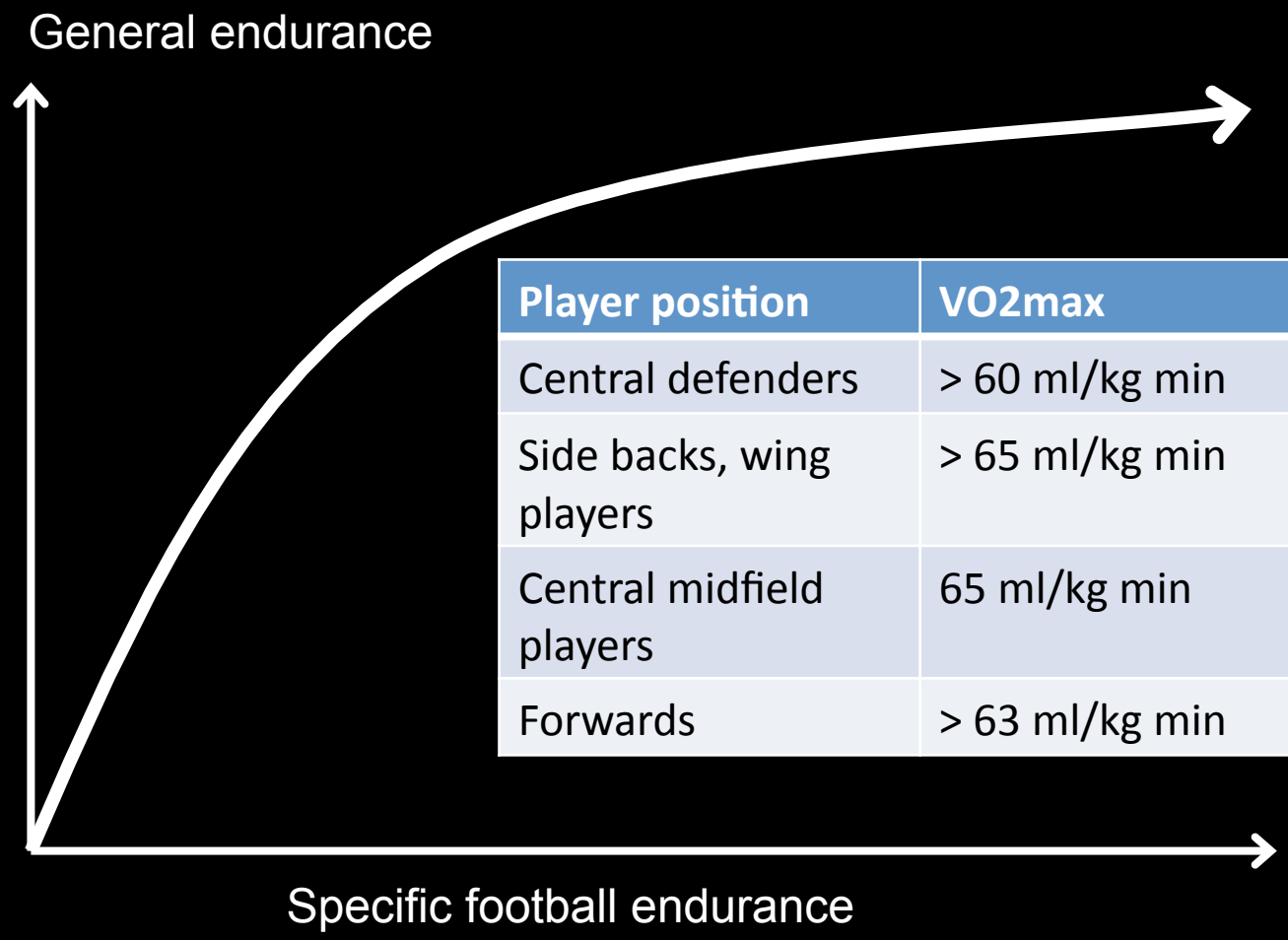
Heikki Rusko 2003

Endurance and football performance

General endurance

Specific football endurance

Satisfactory results on general endurance



Player position	VO2max	Speed at La 4mM
Central defenders	> 60 ml/kg min	> 13.8 km/h
Side backs, wing players	> 65 ml/kg min	> 15.0 km/h
Central midfield players	65 ml/kg min	> 15.0 km/h
Forwards	> 63 ml/kg min	> 14.5 km/h

Sprint - effect on endurance 7 weeks

RSG = 3 x 6 x 40 metre sprint

ITG = 4 x 4 min intervals

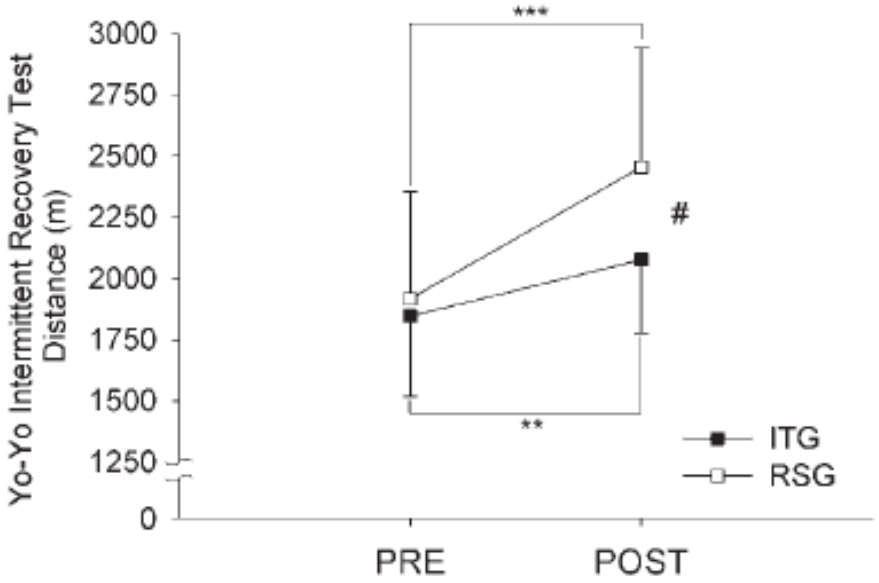


Fig. 1 Changes in football-specific endurance performance for the interval training group (ITG) and the repeated-sprint training group (RSG). ** p < 0.01; *** p < 0.001; # p < 0.01, significant group × time interaction.

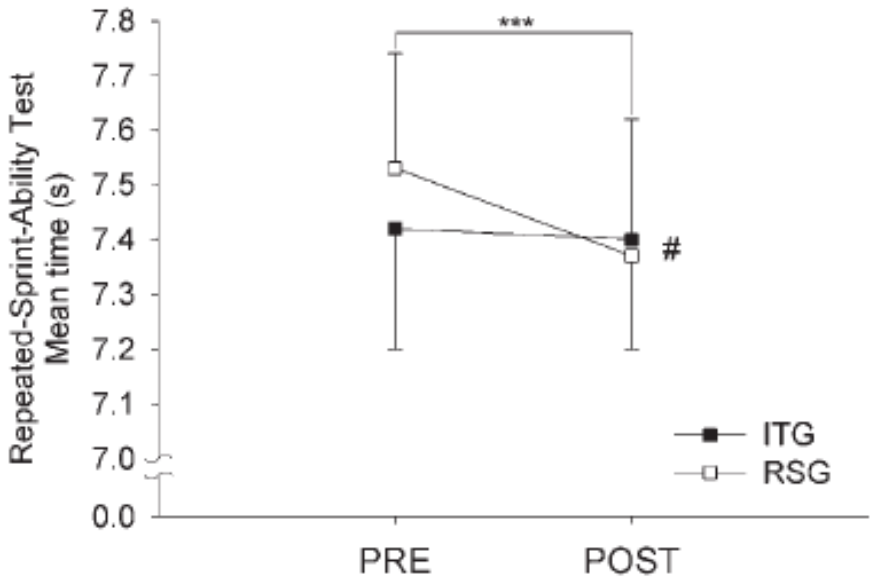


Fig. 2 Changes in the repeated-sprint ability test for the interval training group (ITG) and the repeated-sprint training group (RSG). *** p < 0.001; # p < 0.01, significant group × time interaction.

Bravo DF, Impellizzeri FM, Rampinini E, Castagna C, Bishop D, Wisloff U. Sprint v. interval training in football. Int J Sports Med. 2008 Aug;29(8):668-74.

Endurance and intensity management

1. Programme model
2. Subjective feelings
3. Heart frequency
4. Lactate concentration

Intensity zones for endurance training

	Hjertefrekvens (% av maksimal HF)	Subjektiv følelse	Varighet (min)
Lav	65–80 %	lett	40–60 min
Moderat	80–90 %	lett anstrengende	innsatsperiode > 20 min
Høy	90–95 %	meget anstrengende	innsatsperiode > 10 min
Svært høy	–	maksimal	innsatsperiode 2–5 min

Long periods of exertion - short breaks - long duration = REDUCED INTENSITY

Reduced duration - shorter periods of exertion - longer breaks = INCREASED INTENSITY

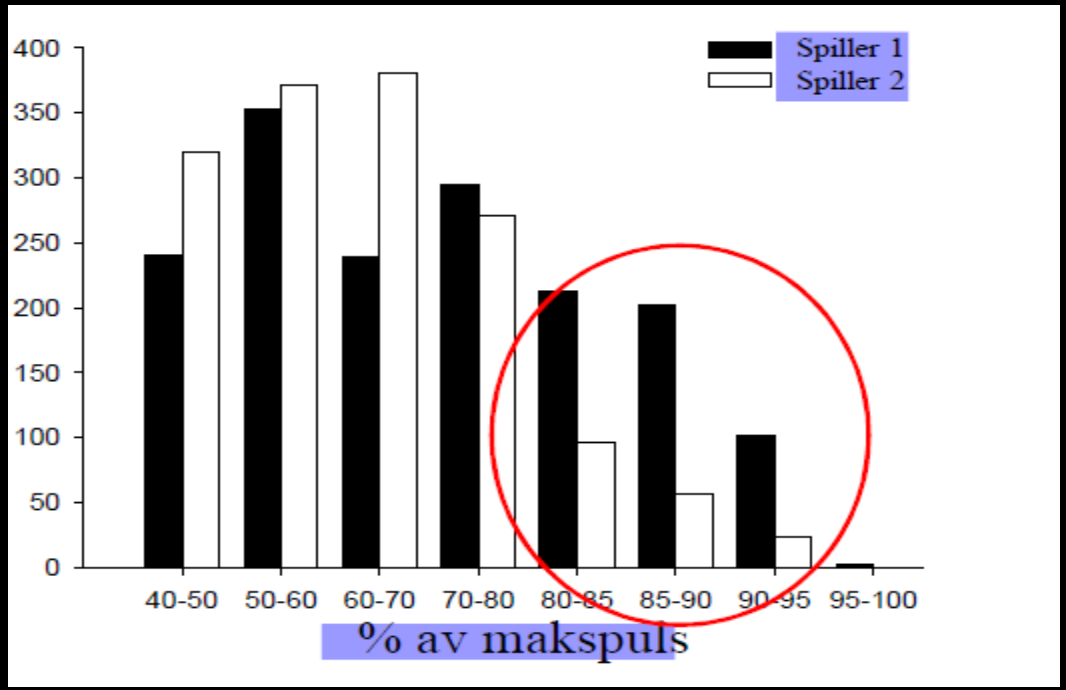
Example from run sessions;

8-9 runs of approx. 5 mins. with 1.30 min. break

11.5	19.5	25.5
5.36	5.58	5.51
4.58	5.17	5.17
5.03	5.10	5.06
5.06	5.09	5.06
5.10	5.08	5.04
5.03	5.06	5.01
5.18	5.04	4.56
5.21	4.58	4.55
		4.57

Use of heart frequency

- Do all players achieve optimal intensity at all training sessions?



Example of general endurance sessions

- Moderate intensity
  - 45 secs./15 secs. x 20 reps = 20 mins.
  - 6 mins. x 4 reps = 24 mins.
  - 5 mins. x 6 reps = 30 mins.
- High intensity
  - 17secs./13 secs. x 10 reps x 3 series = 15 mins.
  - 3 mins. x 5 mins. = 15 mins.
  - 5 mins. x 4 reps = 20 mins.

How can we design football-specific sessions which both take into account the requirement for good physiological effect and are good technically and tactically?

The endurance training

- The aerobic capacity of a football player must be developed optimally, not maximally
- The training should be varied according to the individual needs of the players
- It is a serious mistake to believe that the harder (more intensively) you train, the better your aerobic capacity develops! Over time, this will lead to incorrect training and possibly even overtraining
- Aerobic capacity is first and foremost developed during the autumn and winter months through training in moderate intensity areas (80-90% of HF max)

Summary

Endurance

- To maintain footballing skills throughout the match
- Improved physical performance:
  - Faster pace/bigger tasks
- Improved recovery ability:
  - Get into game more easily, → more active in the game
- Reduce injuries
- To reduce the number of tactical errors of judgement as a result of tiredness
- To reduce technical errors

Summary

Endurance

- All three zones with low, moderate and high intensity lead to some improvement of both central (heart, lungs, main arteries, blood) and peripheral factors (capillaries, aerobic enzymes, mitocondria, etc.)
- We cannot say that one intensity trains any particular factors and that another trains others
- Nor is it such that the different intensities affect different factors to a greater or lesser extent
- The composition of the different I-zones (over weeks, months and years) is the most important factor in achieving optimal performance development

MUSCLE POWER

- Muscle power is important for:
  - Acceleration speed
  - Dual play
  - Jump ability
- Muscle strength in legs highly important
- Strength in stomach and back muscles

BASICS

”In the beginning, I found the physical style of the Premier League difficult – the endless tackle were taxing on my body. I spent a lot of hours training for this. I had to prepare my body for war, to strengthen the muscles. It was never a question of taking it easy, forgetting the BASICS.”(Didier Drogba, 2008, p. 245)

The Specificity Principle

- In specific training, the load factors such as intensity, duration, form of activity, base as well as equipment must be as similar to the conditions in the competition situtation as possible
- One of the goals of long-term training is that the player should be able to train more in competition technique and intensity
- To increase the percentage of specific training in the period of basic training

Specificity - Training philosophy

1. Football training only

2. Both general training and football training.

   The work requirements of football are ALWAYS referances.

3. Only perform general training which leads to increased QUALITY of the football training.

Prinsippet om spesifisitet

A

B

A. Unspecific exercise – specific musculature
B. Specific exercise – specific musculature

Training of muscle power in football

- The aim of weight training is EXPLOSIVITY in specific football situations and to prevent injury.
- The training method for explosive strength is not the same as for maximal strength
  - Maximal strength is an essential basis for explosive strength
- The most important muscle groups:
  - Leg muscles
  - Stabilising musculature in the upper body
- Weight training, free weights, medicine ball, specific exercises in the field

Explosive muscle power/ Spenst

- Footballers need explosive muscle power in their leg muscles.
  - Training of maximal strength with heavy weights affects the spenst, but this is not in itself specific enough to generate optimal training benefits
  - The training starts with general focus and then a gradual increase of the specificity

Training of explosive muscle power/spenst with different degrees of specificity

Trening med tunge vekter	Trening med lette vekter	Trening uten ytre vekt	Trening med ball / i spill
– knebøy full dybde	– knebøyhopp	– knebøyhopp	– heading med hopp med press fra medspillere
– knebøy 90 grader	– svikthopp	– svikthopp	– heading med hopp uten press fra medspillere
– markløft	– styrkevending *	– fallhopp	– spilløvelser og ordinært spill
– leggpress	– rykk *	– hekkehopp	
–	– kickstøt *	– lengde uten tilløp	
–		– 3-steg *	

Suggested weight training programmes throughout the year

Minimum varighet av perioden	Periode 1 3 uker	Periode 2 3 uker	Periode 3 3 uker	Periode 4 3 uker	Sesong 3 uker
Svikthopp uten vekt*	5 x 5	3 x 5	1 x 5	3 x 5	4 x 4
Svikthopp med 20 kg*		2 x 4	2 x 4	2 x 4	
Svikthopp med 40 kg*			2 x 3		
Knebøy**	2 x 8	3 x 8	4 x 6	4 x 5	3 x 4
Knebøy – 90° eksplosivt	2 x 6	3 x 6	4 x 6	3 x 6	3 x 5
Strak mark**	2 x 10	3 x 10	3 x 10	3 x 8	2 x 8
Nordic hamstring	2 x 3	3 x 4	3 x 5	3 x 5	3 x 4
Hofteleddsbøyere	3 x 10	3 x 8	4 x 6	4 x 5	(3 x 5)
Buk – rygg, medisinball (4 øv.)	2 x 15	3 x 15	3 x 15	3 x 15	
Benkpress***	3 x 10	3 x 8	4 x 6	4 x 5	(3 x 5)
Roing***	3 x 10	3 x 8	4 x 6	4 x 5	(3 x 5)
Stående opptrekk til haka***	2 x 10	2 x 8	3 x 8	3 x 6	(2 x 6)
Triceps pushdown***	2 x 10	2 x 8	3 x 8	3 x 6	(2 x 6)
Bicepscurl med manualer***	2 x 10	2 x 8	3 x 8	3 x 6	(2 x 6)

* husk å dempe i landingen
** veksler annenhver gang med øvelsen nedenfor
*** ikke spesielt fotballspesifikk og kan sløyfes

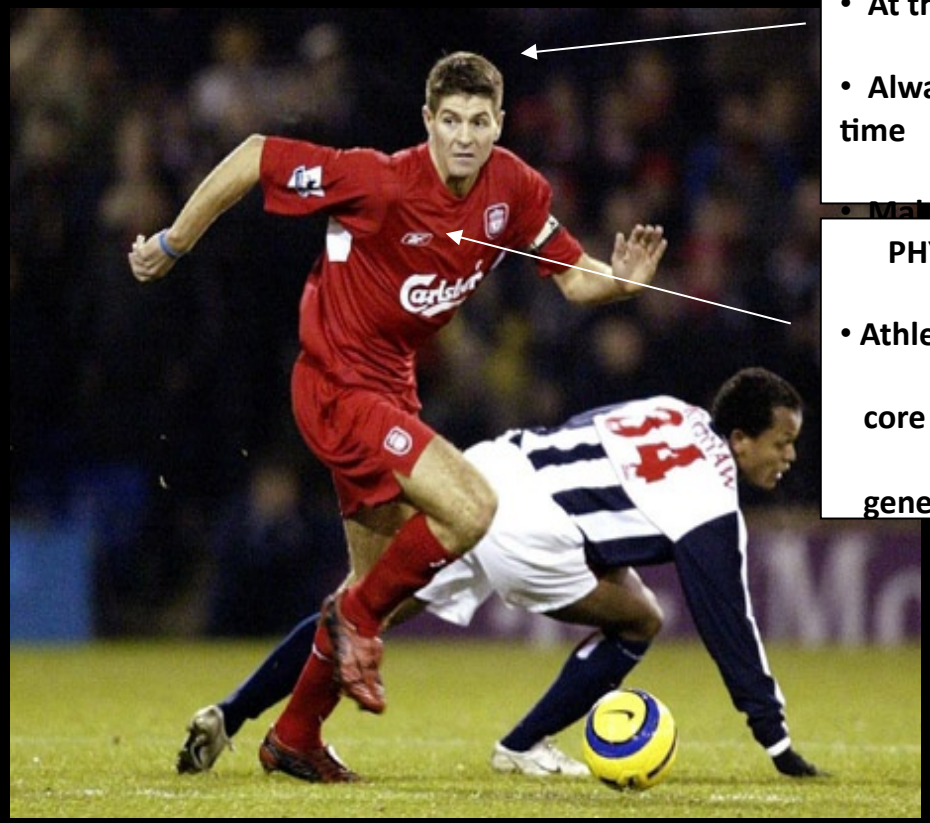
Twice a week during the resource training period, once a week during match season

"I spend at least an hour and a half on warming up, strengthening the muscles. I still do this every single day – it is important never to stop, never believe that you have done enough." (Didier Drogba, 2008, p. 245)

Christian Grindheim

- Less heavy weight training now
- Lighter weights more explosive execution
- Faster
- 5 kg lighter

What characterises the world's best players in terms of football speed?



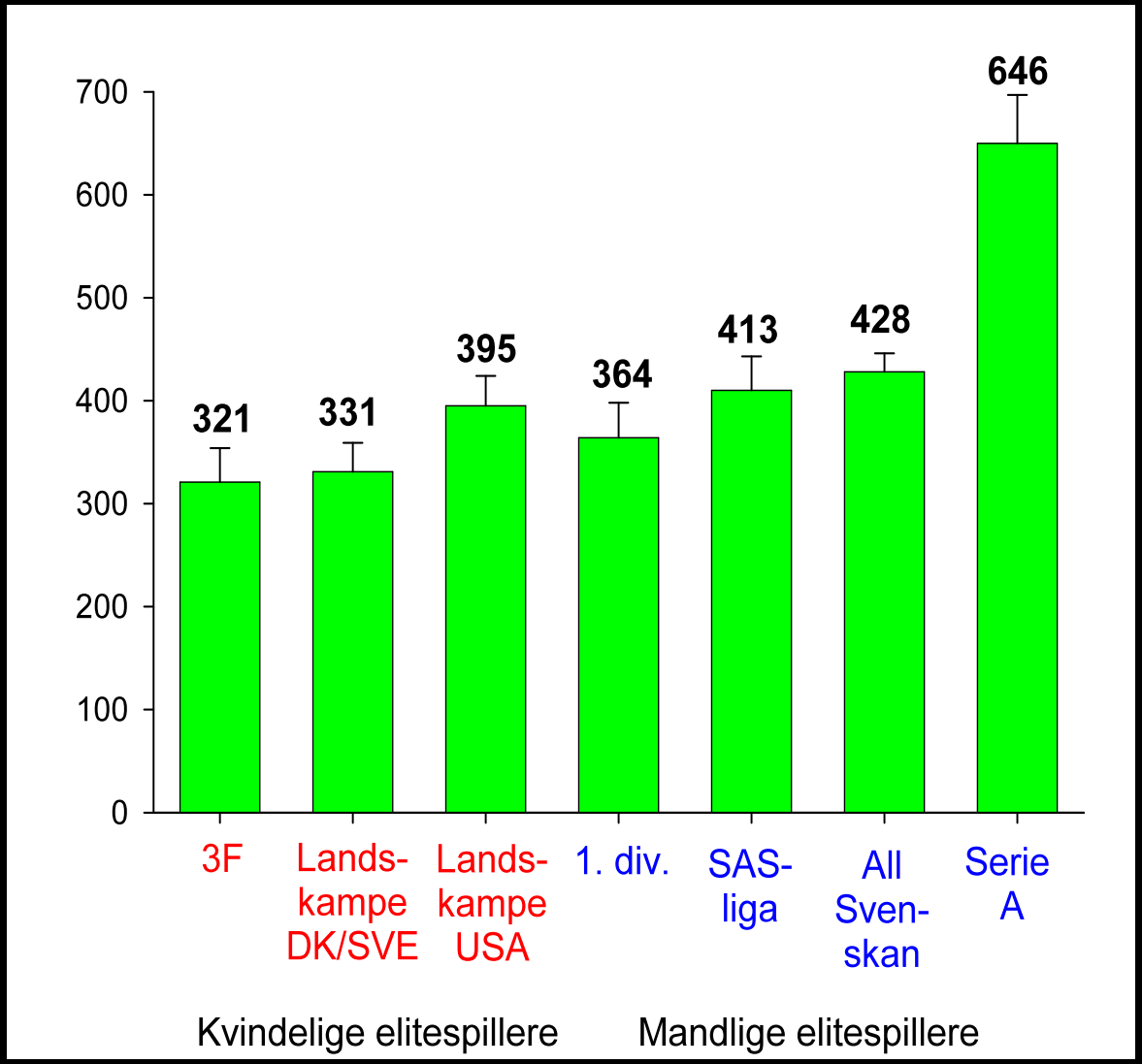
CHOICE OF ACTION

- At the forefront
- Always appear to have plenty of time

PHYSIOLOGICAL RESOURCES

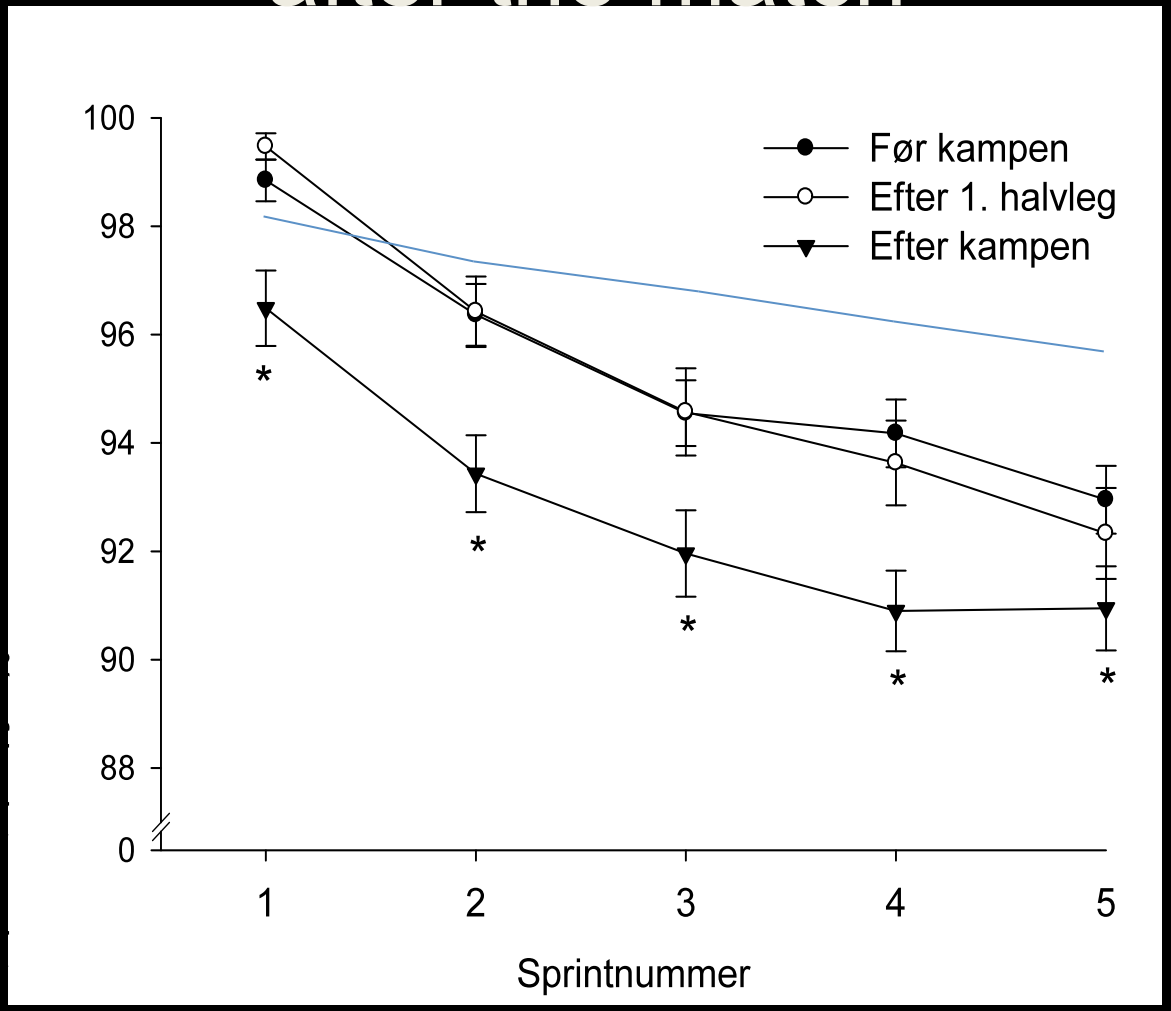
- Athletes with physiological core competences based on own genetic preconditions

Sprint distance during matches at different levels



Peter Krustrup

Sprinting ability before, during and after the match



Is there anyone who wants to have a groups of players with such a training condition?

Krustrup et al. 2006

"I started to exercise when I was 10. Out in the garden, I would run backwards and forwards, again and again. It was important to start with a sprint as it helps you to catch up with an opponent or to get away from the player marking you. Whatever the weather, I exercised. And I continued to exercise after turning professional." (Frank Lampard, 2006, p. 12)

How fast do you need to be to reach national elite level in football?

- Wing players and forwards - test values of 40 metres in under 4.85 secs.(men) and 5.65 secs. (women)
- One of the most successful attackers today - value 4.70 seconds
- International level probably under 4.75 seconds and 5.55 for male and female attackers respectively

(Olympiatoppens testdatabase, 2006).

Ronaldo gets help with his sprint

Cristiano Ronaldo – one of the world's best football players

Usain Bolt – the world's fastest man

- **He is already reckoned to be the world's best football player, but Cristiano Ronaldo wants to get faster. What better private coach than the sprint king Usain Bolt?**

- The Olympic king Usain Bolt, the world's fastest man at both 100 metres (9.69) and 200 metres (19.30) is going to teach the Manchester United star how to become faster

TV 2 sporten Published 09.03.2009 09.10

Speed training

Treningsmetode	Intensitet	Varighet/distanse	Antall løp	Pauser/seriepauser
Akselerasjonshurtighet	> 95 %	2–4 s / 15–30 m	3–8	2–5 min
Maksimal hurtighet	> 95 %	4–8 s / 30–60 m	3–8	4–7 min
Utholdende hurtighet	> 90 %	3–8 s / 20–60 m	8–30	0,5–2 min / 10 min

- Training frequency: 1 to 2 sessions a week
- NB - players who have recovered before training have a lower risk of injury and higher training efficency
- Acceleration speed: 3-8 maximum run up to 30 m.
- Enduring speed; 10-30 runs of 20-60 m.
  - Break 20 secs. per second run
  - Series of 4 to 6 runs
  - Series breaks of 10 mins.

Experience Leif Olav Alnes

The objective of the project

- Greatest possible progress in respect of the players' running speed with the least possible training, without any form of injury.

Strategy

- 1 x training per week, duration approx. 60 mins. per session (including warm-up)
- 40m distance for all runs, start every minute.
- Running on soft and gentle ground
- Trainers with core competences in speed always present
- Use of electronic timers 10-40m (30m flying) to check the intensity

Players

- Individual players from women's national football team. Total 7 players have been through. 4 of the players have attended regularly. The others have attended sporadically.

Result development

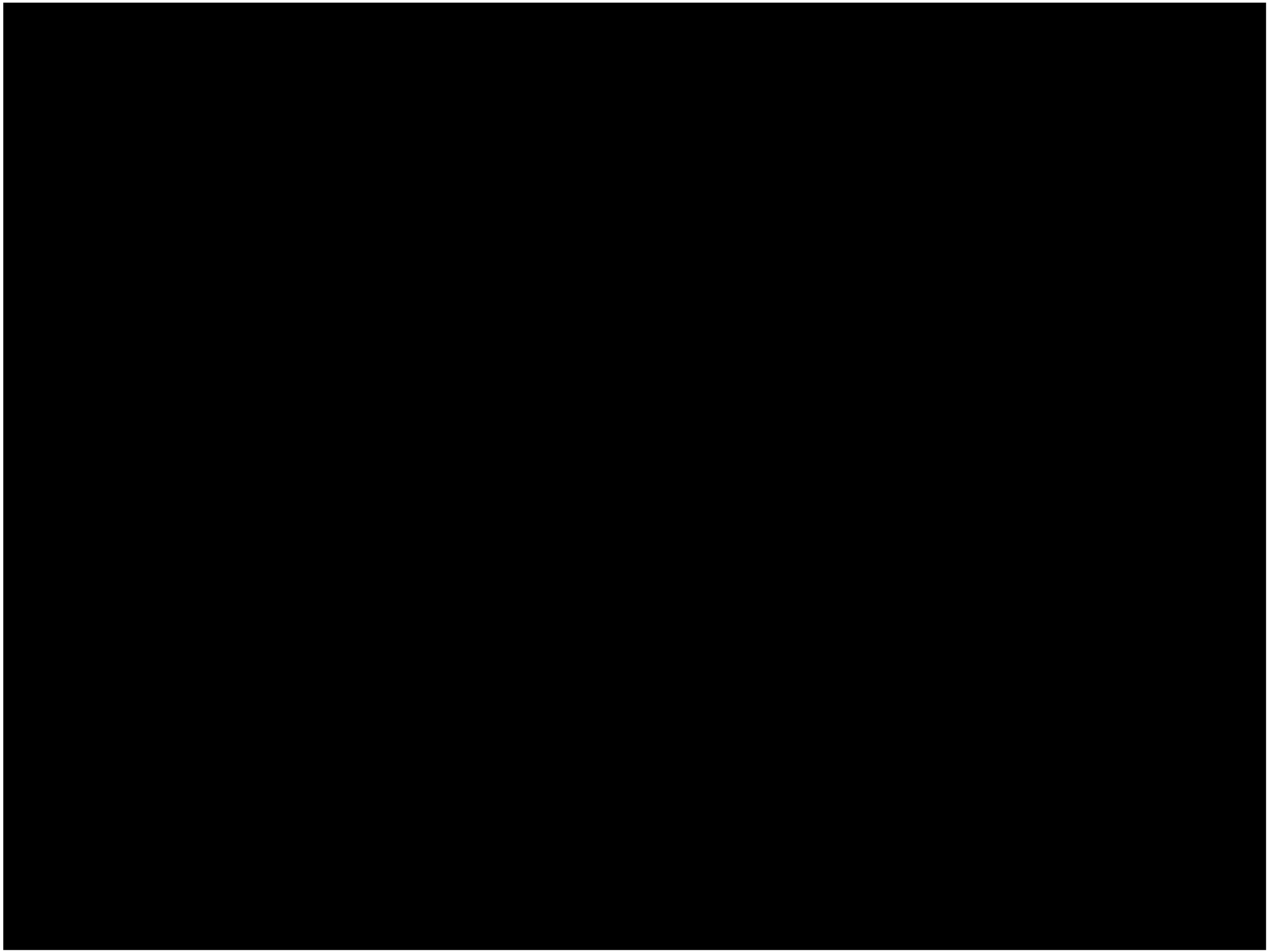
	Player xx	Player xx	Player xx	Player xx
Max test in early January	4.03 secs.	4,11	4,09	Did not attend
Status mid February	24 runs averaging 4.03 secs. 3.99 secs. on run no. 24	24 runs averaging 4.15 secs. 4.10 secs. on run no. 22	24 runs averaging 4.15 secs. 4.07 secs. on run no. 19	8 runs averaging 3.99 secs. Fastest run 3.88 secs.
Fastest run in March	3.81 secs.	4,05	3,99	12 runs averaging 3.80 secs. Fastest run 3.72 secs.

Speed training in football

- **The team of trainers must develop role-specific exercises which are:**
- **Match-related - relevant signal - motivational**
- **Dose the current training so that it gives optimum benefit**

"The demand for speed in football is increasing, and the days when football players could compensate for POOR speed with good technique, positioning ability and player understanding are coming to an end."

Tonnessen E, Alnes L O, Aasen S B. Hurtighetstrening i fotball. Olympiatoppen 2009.



Regeneration and consequences for planning in football training.

- Planning is aimed at optimising the daily training
- The quality of the daily training has the greatest effect on performance ability

How do you organise the training so that the players make the most of their talent?

The main challenge of the team of football trainers?

- How do you assure the optimal development of individual players?

Year plan and periodisation

- Optimise performance development both for the team and individual players
- The training year is divided into periods with different goals and content:
  - General resource training period
  - Season preparation period
  - Match season

What are your players' main areas of development?

- Training focus on certain areas for improvement
- Ole is very keen to improve the quality of the daily training
  - Endurance
  - Shooting technique
  - On target percentage
  - Speed

Prioritise individual development areas

- A
- B
- C
- ~~D~~

Variables to consider

PHV

Flexibility

Injury

Social Stressors

Muscle Fibre Type

Academic Load

Hormonal Changes

Illness

Coordination

N-Muscular System

DOMS

Other Sports

Stability

Strength

Balance

Skill Acquisition Issues

Slower Adaptation

Training Age

Learning Style

The Strategy

Where are they now?

What is the athlete's current physical & skill status?

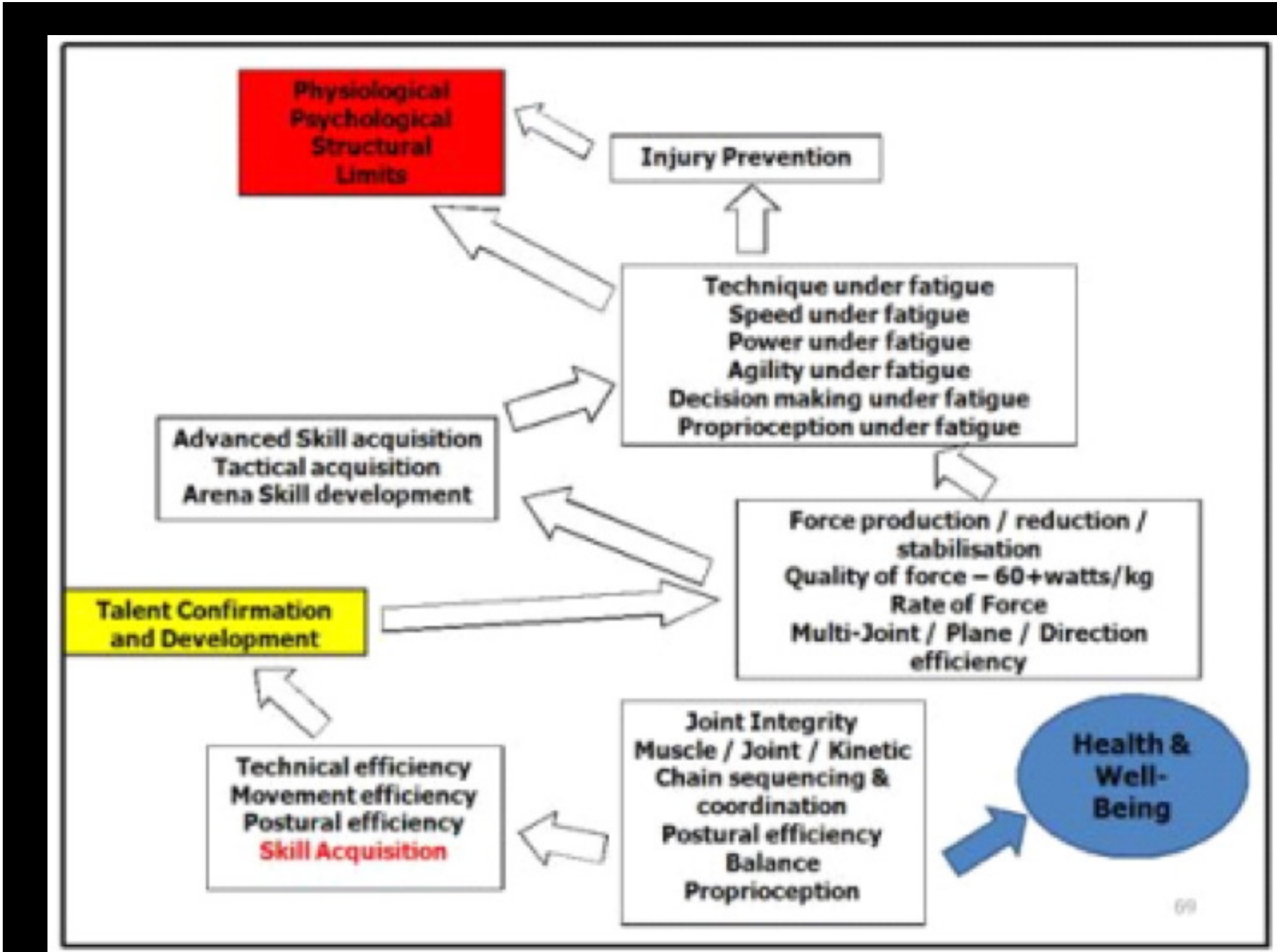
What are their progressive destinations?

...relative to their maturation stage?

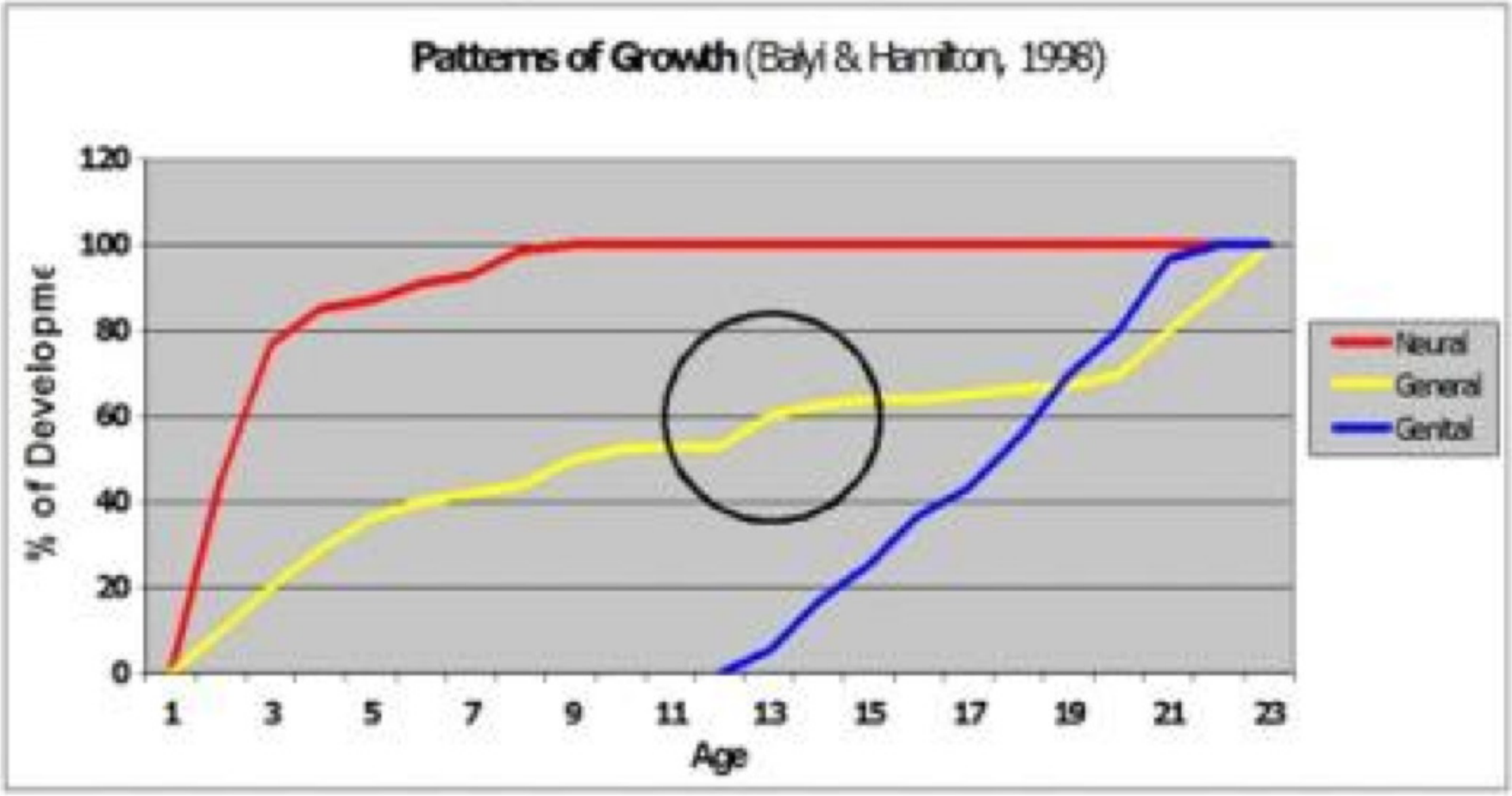
What is the systematic, sequential, progressive journey for the individual player?

...eradicating their limitations to future success – Physical, Technical, Tactical, Psychological

How do we design the training sessions?


Physiological
Psychological
Structural
Limits
Injury Prevention
Technique under fatigue
Speed under fatigue
Power under fatigue
Agility under fatigue
Decision making under fatigue
Proprioception under fatigue
Advanced Skill acquisition
Tactical acquisition
Arena Skill development
Force production / reduction / stabilisation
Quality of force – 60+watts/kg
Rate of Force
Multi-Joint / Plane / Direction efficiency
Talent Confirmation and Development
Technical efficiency
Movement efficiency
Postural efficiency
Skill Acquisition
Joint Integrity
Muscle / Joint / Kinetic Chain sequencing & coordination
Postural efficiency
Balance
Proprioception
Health & Well-Being
69

An Overview of Trainability & Critical Periods of Development During Childhood



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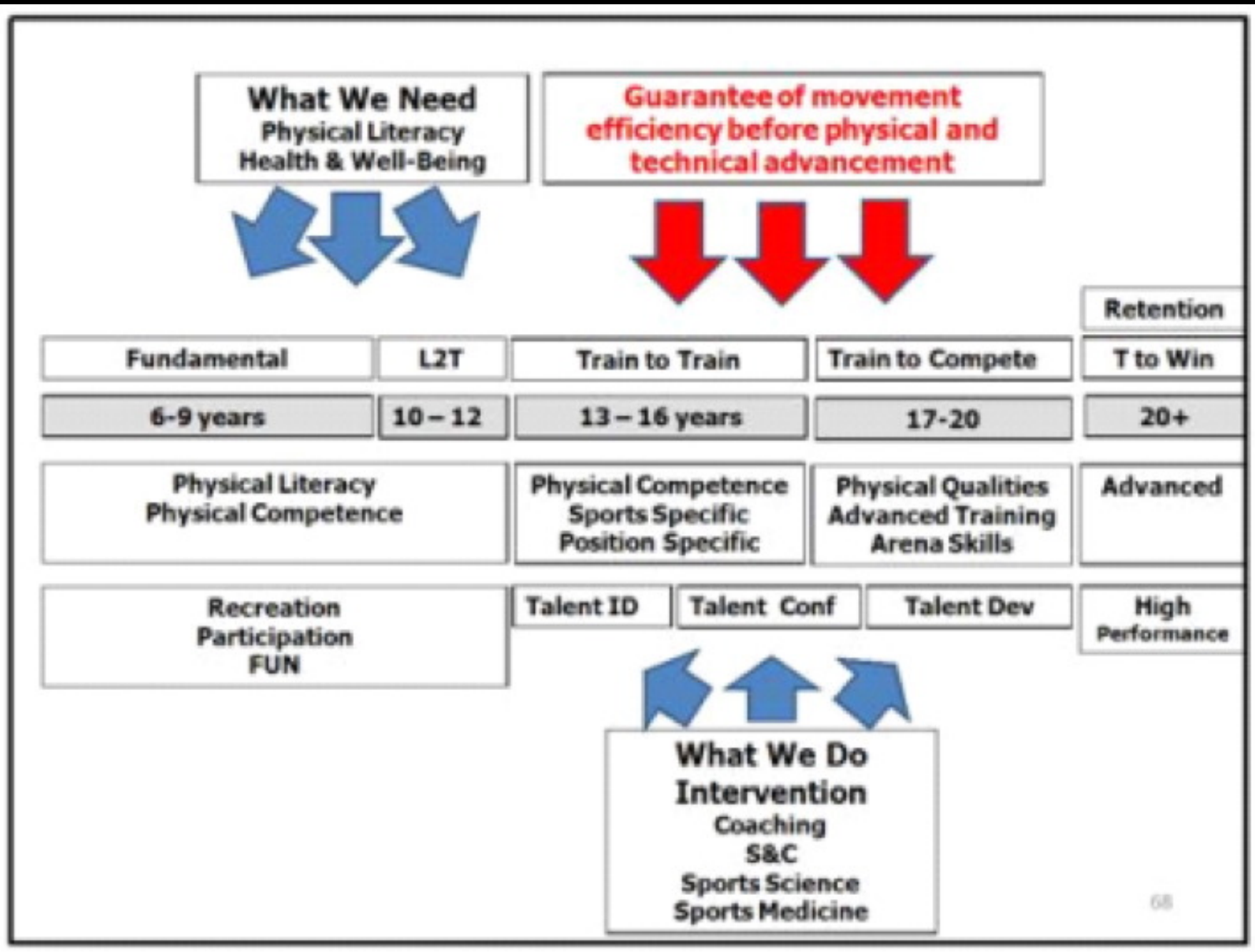

What We Need
Physical Literacy
Health & Well-Being
Guarantee of movement efficiency before physical and technical advancement
Retention
Fundamental
L2T
Train to Train
Train to Compete
T to Win
6-9 years
10 – 12
13 – 16 years
17-20
20+
Physical Literacy
Physical Competence
Physical Competence
Sports Specific
Position Specific
Physical Qualities
Advanced Training
Arena Skills
Advanced
Recreation
Participation
FUN
Talent ID
Talent Conf
Talent Dev
High
Performance
What We Do
Intervention
Coaching
S&C
Sports Science
Sports Medicine
68

An Overview of Trainability & Critical Periods of Development During Childhood

Age:	5	6	7	8	9	10	11	12	13	14	15	16	17	18 +
Coord Capacities:	FUNdamental					Learning to Train					Train to Train			Train to C
Motor Learning			G	G	G	E	E				G	E	E	E
Motor Control			G	G	G	G	E				G	G	G	G
Reaction to Audiovisual Cues			G	E	E	G								
Rhythm/Cadence Capacity			G	G	E	E	G	G						
Spatial Awareness			G	G	G	G	G	E	E	E				
Kinesthetic Awareness					G	E	E	G	G					
Physical Capacities:														
Endurance	G	G	G	G	G	G	G	E	E	E	E	E	E	E
Strength					G	G	G	G	E	E	E	E	E	E
Speed		G	E	E	E	E	E	E	E	G	G	G		

G: Good E: Excellent

Different requirements of the different positions on the pitch

Player position

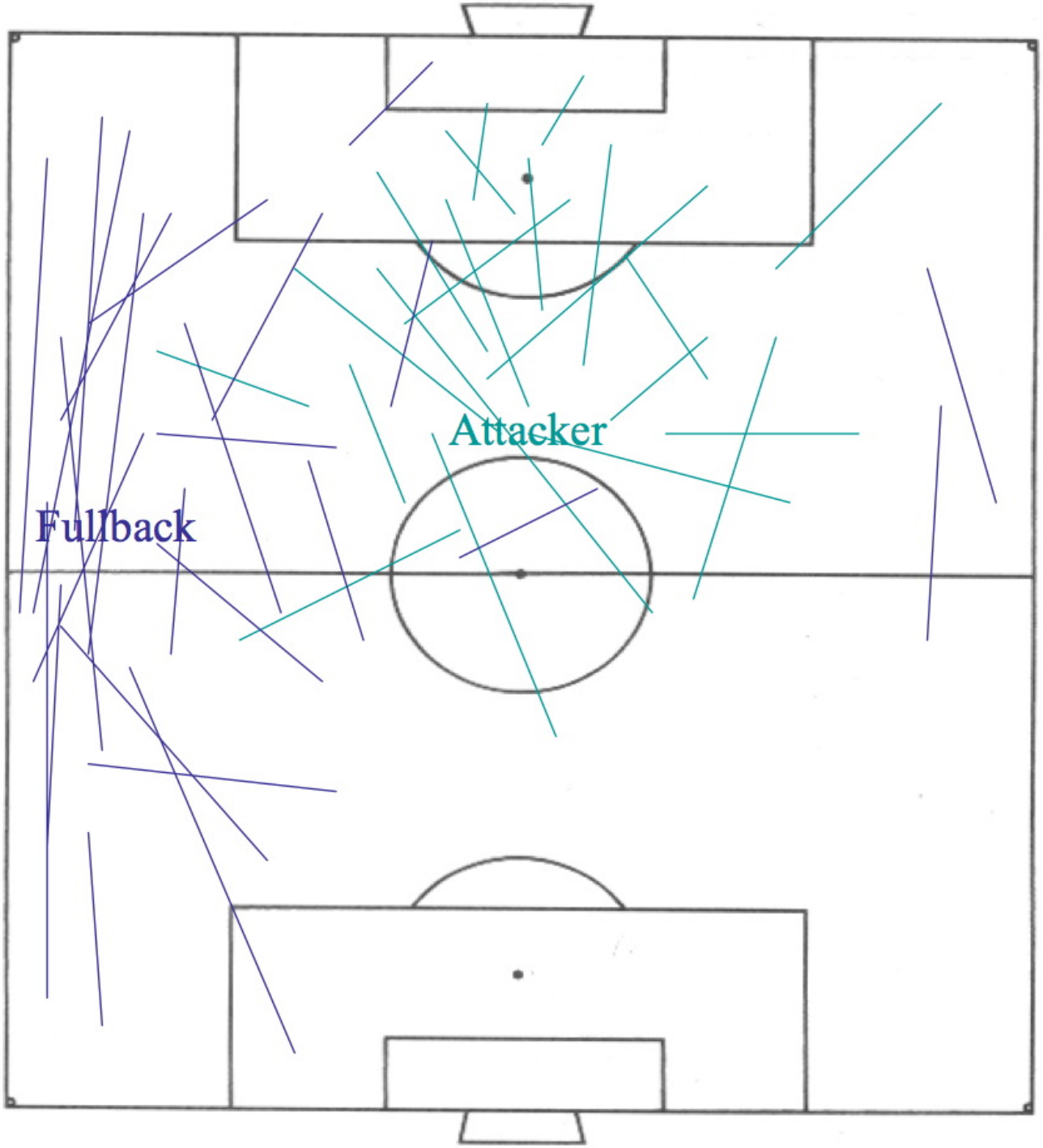
Keeper

Central defenders

Side backs, wing players

Central midfield players

Forwards


Attacker
Fullback

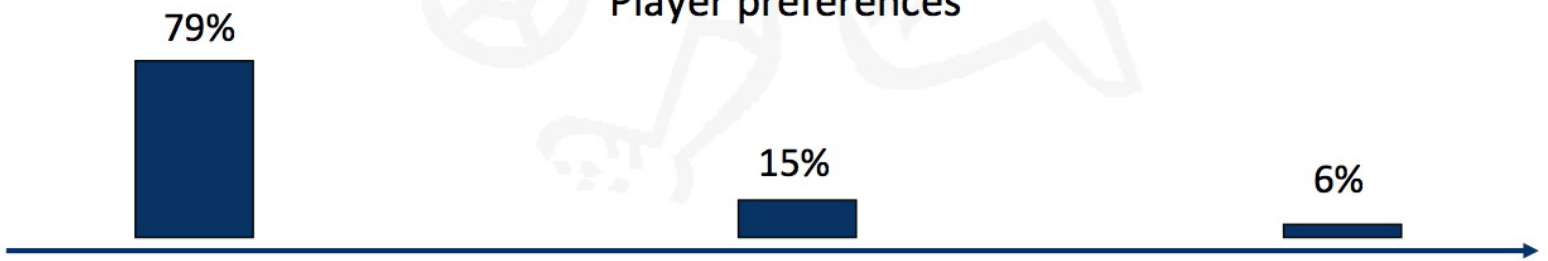
First research question …

NTNU

> Motivation

Small-sided games — **Specific Circuit** — **In line running**

Player preferences



(n=49; Impellizzeri e Stoop, unpublished results)

Period plan; example of the number of training sessions per week and the dividing of sessions into the different physical resources

	Generell ressurs-treningsperiode	Sesongforberedende periode	Kampsesong
Hovedhensikt med fysisk trening	Øke generelle fysiske ressurser	Øke rollespesifikke fysiske ressurser	Vedlikeholde
Økter totalt	6–11	8–11	6–8
Fotballøkter	4–6	6–7	6
Fotballspesifikk utholdenhet	1	2	1–2 *
Generell utholdenhet	2	1–2	0–1 *
Fotballspesifikk hurtighet	0	1	1
Styrke, spenst, hurtighet	2	2	0–1 *
Fridager	3–1	1	1

* Denne treningen kuttes når det spilles to kamper i uka.

Example of week plan towards the end of the general resource training period

	Morgen	Belastning	Ettermiddag	Belastning
Mandag	Fotballøkt	(middels)	Generell utholdenhet	(middels)
Tirsdag	Styrke, spenst, hurtighet	(middels)	Fotballspesifikk utholdenhet	(middels)
Onsdag			Fotballøkt	(liten)
Torsdag	Generell utholdenhet	(stor)	Fotballøkt	(middels)
Fredag	Fotballspesifikk utholdenhet	(middels)	Styrke, spenst, hurtighet	(middels)
Lørdag			Kamp	(middels)*
Søndag	Fri			

*Forutsetter redusert spilletid per spiller

Develop the physical resources so that the players can cope with the increased amount of football-specific training which comes

High possibility of individual training with focus on areas for development

Example of week plan at the beginning of the season preparation period

	Morgen	Belastning	Ettermiddag	Belastning
Mandag	Fotballspesifikk utholdenhet	(liten)	Fotballøkt	(middels)
Tirsdag	Fotballspesifikk hurtighet	(stor)	Styrke, spenst, hurtighet	(middels)
Onsdag			Fotballøkt	(middels)
Torsdag	Fotballspesifikk utholdenhet	(middels)	Fotballøkt	(middels)
Fredag	Fotballøkt	(middels)	Generell utholdenhet	(middels)
Lørdag	Styrke, spenst, hurtighet	(middels)	Kamp	(stor)
Søndag	Fri			

Further develop the football-specific physical resources.
Individualisation with the help of exercises on the field.

Example of week plan in the period right before the series premiere

	Morgen	Belastning	Ettermiddag	Belastning
Mandag	Generell utholdenhet	(liten)	Fotballøkt	(liten)
Tirsdag	Fotballspesifikk utholdenhet	(middels)	Styrke, spenst, hurtighet	(middels)
Onsdag			Fotballøkt	(middels)
Torsdag	Fotballspesifikk hurtighet	(stor)	Fotballøkt	(liten)
Fredag			Fotballøkt	(middels)
Lørdag			Kamp	(stor)
Søndag	Fri			

- Reduce training in the last three weeks before the series premiere
- Clear differentiation between sessions with low and high training efforts

Example of week plans during match season

	Morgen	Belastning	Ettermiddag	Belastning
Mandag	Fri			
Tirsdag	Fotballspesifikk utholdenhet	(middels)	Generell utholdenhet	(middels)
Onsdag			Fotballøkt	(middels)
Torsdag	Fotballspesifikk hurtighet	(stor)	Fotballøkt ut fra rollekrav	(liten)
Fredag	Fotballspesifikk utholdenhet	(middels)		
Lørdag	Fotballøkt	(middels)		
Søndag	Kamp	(stor)		

Best prepared for the next match
Physical training focus to be maintained
Considerably less training is required to maintain the level
Organise the weeks so that the players have optimal energy on the day of the match

Tiredness and restitution in football

- Tiredness after football matches
  - Reduced muscle strength in legs 5-15%
  - Jump height reduced by 5-10%
  - Reduced running speed 2-3% (10-15 hundredths over 40m)
  - 2-3 days until 100% restituted after match

Source: Mohr et al.2004 and Raastad et al. 2002

Restitution time

Restitution time is mainly dependent on:

a) The training load

b) Which restitution the player uses before, during and after the training session

c) The player's training condition

According to Badtke (1989), international players recover twice as fast as players with a poor training basis

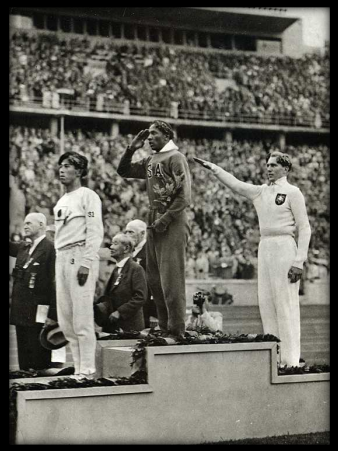
Restitution measures in football

- Low intensity training: cycling/running 15 to 30 mins.
- NB! CONSUMPTION OF LIQUID AND FOOD BEFORE COOLING DOWN. This will lead to faster restitution and enable more effective training on subsequent days
- Hot/cold bath
  - 45 degrees 2mins. and 12 degrees 1 min. total 5 and 4 rounds respectively

- Aqua jogging
  - 30 mins. 75-85% of HF max.
    - (Source: Dawson et al. 2005, Reilly and Ekblom 2005)

"Life’s battles don’t always go to the stronger or faster man, but sooner or later, the man who wins is the man who thinks he can"

Jesse Owens



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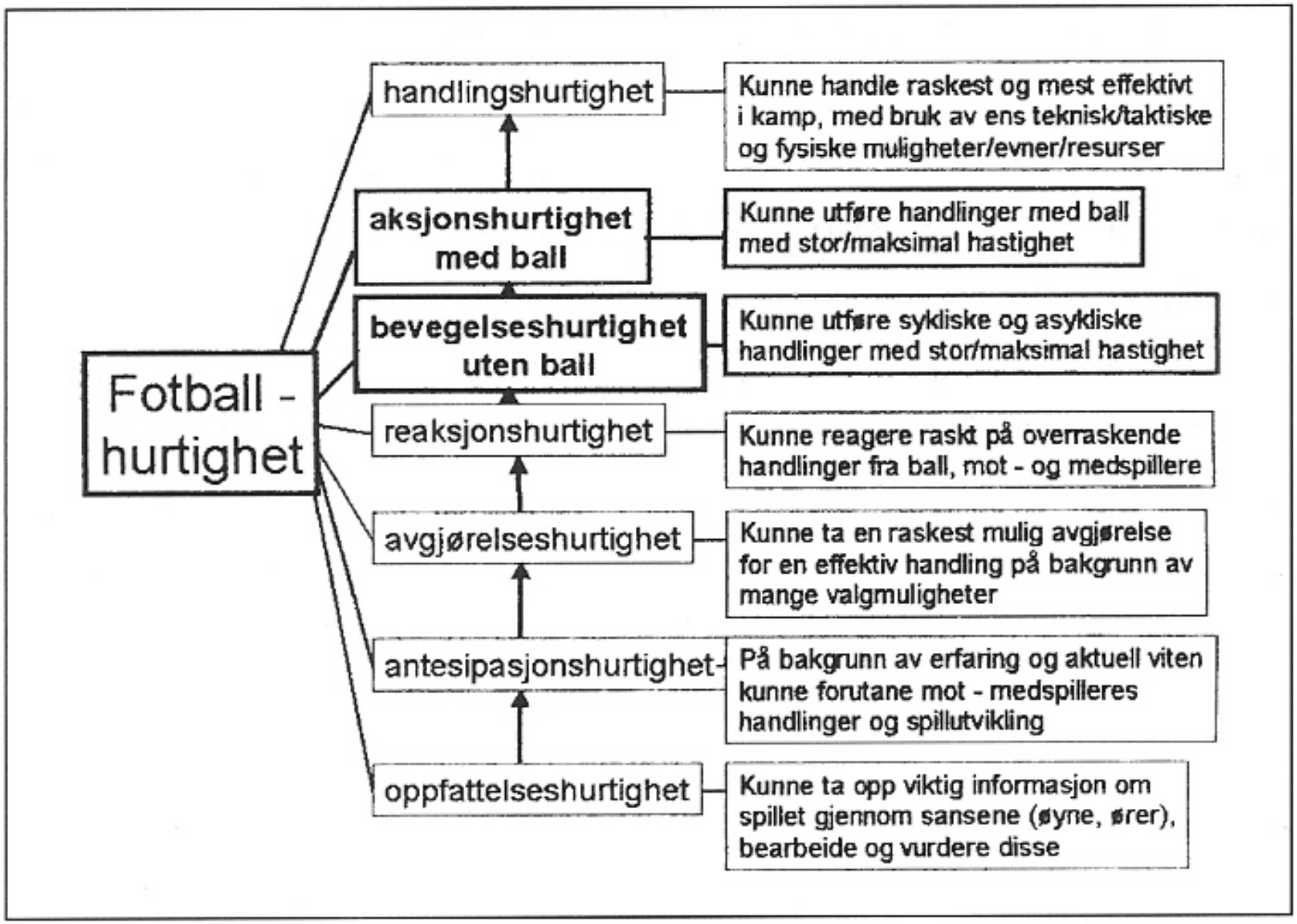
Fotball - hurtighet
handlingshurtighet
Kunne handle raskest og mest effektivt i kamp, med bruk av ens teknisk/taktiske og fysiske muligheter/evner/resurser
aksjonshurtighet med ball
Kunne utføre handlinger med ball med stor/maksimal hastighet
bevegelseshurtighet uten ball
Kunne utføre sykliske og asykliske handlinger med stor/maksimal hastighet
reaksjonshurtighet
Kunne reagere raskt på overraskende handlinger fra ball, mot - og medspillere
avgjørelseshurtighet
Kunne ta en raskest mulig avgjørelse for en effektiv handling på bakgrunn av mange valgmuligheter
antesipasjonshurtighet-
På bakgrunn av erfaring og aktuell viten kunne forutane mot - medspilleres handlinger og spillutvikling
oppfattelseshurtighet
Kunne ta opp viktig informasjon om spillet gjennom sansene (øyne, ører), bearbeide og vurdere disse


msn video
0:06 / 2:42
HD