



How can soccer performance be predicted validly and reliably?

T. Bergkamp, A.S.M. Niessen, R.R. Meijer  
J.R. Den Hartigh, W.G.P. Frencken



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How can we optimize performance predictions, in order to improve selection decisions?





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# Talent identification research

## Talent identification in youth soccer

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(Accepted 14 September 2015)

Psychological talent predictors in early adolescence and their empirical relationship with current and future performance in soccer

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<sup>2</sup>University of Salzburg, Austria



## Development Programmes in Sport

Talent identification in youth soccer: the role of the coach and the club

Susana María Gil, Jon Zabala-Lili, Iraia Bida, Jose Antonio Lekue, Jordan Santos-Concejal

Sports Med  
https://doi.org/10.1080/17445019.2015.1081407

SYSTEMATIC REVIEW

Talent Identification and Development in Male Football: A Systematic Review

Hugo Sarmento<sup>1,2,3</sup>, M. Teresa Alegre<sup>1</sup>, António Pereira<sup>1</sup>, Duarte Araújo<sup>1</sup>

<sup>1</sup>Universidade do Porto, Portugal  
<sup>2</sup>Universidade Nova de Lisboa, Portugal  
<sup>3</sup>Universidade de Coimbra, Portugal

Jonathan S J Fenner, John Iga & Viswanath Unnithan

talent identification in youth soccer: the role of the coach and the club

# Talent identification research

*Talent identification and development in soccer*

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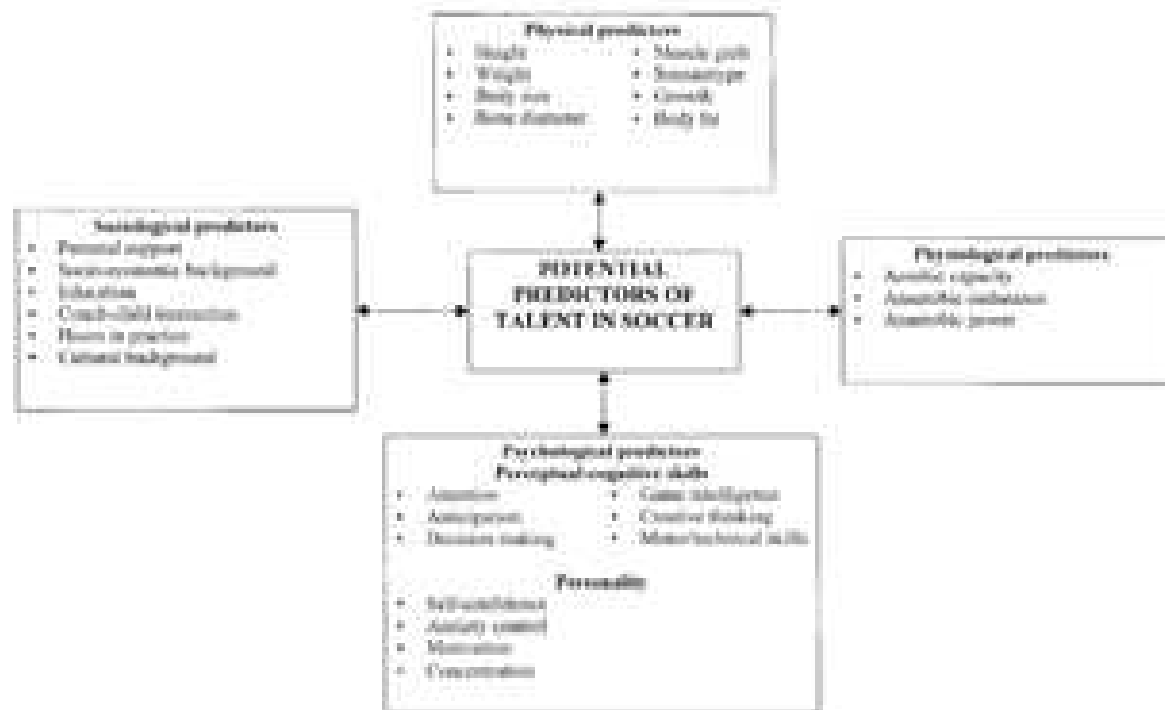


Fig. 3. Potential predictors of talent in soccer from each sports science discipline (adapted from Williams and Franks, 1998).



# Talent identification research

- Focused on **isolated traits** of soccer performance
- Selection psychology: **signs** of performance
- Limitation: predictive validity may be limited, reductionist approach
- No in-game soccer performance criterion (c.f. job performance)





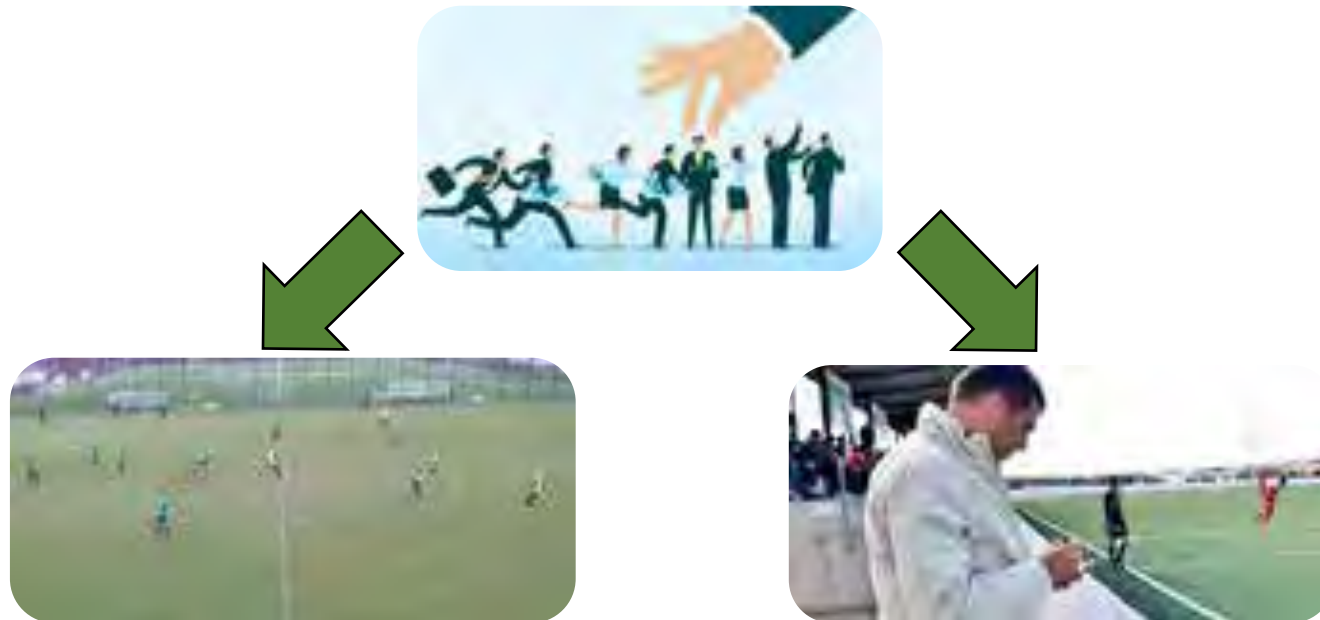
# Talent identification research

- Hardly any research on important practitioners: coaches and scouts



# Optimizing predictions

- Concepts, theory, and ideas from (personnel) selection psychology
  1. Determining **what variables or tests** predict which performance
  2. Decide **how to collect and combine** predictor information





# Methodology of TID

Sports Medicine  
https://doi.org/10.1007/s12274-014-0111-4

**POSITION STATEMENT**

**Methodological Issues in Soccer Talent Identification Research**

Tom L. G. Bergkamp<sup>1</sup> · A. Susan M. Niessen<sup>1</sup> · Raouf, J. R. den Hartigh<sup>2</sup> · Wouter G. P. Francken<sup>1,2</sup> · Rob B. Nijper<sup>1</sup>

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**Abstract**

Talent identification research in soccer comprises the prediction of elite soccer performance. While many studies in this field have aimed to empirically relate performance characteristics to subsequent soccer success, a critical evaluation of the methodology of these studies has rarely been done to the literature. In this position paper, we discuss advantages and limitations of the design, validity, and utility of current soccer talent identification research. Specifically, we draw on principles from selection psychology that can contribute to best practices in the context of making selection decisions across domains. Based on an extensive search of the soccer literature, we identify four methodological issues that this framework can be relevant for talent identification research. I.e. (1) the operationalization of criterion variables (i.e. performance to be predicted) at performance levels, (2) the focus on isolated performance indicators as predictors of soccer performance, (3) the effects of range restriction on the predictive validity of predictors used in talent identification, and (4) the effect of the base rate on the utility of talent identification procedures. Based on these four issues, we highlight opportunities and challenges for future soccer talent identification studies that may contribute to developing evidence-based selection procedures. We suggest for future research to consider the use of individual soccer criterion measures, to adopt representative, high-fidelity predictions of soccer performance, and to take inspiration of design and the base rate literature.





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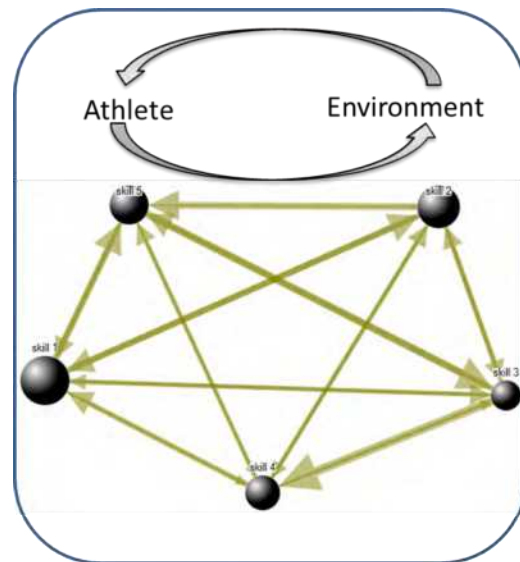
## Methodological Issues in Soccer Talent Identification Research

Sam L. G. Bergkamp<sup>1</sup> | W. Sauer<sup>2</sup>, M. Meyer<sup>3</sup> | Rudi J. B. Van Herogh<sup>1</sup> | Wouter G. P. Frencken<sup>1\*</sup> | Sjoep B. Reijnen<sup>1\*</sup>



# Sample-based predictors

- **Samples:** Representative, maintain person-task-environment interaction, mimic performance behavior
- Selection psychology: work-samples can be very good predictors
- Small-sided games





# Research at FC Groningen

- The validity of small-sided games in predicting 11-vs-11 soccer game performance
  - Sample: individual performance in **7-vs-7 SSGs**
  - Signs: speed, agility, and endurance
  - Criterion: 11-vs-11 performance





# Research at FC Groningen

- Q1: to what extent are 7-vs-7 SSGs representative of regular 11-vs-11 soccer games?

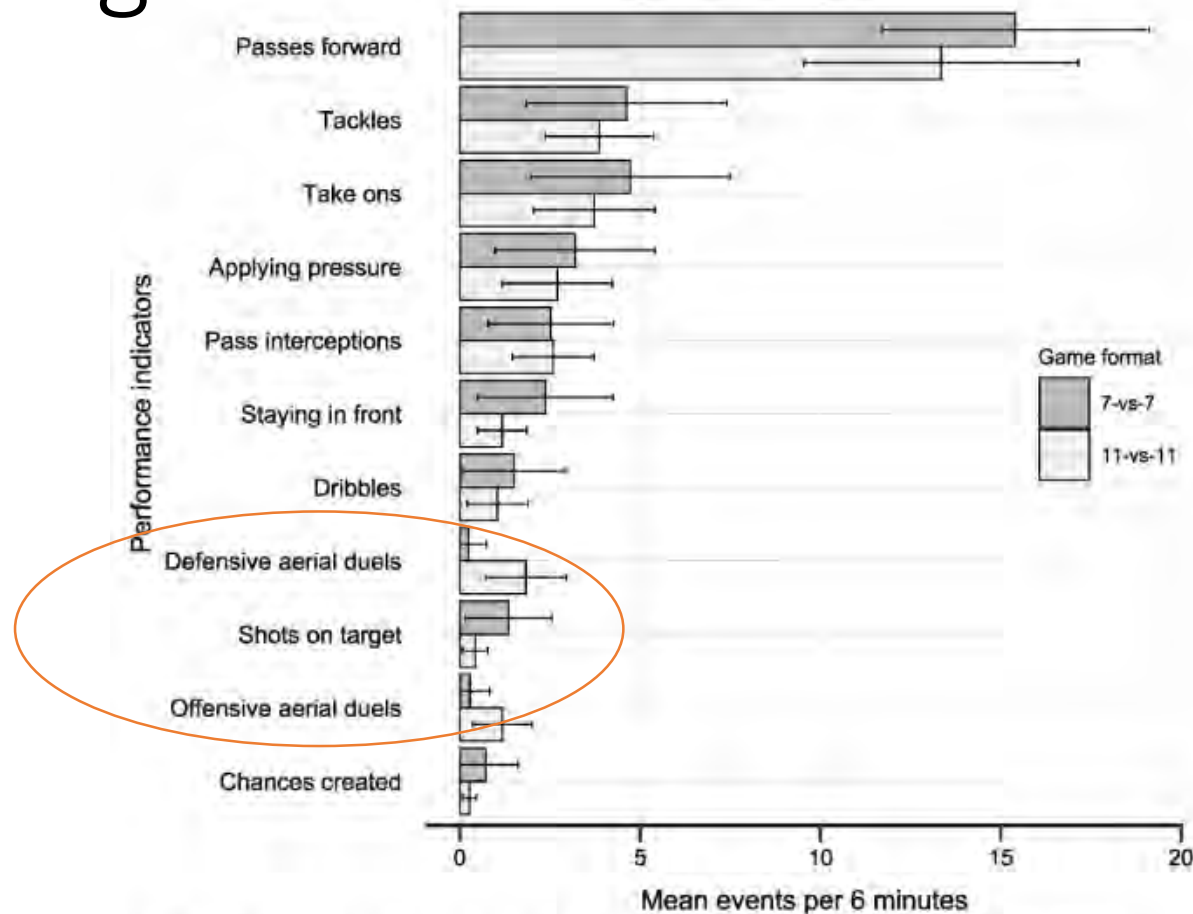


Fig 1. Mean events per 6 minutes for the performance indicators in 7-vs-7 SSGs and 11-vs-11 games.

# Research at FC Groningen

- Q2: what is the validity of SSG performance in predicting individual regular game performance?

**Table 4. Aggregated Spearman's correlations between the performance indicators in the SSGs and 11-vs-11 games.**

Performance indicator	$r_s$ (95% CI)	$p$	$n$
Forward passing	0.38 (0.11–0.59)	0.007	63
Chances created	< 0.01 (-0.27–0.26)	0.98	63
Shots on target	0.38 (0.05–0.63)	0.03	63
Pass interceptions	0.53 (0.25–0.73)	< 0.001	63
Applying pressure	0.40 (0.13–0.61)	0.005	63
Offensive duels	0.35 (0.08–0.58)	0.01	59
Overall offensive performance	0.46 (0.20–0.65)	< 0.001	59
Defensive duels	0.02 (-0.26–0.30)	0.88	61
Overall defensive performance	0.28 (0–0.52)	0.05	61

$r_s$  = aggregated spearman correlation coefficient; CI = Confidence Interval

# Research at FC Groningen

- Q3: what is the predictive validity of physical performance (in comparison to SSG performance)?

Table 5. Aggregated Spearman's correlations between physiological and motor tests and overall offensive (left) and defensive performance (right) in 11-vs-11 games.

Physiological and motor performance	Overall offensive performance (11-vs-11)			Overall defensive performance (11-vs-11)		
	$r_s$ (95% CI)	$p$	$n$	$r_s$ (95% CI)	$p$	$n$
10 m sprint	-0.19 (-0.47-0.12)	0.23	55	0.05 (-0.24-0.34)	0.72	56
30 m sprint	-0.20 (-0.54-0.20)	0.32	55	0.02 (-0.26-0.31)	0.87	56
ISRT	0.15 (-0.22-0.48)	0.43	58	-0.12 (-0.38-0.17)	0.42	60
Agility	-0.11 (-0.46-0.29)	0.62	55	0.11 (-0.18-0.39)	0.45	56

$r_s$  = aggregated spearman correlation coefficient; CI = Confidence Interval.

Note: a lower time on the sprinting and agility tests indicates a better performance, hence a negative correlation indicates that faster sprinting and agility is related to better overall performance in 11-vs-11.



# Conclusion

- 7-vs-7 highly representative of regular 11-vs-11 games
  - Exception of aerial duels
- Individual SSG performance clearly stronger predictor of regular game performance than physiological and motor ability tests
- Sample-based predictor enhances predictive validity



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*Performance predictors*



## The validity of small-sided games in predicting 11-vs-11 soccer game performance

Sam L. G. Broekmans<sup>1</sup> | Ronald J. B. Van Heugh<sup>1</sup> | Wouter G. P. Frencken<sup>1,2</sup> | A. Sison<sup>1</sup>, M. Meyer<sup>1</sup> | Bas B. Reijnen<sup>1</sup>





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*Performance predictors*



The validity of small-sided games in predicting 11-vs-11 soccer game performance



Predicting soccer performance based on SSGs, using **'top-down'** performance measures

# Optimizing predictions

- Concepts, theory, and ideas from (personnel) selection psychology
  1. Determining **what variables or tests** predict which performance
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# Talent identification research

- Hardly any research on important practitioners: coaches and scouts
- Survey → Perceptions soccer scouts on talent identification process





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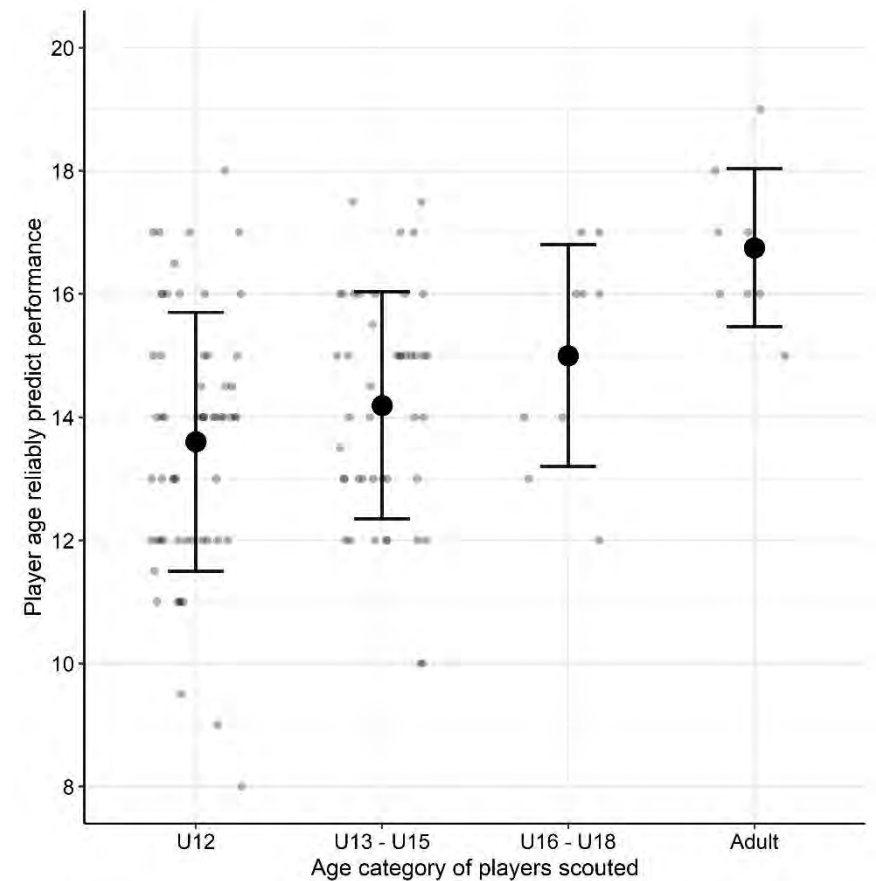
# Scout survey

- Talent scouts in soccer (n = 125)
- 1. At what age of the player do they perceive they can predict performance?



# Scout survey

1. Ideal age of predicting performance does not correspond to practice





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# Scout survey

- Talent scouts in soccer (n = 125)
  1. At what age of the player do they perceive they can predict performance?
  2. What factors or variables do scouts take into account?



# Scout survey

1. Ideal age of predicting performance does not correspond to practice
2. Technical characteristics most important for predicting future performance. However, very little detail into *which* technical characteristics

Table 1. Rank of future soccer performance, in terms of total frequency (R) and the number of times five (1st).

Attribute	R	1st
Technical skills or technique with the ball*	62 (50%)	14 (27%)
Ball control	25 (20%)	6 (12%)
(Skills related to) dribbling*	11 (9%)	4 (8%)
(Skills related to) defending*	9 (8%)	3 (6%)
Pass movement or passing*	9 (8%)	1 (2%)
First touch	6 (5%)	0 (0%)
(Skills and abilities related to) attacking*	5 (4%)	1 (2%)
Shooting or shot technique	5 (4%)	0 (0%)
Team spirit†	5 (4%)	1 (2%)
Dribbling	2 (2%)	0 (0%)
Assessing pressure	1 (1%)	0 (0%)
Scoring	1 (1%)	0 (0%)
Scoring up offensively	1 (1%)	0 (0%)
Disrupting the opponent's build up	1 (1%)	1 (2%)
Preventing goal-scoring opportunities	1 (1%)	0 (0%)
Scoring goals	1 (1%)	0 (0%)
Performance category total	143 (24%)	46 (27%)



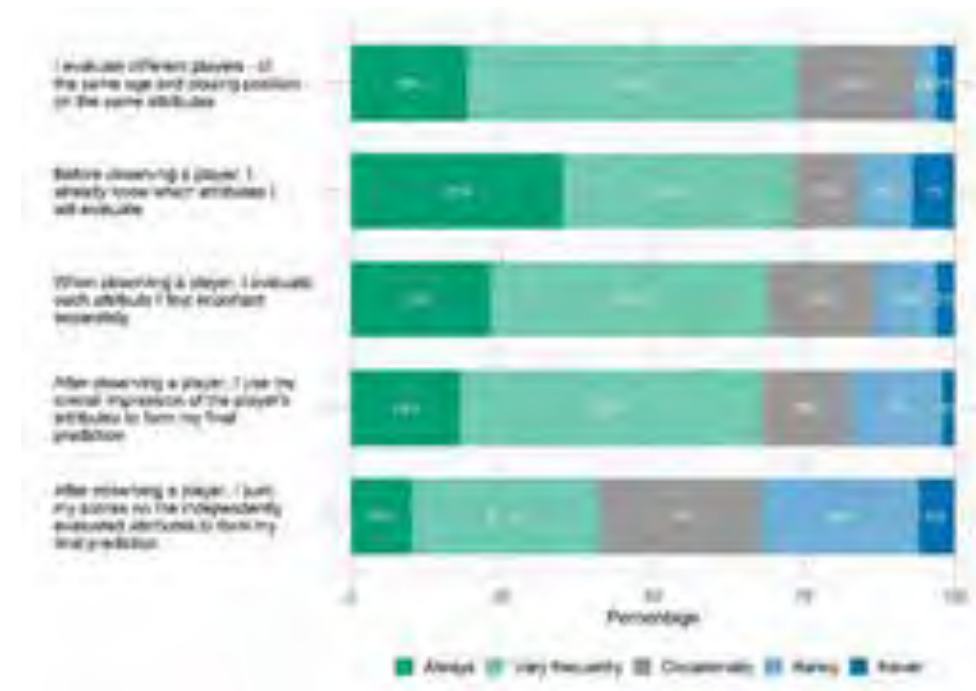
# Scout survey

- Talent scouts in soccer (n = 125)
  1. At what age of the player do they perceive they can predict performance?
  2. What factors or variables do scouts take into account?
  3. How do scouts approach talent identification process, in terms of structure and combination of information?



# Scout survey

1. Ideal age of predicting performance does not correspond to practice
2. Technical characteristics most important for predicting future performance. However, very little detail into *which* technical characteristics
3. Scouts say they are very structured, systematic. However, final assessment based on overall impression





## Methodological Issues in Soccer Talent Identification Research

Tom L. G. Bergkamp<sup>1</sup> | A. Susan M. Niessen<sup>1</sup> | Ruud J. R. den Hartigh<sup>1</sup> | Wouter G. P. Frencken<sup>1,2</sup> | Rob B. Meijer<sup>1</sup>

### Performance predictors



#### The validity of small-sided games in predicting 11-vs-11 soccer game performance

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Predicting soccer performance based on SSGs, using **'top-down'** performance measures

### Information collection and combination



#### How soccer scouts identify talented players

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# Talent identification research

- Hardly any research on important practitioners: coaches and scouts
- Survey → Perceptions soccer scouts on talent identification process
- Reliability and predictive validity of soccer scouts (and coaches ) assessments



# Holistic vs. mechanical combination

- Methods differ in the way information is weighed and combined
- Holistic judgment sensitive to biases, low reliability

Holistic combination

Versus

Mechanical combination

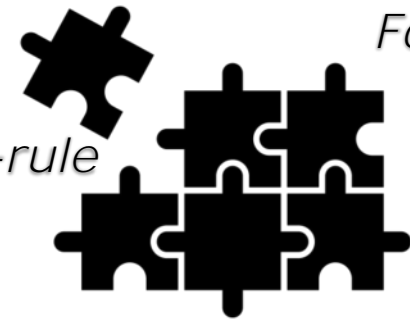
*Gut feeling*



*Intuition*

*Experience*

*Decision-rule*



*Formula*

*Algorithm*

# Pitfalls of holistic combination

**Man Utd missed out on Matthijs de Ligt transfer after they were told he would be too FAT**

Dutch scout Marcel Bout, who was a former United manager's scout, told United that De Ligt was too fat. But Bout told United that De Ligt was too fat. Holland International would...



**The Suns Actually Passed on Kawhi Leonard Because He Was Sweating During Interview**

By Jason Ford | Oct 24, 2019





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# Experiment

- Within-subjects
- $N = 95$
- Unstructured and structured condition
- Assess performance soccer player based on video
- Outcome measures
  - Unstructured-holistic assessment (unstr. cond.)
  - Structured-mechanical assessment (str. cond.)
  - Structured-holistic assessment (str. cond.)
- $H_1$ : structured-mechanical most reliable
- $H_2$ : structured-mechanical highest pred. validity



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Op basis van je beoordeling van de 8 spelers, hoe zou je de globale voetbalwaaltesen van deze speler beoordelen? Geef je beoordeling door een spoor te geven op een schaal van 1 tot 7, waarbij 1 = zeer slecht en 7 = uitstekend, met 4 = matig.

	Zeer slecht			Matig		Uitstekend	
	1	2	3	4	5	6	7
Speler 1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Zeer slecht			Matig		Uitstekend	
	1	2	3	4	5	6	7
Speler 2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

#26 Arthur Masuaku




Geboortedatum: 7 nov. 1993 (27)  
 Geboorteland:  Côte d'Ivoire  
 Nationaliteit:  Democratische Republiek Congo

Lengte: 1,79 m  
 Positie: Linksvleugelverdediger

Voornamelijk in Congo  
 Internationaal: 17

METR VIDEO'S  
 12:44 / 34:44



**West Ham United**  
 Premier League  
 Niveau: Hoogste divisie  
 In het bezit sinds: 8 aug. 2016  
 Uitsluit tot: 30 jun. 2024

**7,00 mln. €**  
 Laatste waardeering: Jan 2022



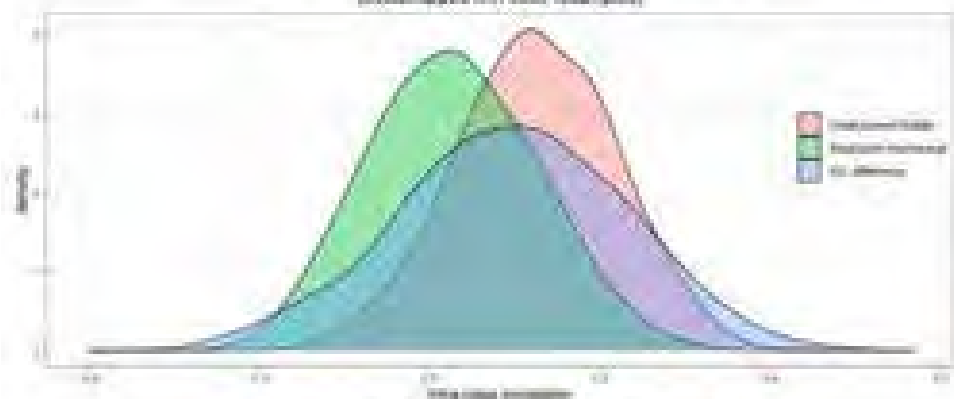
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# Results

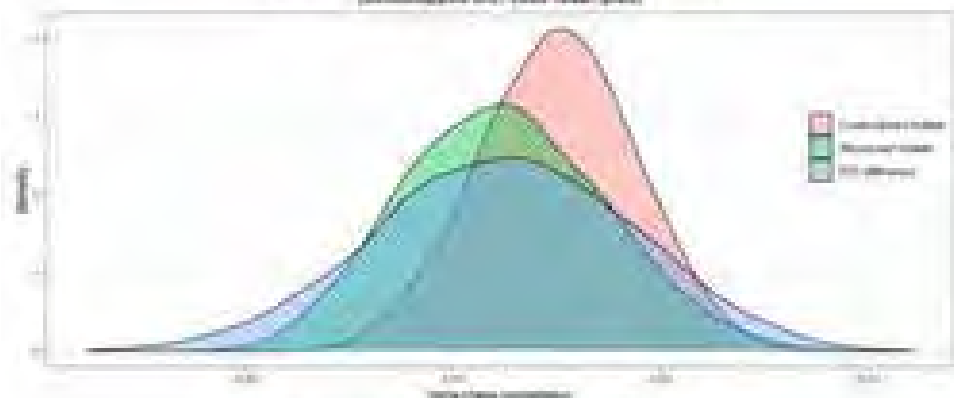
- Inter-rater reliability (ICC)



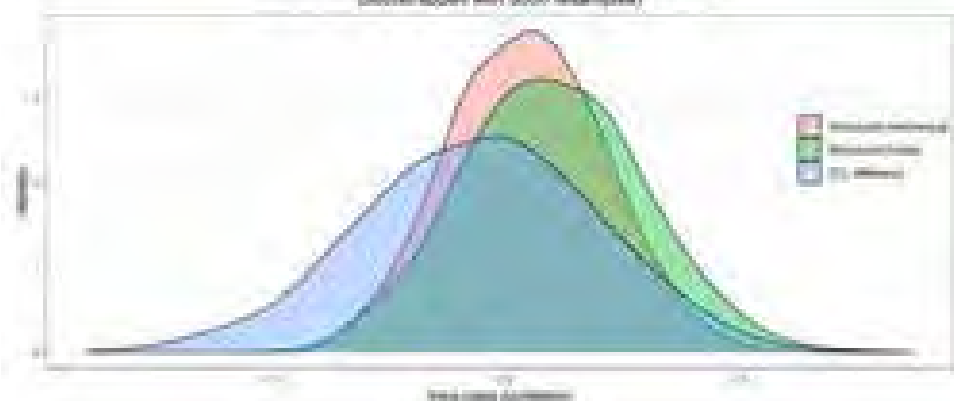
Unstructured factor vs. structural mechanical ICC estimates  
(bootstrapped with 5000 resamples)



Unstructured factor vs. structural factor ICC estimates  
(bootstrapped with 5000 resamples)



Structural mechanical vs. Unstructured factor ICC estimates  
(bootstrapped with 5000 resamples)





# Results

- Inter-rater reliability (ICC)
  - No substantial differences between ratings overall reliability very low
  - Unstructured-holistic > structured-mechanical;  $H_1$  not supported
- Predictive validity (criterion = TM value)

<b>Rating</b>	<b><i>r</i></b>	<b>95% CI</b>	<b><i>p</i></b>
Unstructured-holistic	0.33	0.14; 0.50	0.001
Structured-mechanical	0.23	0.03; 0.41	0.023
Structured-holistic	0.14	-0.06; 0.33	0.17

# Results

- Inter-rater reliability (ICC)
  - No substantial differences between ratings reliability overall very low
  - Unstructured-holistic < structured-mechanical;  $H_1$  not supported
- Predictive validity (criterion = TM value)
  - Small-to-moderate
  - OK, given reliabilities
  - Unstructured-holistic < structured-mechanical;  $H_2$  not supported



# Conclusion

- Contrary to expectations, structured-mechanical or structured-holistic ratings were not more reliable and valid than unstructured-holistic ratings
- Difficult to conclude why
  - Participants from different organisations
  - Too many performance indicators? Or not structured enough?



## Methodological Issues in Soccer Talent Identification Research

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Reliability and predictive validity of soccer scouts and coaches assessments



# Holistic vs. mechanical judgment at FCG

	Gloobaal				Voetballer		Atleet	Topsporter
Naam speler	1	2	3	4 - 5	Aanvallen	Ver		

1	2	3
AV klein (bv FC Assen)	AV groot (bv Be Quick 1887)	BVO Klein (bv Excelsior)





# Holistic vs. mechanical judgment at FCG

	Gloobaal				Voetballer		Atleet	Topsporter
Naam speler	1	2	3	4-5	Aanvallen	Verdedigen	Bewegen	Strijdvaardig
	<b>2</b>				<b>2</b>	<b>3</b>	<b>4</b>	<b>V</b>

Ik zag bij deze speler: ... Zijn techniek is goed, zonder bal is het alleen vooral passen roepen en stil zijn. Ik vind dat hij wel makkelijk loopt. Hij wil wel graag winnen en doet hier veel voor

1	2	3	4	5
AV klein (bv FC Assen)	AV groot (bv Be Quick 1887)	BVO Klein (bv Excelsior)	BVO midden (FC Groningen)	BVO groot (bv Ajax)





# Holistic vs. mechanical judgment at FCG

$$\text{Score} = ((2 + 3 + 4) / 3) + .5 = 3.5$$

	Globaal				Voetballer		Atleet	Topsporter
Naam speler	1	2	3	4-5	Aanvallen	Verdedigen	Bewegen	Strijdvaardig
	<b>2</b>				<b>2</b>	<b>3</b>	<b>4</b>	<b>V</b>

Ik zag bij deze speler: ... Zijn techniek is goed, zonder bal is het alleen vooral passen roepen en stil zijn. Ik vind dat hij wel makkelijk loopt. Hij wil wel graag winnen en doet hier veel voor

1	2	3	4	5
AV klein (bv FC Assen)	AV groot (bv Be Quick 1887)	BVO Klein (bv Excelsior)	BVO midden (FC Groningen)	BVO groot (bv Ajax)



## Structured assessment at FCG

- Q: What is the inter-rater reliability of the coaches in assessing players at FCG?

	<b>Global</b>	<b>Combination</b>
All coaches (incl. assistant)	0.18	0.25

- Overall low reliability, but data combination improves point estimate.
- Can we do better?



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Reliability and predictive validity of soccer scouts and coaches assessments

(On)terecht buitenspel gezet. Sportprestaties voorspellen door systematische en gestructureerde beoordelingen

# Soccer as a unique selection context

- Typically low base rate (when criterion is operationalized as prof. senior. success)
- Difficult to operationalize soccer performance
  - No norm for successful performance.
  - (Structured) coach/scout ratings: low reliability
  - Selection decision inherent in performance level. More importantly, assumption that selection contributes to development of talent
- High or low validity environment? (Kahneman and Klein, 2009)
  - Typically no direct feedback



# Conclusion

- Thesis: novel look on these issues through lens of selection psychology
- Selection psychology fits well with recent insights for understanding soccer performance (i.e. ecological dynamics)
- Diverse set of studies that replicate different soccer selection contexts
  - Direct applicability in soccer?
  - Ultimately contribute to more robust research practices



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# Reflecting on my PhD research

- New adventures 😊

