Talent Identification
by Axel Müller

Talent Identification

- Talent identification is considered today as one of the key factors for the high competition performance and for a successful elite program

- In Sport we consider a **Talent**, that person which has an over standing potential to achieve higher results and sport specific performance than a regular person or athlete.
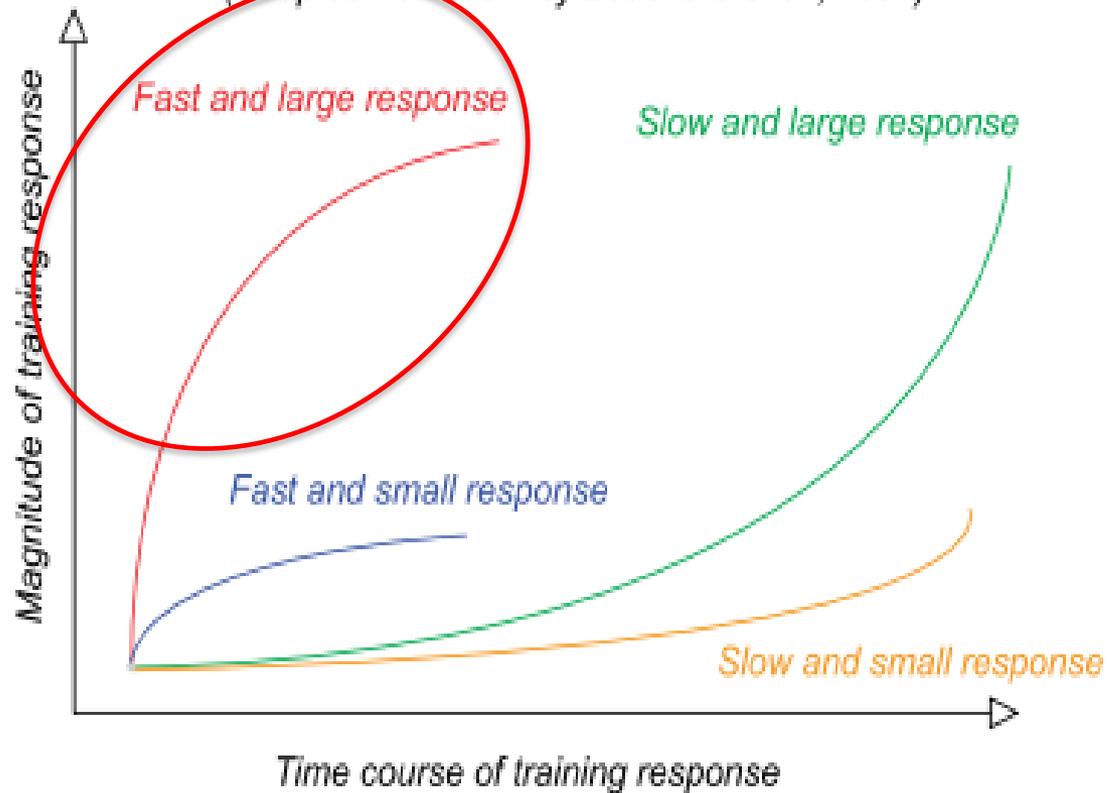
Talent Identification

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Fig. 1 The Sports Performance Pyramid

THOUGHT ON "DOC'S BLOG – INTRODUCTION TO SPORT PERFORMANCE" by Scott Black, MD.

Talent Identification

Variation in trainability.
(Adapted from work by Bouchard et.al., 1997)
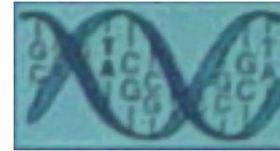
Talent Identification

- Genetic Influence
  - The trainability (increment of performance) is based on degradation (catabolism) and re-synthesis (anabolism) of those proteins which forms the short life cellular substructures (mitochondrias, myofibrils, hematites, etc.).

  - The mechanisms of adaptation are based on the protein degradation which activates new chains of transcription on that genes related to reestablish cellular balance.
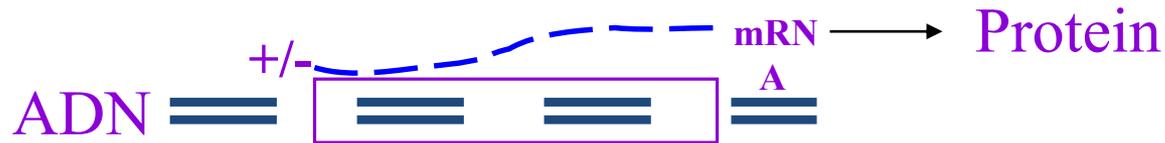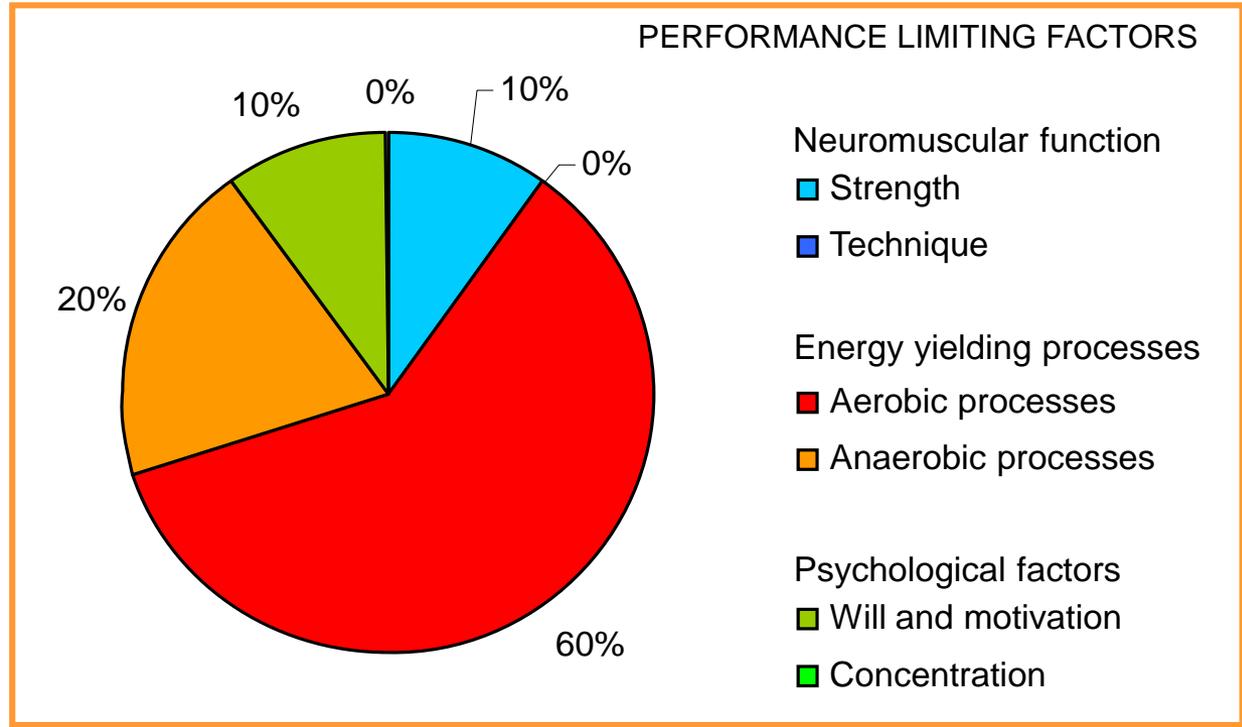
Talent Identification

Talent ← [DNA helix image]

training → Gen activation

ADN ═══ +/- ═══ ═══ mRNA → Protein

Bengt Saltin, 2002

PERFORMANCE LIMITING FACTORS

Neuromuscular function
- Strength
- Technique

Energy yielding processes
- Aerobic processes
- Anaerobic processes

Psychological factors
- Will and motivation
- Concentration

10%   0%   10%
0%
20%
60%

Per Tesch (2005)

Karolinska Institutet, Dept. of Physiology and Pharmacology
Section for Muscle and Exercise Physiology

Limiting Factors

- Anthropometrics
- Physiological
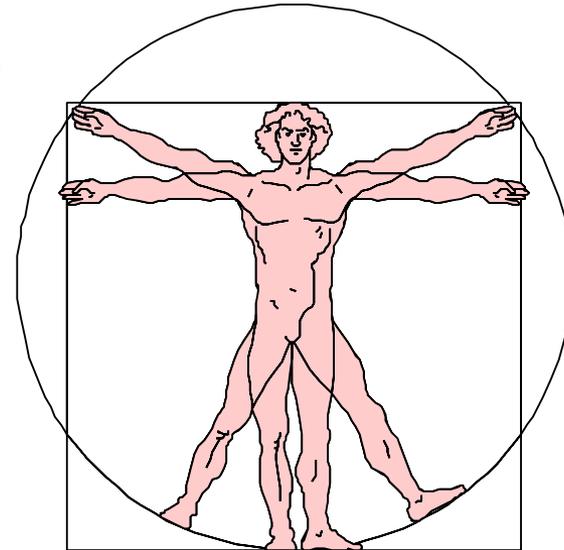- Psychological
- Technique
- Physical condition

Limiting Factors

- Anthropometrics*
- Physiological*
- Psychological*
- Technique
- Physical condition

*determinated by genetics

Anthropometrical

A) Dimensions (height, weight, BMI,…)

B) Form and proportions

C) Body Composition

D) Maturation age

E) Functionality

Physiological

A) Oxygen Consumption (VO$_2$ max.)

B) Anaerobic Threshold

C) Anaerobic Power.

Physiological and somatic predictors of rowing and sculling performance

F.A. Rodríguez, A. Müller

Introduction

- Physiological variables have been related to performance in laboratory tests

  – cycle ergometer or treadmill (Secher et al. 1982)

  – rowing ergometer (Nevill et al. 1992, Cosgrove et al. 1999)

Introduction

- How do these physiological and somatic parameters individually measured on a specific test actually relate to "on water" rowing and sculling performance during a competitive race?

Aims

- To analyse in a group of high level oarsmen, using a multivariate statistical approach, the relationship between

    – selected anthropometrical and physiological parameters

    – performance in a 2,000-m regatta

Material and methods

- 33 male oarsmen

  - 19-36 years old (mean 22.6 $\pm$ sd 4.2)

  - height 182.7 $\pm$ 5.9 cm

  - body mass 79.4 $\pm$ 8.0 kg

  - VO_2max 5.13 $\pm$ 0.4 L·min^{-1}

  - all members of the Spanish national team (senior absolute or LW category)

Material and methods

- All subjects tested twice within 3 weeks

  – two-intensity 6 min test
  Gjiessing RE
  (Rodríguez 1989)

  > submaximal (at 300 W ca.)
  > maximal ("all out")

  – "all out" 2,000 m time-trial test
  Concept II RE

Material and methods

Two intensity ergometer test

- Expired gas continuously measured BxB (CPXII, USA)

- Blood samples for lactate photoenzimatic analysis (1, 3, 5, 7, 10 min) (Boehringer-Mannheim, Germany)

Material and methods

Anthropometry

- Body mass and height, 6 skinfolds, 3 breaths, 2 girths

- Body composition

  – four compartment model technique (Rose & Guimaraes 1980)

  – modified by fat estimation following Yuhasz (Carter 1982; Rodríguez 1986)

- Somatotype (Heath & Carter 1975)

Material and methods

Procedure

- All subjects participated in a 3-day competition (Open Trial Regatta, Banyoles)

  – singles or pairs

  – qualification for the National team

  – no weight categories

Material and methods

Statistical analysis

• Relationships of variables with racing speed

– bivariate
linear correlation (Pearson, R)

– multivariate
multiple linear regression

best subsets selection procedure (up to 4)

dependent variable: racing speed

R^2, VIF (variance inflation factor)

Results

Singles, 1x (n= 13)	R (LR model)	R^2 (MLR model)
VO_2max/BM (mL·kg^{-1}·min^{-1})	.461	
Lactate threshold, 4 mmol·L^{-1} (W)	.496	
Maximal blood lactate (mmol·L^{-1})	.158	
Height (cm)	.461	
All variables in the MLR model		.689

Results

Coxless pairs, 2− (n= 20)	R (LR model)	R^2 (MLR model)
VO$_2$max (L·min^{-1})	.379	
Maximal power, CII (W)	.527	
Endomorphy	.431	
Height (cm)	.343	
All variables in the MLR model		.630

Discussion

- Maximal aerobic power is related to performance

  – in rowing ergometer tests
  R= .86 -.85 between VO_{2max} & $d_{7min.}$ or V_{2000} (Nevill et al. 1992; Cosgrove et al. 1999)

  – in rowing race (tested in cycle or treadmill)
  R= .87 between average VO_{2max} (crew) & placing in European championship (Secher et al. 1982)

  – in rowing race (present study)
  R= .46 (1X); R= .38 (2–) between VO_{2max} & race speed

Discussion

- Lactate threshold is related to performance

    – in rowing ergometer tests (CII)
    R= .74 between V_4 & V_{2000}
    R= .68 between VO_2 @ 4 mmol·L^{-1} & V_{2000}
    (Cosgrove et al. 1999)

    – in rowing race (present study)
    R= .50 between P@4 mmol·L^{-1} & race speed

Discussion

- Is blood maximum lactate related to performance?

    – Yes (rowing ergometer tests)
    R= .58 between $L_{max,5min}$ & V_{2000}
    (Cosgrove et al. 1999)

    – No (rowing race)
    R= .16 between L_{max} & race speed

Discussion

- Some anthropometric variables are also correlated with performance

  – body mass
  R= .70 with V_{2000} (Cosgrove et al. 1999)
  R= -.53 (1x); R=.48 (2–) with race speed

  – lean body mass
  R= .85 with V_{2000} (Cosgrove et al. 1999)
  R= -.48 (1x); R=.48 (2–) with race speed

  – percent fat
  R= -.25 with V_{2000} (ns) (Cosgrove et al. 1999)
  R= -.54 (1x); R=.39 (2–) with race speed

Discussion

- Multivariate prediction models including anthropometric and physiological variables

    - do not increase predictive power ($R^2 = .64$) as compared to anthropometric variables alone ($R^2 = .67$) in elite schoolboy rowers tested in a 2,000 m time-trial test (Russell et al. 1998)

    - increase predictive power ($R^2 = .63-.69$) and help to better explain race performance in elite senior rowers (present study)

Conclusions

- Rowing and sculling performance in short boats can be reasonably predicted

  – from selected anthropometric and physiological parameters measured in the laboratory

  – explaining 63% (pairs) to 69% (singles) of racing speed variance

Conclusions

- Although various significant correlations were observed between those variables and race performance, predictive multivariate models included

  – maximal aerobic power and height

  – lactate threshold and maximum (1x)

  – maximal power and endomorphy (2–)

- However, predictive models may be sample-specific (homogeneous vs. heterogeneous) and boat-specific

Thank you for your attention !

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