

# Reliability of a Test Battery for Evidence-Based Classification in Cerebral Palsy Football



  
**VISTA**  
CONFERENCE



centro de  
investigación del  
deporte

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INTERNATIONAL FEDERATION OF  
**CP FOOTBALL**

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Girona, 7 – 10 October 2015



# Introduction

## EVIDENCE-BASED CLASSIFICATION IN CP-FOOTBALL



Qualitative descriptions → Individual interpretations  
(Bicici, Tweedy & Vanlandewijck, 2012)



### IMPAIRMENT

Ataxia  
Hypertonia  
Athetosis



FT5



FT6

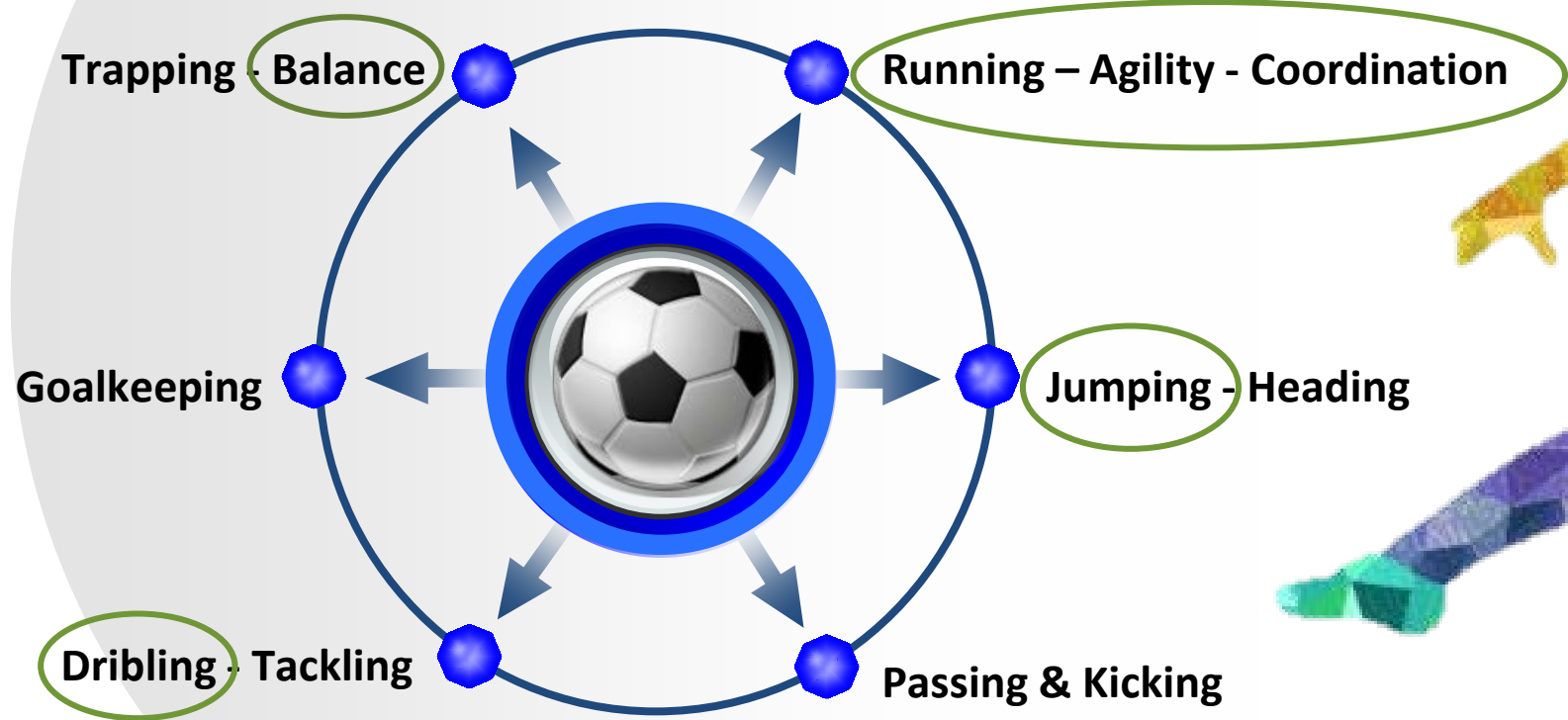


FT7

FT8





# Introduction




**Reliability**  
**Between-groups differences**



# Methods: Participants




53 to 129 Football Players with  
hyperthonia, ataxia or athetosis  
(CPFP)



Age:  $26.27 \pm 7.09$  yr  
Height:  $175.57 \pm 7.08$  cm  
Weight:  $70.08 \pm 9.01$  kg  
Experience:  $11.42 \pm 7.08$  yr

12 to 36 Non-Impaired Football  
Players  
(NIFP)



Age:  $19.44 \pm 3.29$  yr  
Height:  $178.03 \pm 5.86$  cm  
Weight:  $72.59 \pm 7.81$  kg  
Experience:  $9.85 \pm 5.17$  yr



**COORDINATION (N=6)**

**SPRINT (N=2)**

**AGILITY (N=4)**

**POWER (N=5)**

**BALANCE (N=6)**



# Methods: Test Battery

## COORDINATION TEST

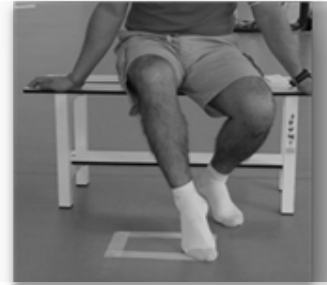
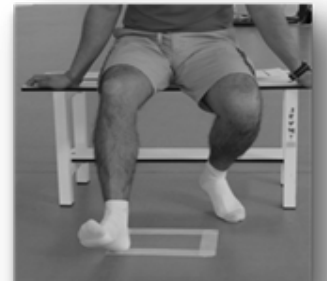
### SPLIT JUMP <sup>1</sup>



### RUNNING IN PLACE <sup>1</sup>



### HEEL-TOE PLACEMENT <sup>2</sup>



1. Beckman, E.M., & Tweedy, S.M. (2009)

2. Bicici, S., Tweedy, S., & Vanlandewijck, Y. (2012)



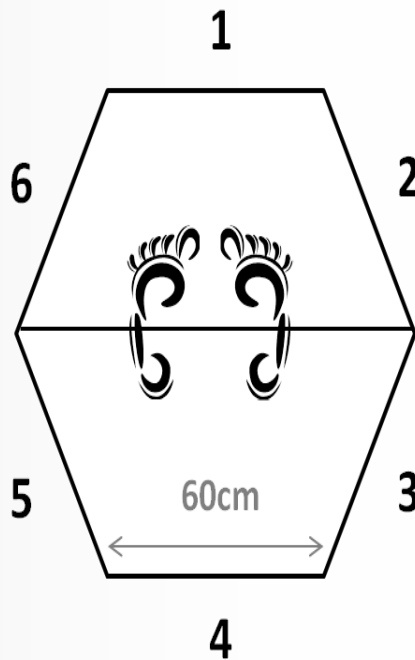
# Methods: Test Battery

## COORDINATION TEST

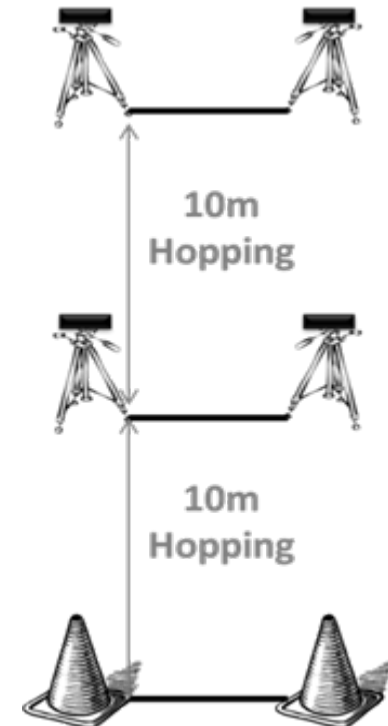
### SIDE STEPPING



### HEXAGON <sup>2</sup>



### 10M SKIP <sup>1</sup>



1. Beckman, E.M., & Tweedy, S.M. (2009)

2. Beekhuizen, K.S., Davis, M.D., Kolber, M.J., & Cheng, M.S.S. (2009)

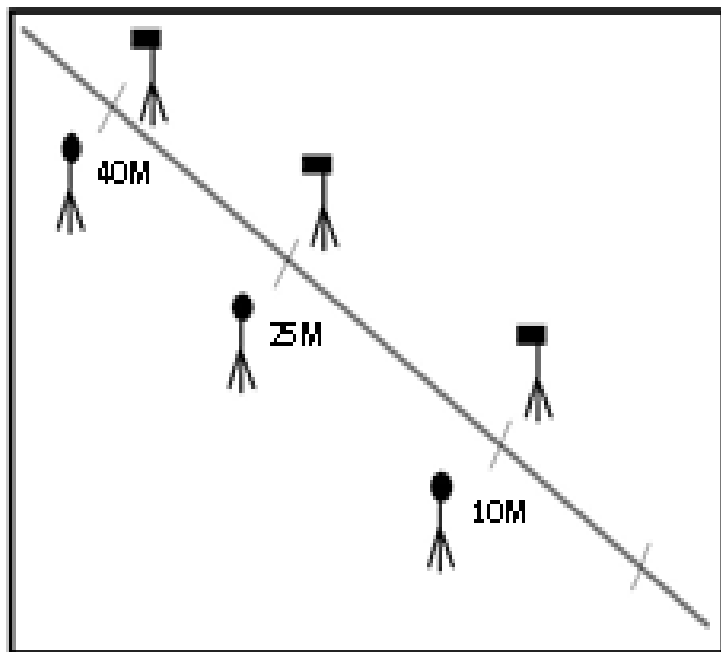


# Methods: Test Battery

## SPRINT TEST

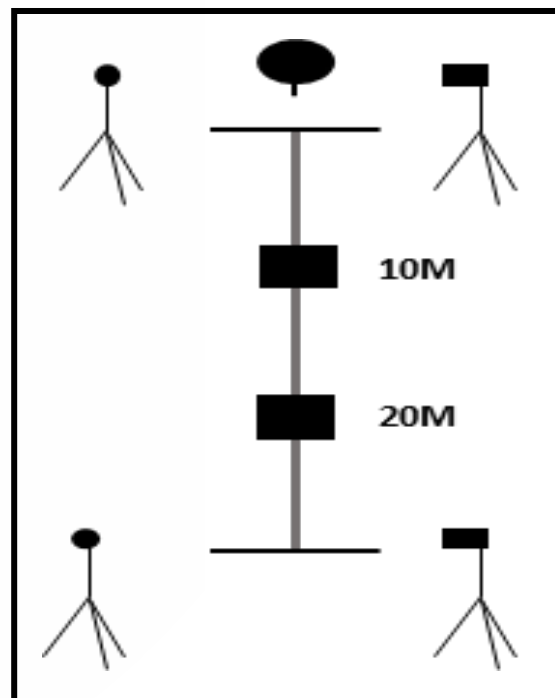
40M

40M WITH BALL <sup>1</sup>



STOP & GO

STOP & GO WITH BALL <sup>2</sup>



1. Beckman, E.M., & Tweedy, S.M. (2009)

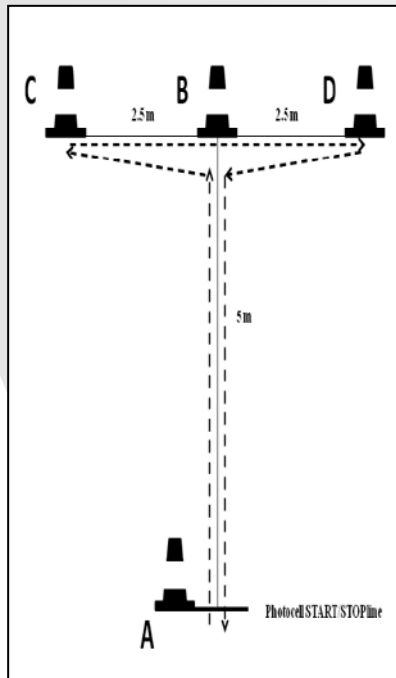
2. Reina, R., Vázquez, E., Hernández, O., & Rodríguez, R. (2012)



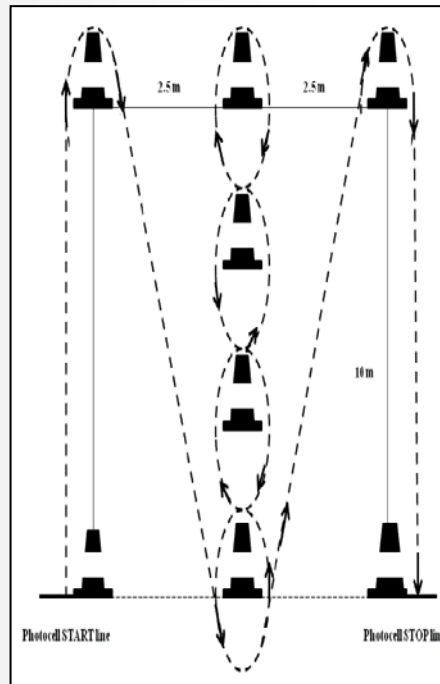
# Methods: Test Battery

## AGILITY TEST

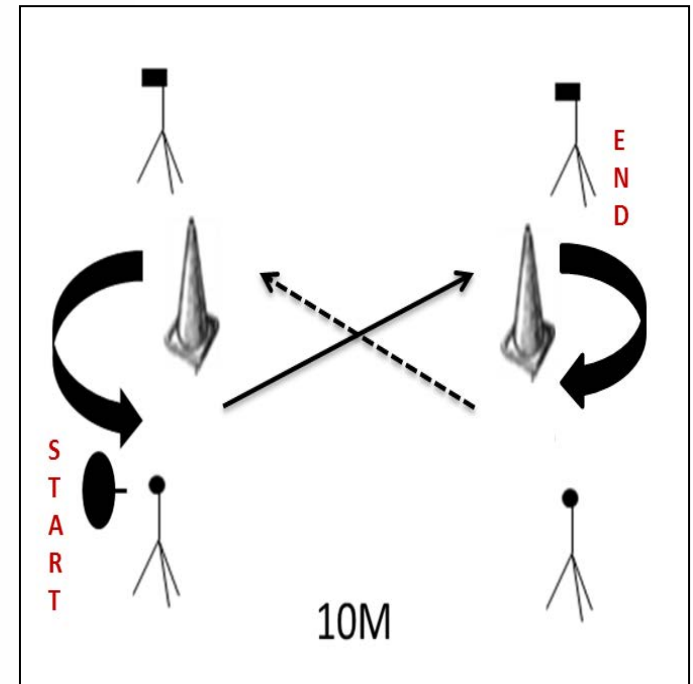
### MAT<sup>1</sup>



### ILLINOIS ILLINOIS WITH BALL<sup>2</sup>



### TURNING & DRIBBLING



1. Yanci, J., Los Arcos, A., Reina, R., Gil, E., & Grande, I. (2014)

2. Váczi, M., Tollár, J., Meszler, B., Juhász, I., & Karsai, I. (2013)





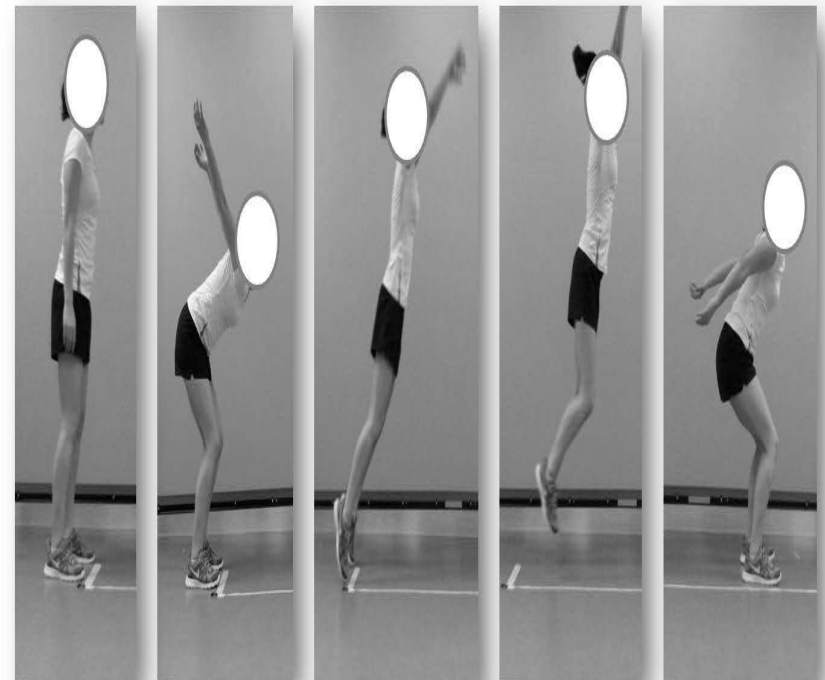
# Methods: Test Battery

## POWER TEST

COUNTER MOVEMENT JUMP (CMJ) <sup>2</sup>



STANDING BROAD JUMP (SBJ) <sup>1</sup>



1. Beckman, E.M., & Tweedy, S.M. (2009)

2. Cámara, J., Grande, I., Mejuto, G., Los Arcos, A., & Yanci, J. (2013)



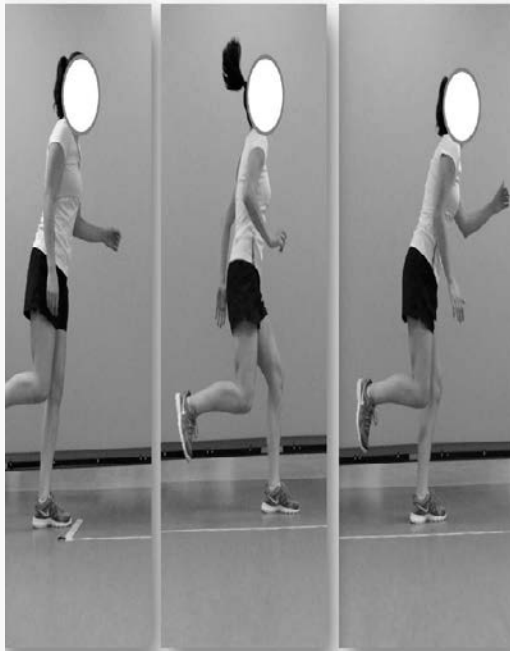
# Methods: Test Battery

## POWER TEST

### 4 BOUNDS <sup>1</sup>



### TRIPLE HOP (R ; L) <sup>2</sup>



### DYNAMOMETRY (FORCE PEAK) <sup>3</sup>



1. Beckman, E.M., & Tweedy, S.M. (2009)

2. Munro, A.G., & Herrington, L.C. (2011)

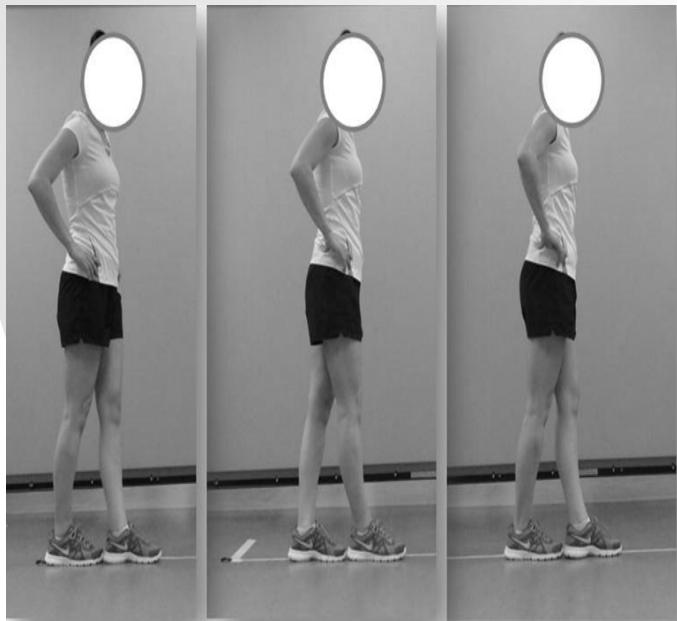
3. Reina, R., Moya, M., Sarabia, J.M., & Sabido, R. (2013)



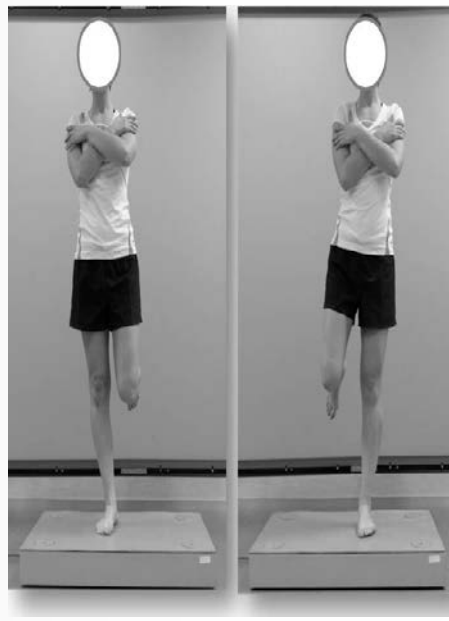
# Methods: Test Battery

## BALANCE TEST

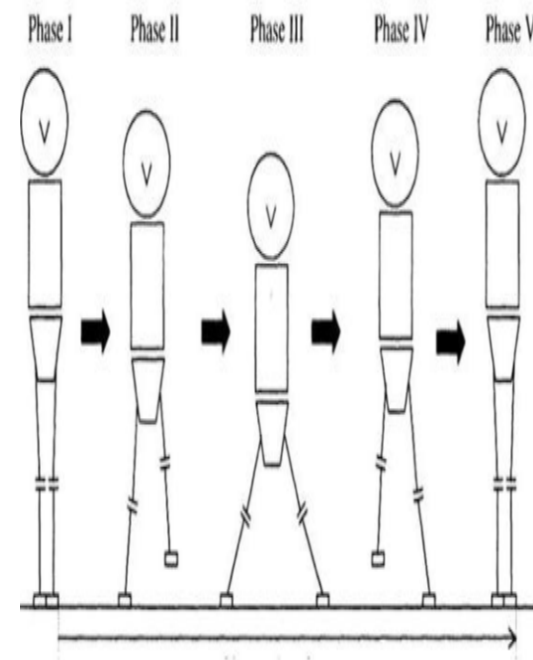
**TANDEM WALK  
(10st ; 5m)<sup>1</sup>**



**ONE LEG STANCE  
(OLS)<sup>3</sup>**



**SIDE – STEP (R ; L)<sup>2</sup>**



1. Bicici, S., Tweedy, S., & Vanlandewijck, Y. (2012)

2. Fujisawa, H., & Takeda, R. (2006)

3. Springer, B.A., Marin, R., Cyhan, T., Roberts, H., & Gill, N.W. (2007)



# Methods: Data Analysis

## *Reliability measures*

SEM

Standard Error Measurement

ICC

Intra-Class Correlation

## *Between-groups differences*

One way  
ANOVA

Both groups comparision

% $\Delta$

$$\% \Delta = \frac{\text{CPFP} - \text{NIFP}}{\text{NIFP}} \times 100$$



# Results: Coordination test

Table 1. Reliability and between-groups differences for coordination test

TEST	GROUP	N	SEM	ICC	P - valor	%Δ
HEEL-TOE (R – L)	CPFP	129*	11.8 - 8.2	0.86 - 0.92	< .001	56.26 – 53.14
	NIFP	37	5.6 - 8.9	0.9 - 0.82		
SPLIT JUMP	CPFP	108	10.4	0.88	< .001	71.17
	NIFP	36	4.4	0.92		
RUNNING IN PLACE	CPFP	102	7.3	0.84	< .001	17.36
	NIFP	33	6.9	0.71		
SIDE STEPPING	CPFP	112	9.1	0.89	< .001	50.88
	NIFP	35	5.6	0.87		
HEXAGON	CPFP	122	10.9	0.89	< .001	59.40
	NIFP	36	7.4	0.78		
SKIP 10M	CPFP	71	11.4	0.82	.005	19.62
	NIFP	21	7.7	0.89		



# Results: Sprint test

Table 2. Reliability and between-groups differences for sprint test

TEST	GROUP	N	SEM	ICC	P - valor	%Δ
40m	CPFP	71	3.9	0.85	< .001	12.74
	NIFP	15	1.4	0.94		
40m_BALL	CPFP	63	6.5	0.73	< .001	22.75
	NIFP	14	3.4	0.78		
SG	CPFP	83	6.2	0.53	.001	4.82
	NIFP	-	-	-		
SG_BALL	CPFP	78	9.8	0.48	< .001	20.32
	NIFP	-	-	-		



# Results: Agility test

Table 3. Reliability and between-groups differences for agility test

TEST	GROUP	N	SEM	ICC	P - valor	%Δ
MAT	CPFP	88	5.8	0.82	< .001	31.72
	NIFP	35	3	0.76		
ILLINOIS	CPFP	89	2.5	0.95	< .001	17.91
	NIFP	33	1.9	0.84		
ILLINOIS WITH BALL	CPFP	83	6.3	0.84	< .001	23.80
	NIFP	24	3.7	0.28		
TURNING & DRIBBLING	CPFP	76	10	0.57	< .001	20.24
	NIFP	-	-	-		



# Results: Power test

Table 4. Reliability and between-groups differences for power test

TEST	GROUP	N	SEM	ICC	<i>P value</i>	%Δ
SBJ	CPFP	113	5.4	0.93	< .001	29.23
	NIFP	36	3.2	0.78		
CMJ (h)	CPFP	107	9.2	0.88	< .001	32.43
	NIFP	10	10.4	0.81		
4 BOUNDS	CPFP	85	3.8	0.96	< .001	32.10
	NIFP	35	2.9	0.88		
TRIPLE HOP (R – L)	CPFP	82*	6.8 - 6.7	0.97 - 0.97	< .001	40.81 - 34.84
	NIFP	34	3.8 - 3.7	0.82 - 0.82		
FORCE PEAK (R – L)	CPFP	114*	11.9 - 11.3	0.84 - 0.87	> .05	11.36 - 12.36
	NIFP	34	14.5 - 15	0.86 - 0.86		





# Results: Balance Test

Table 5. Reliability and between-groups differences for balance test

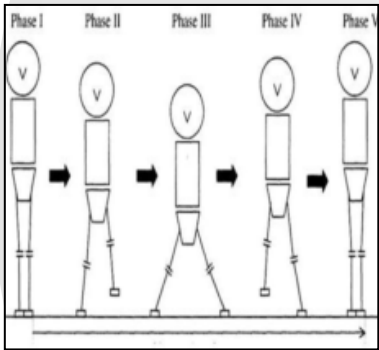
TEST	GROUP	N	SEM	ICC	<i>P value</i>	%Δ
TANDEM WALK 10st	CPFP	122	16.7	0.85	< .001	123
	NIFP	35	3.9	0.94		
TANDEM WALK 5m	CPFP	124	10.5	0.95	< .001	115.9
	NIFP	33	7.4	0.81		
SIDE-STEP (R – L)	CPFP	86*	4.3 - 4.4	0.91 - 0.92	< .001	32.96 – 31.9
	NIFP	25	2.9 - 2.8	0.85 - 0.88		
OLS (BVE) (R – L)	CPFP	129	39.2 - 38.9	0.84 - 0.80	≤ .001	88.9 - 100
	NIFP	23*	16.5 - 14.1	0.79 – 0.97		



# Conclusions



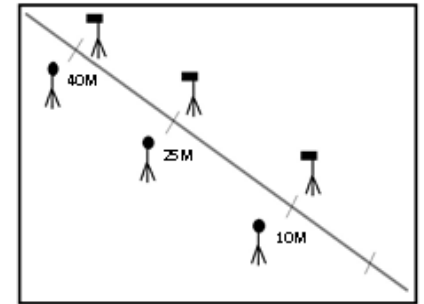
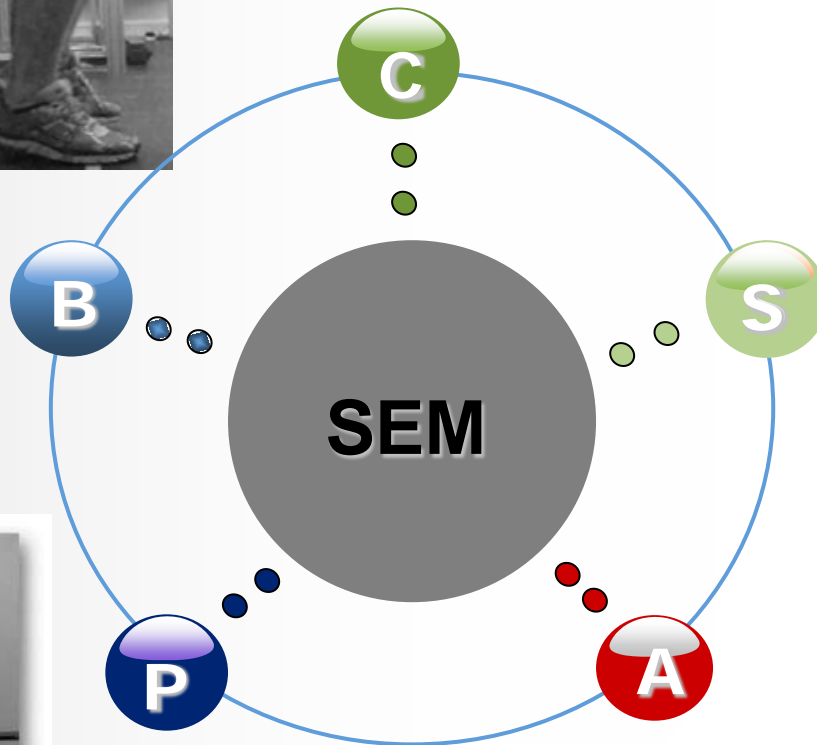
Running in Place



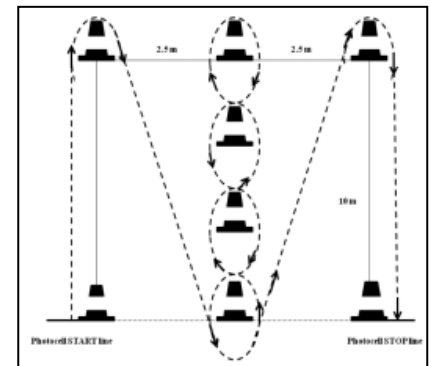
Side - Step



4 Bounds



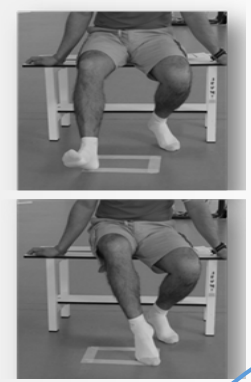
40m Sprint



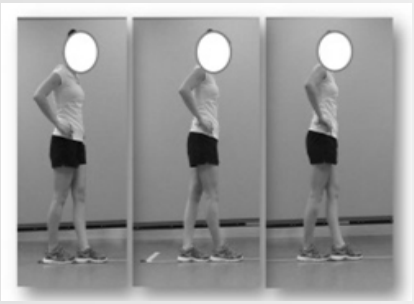
Illinois



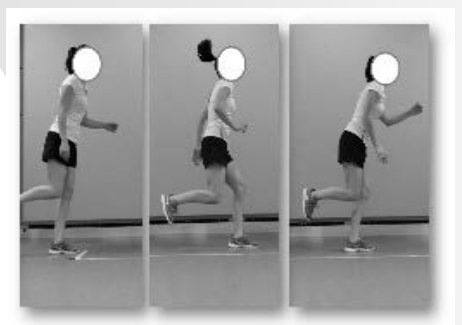
# Conclusions



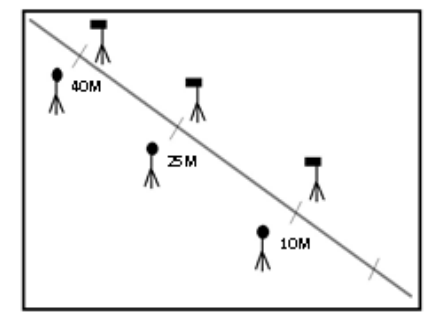
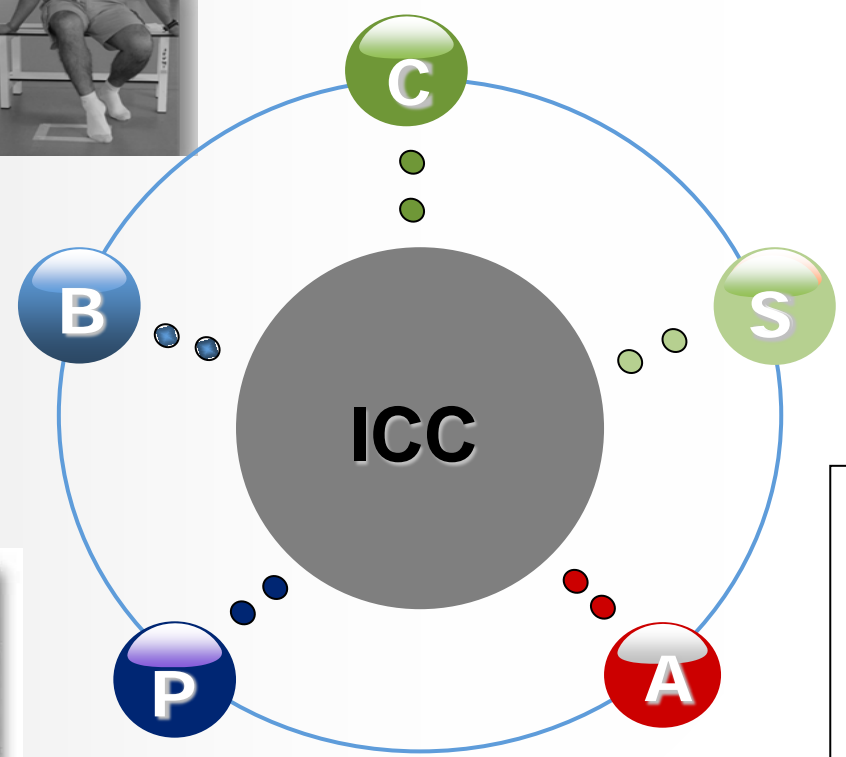
Heel - Toe



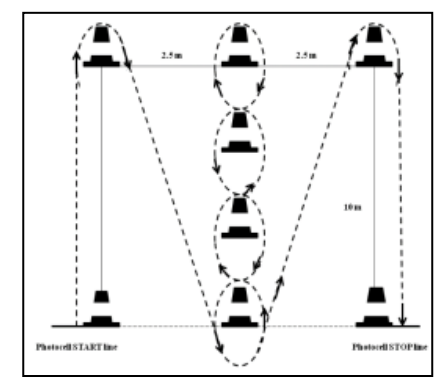
Tandem Walk  
(5m)



Triple hop



40m Sprint



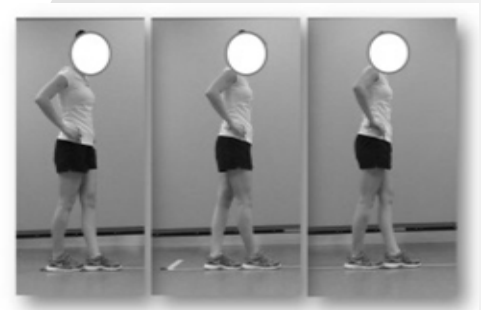
Illinois



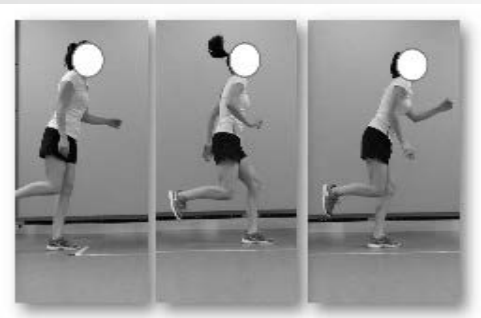
# Conclusions



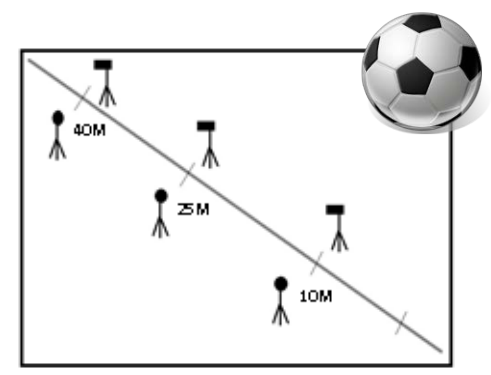
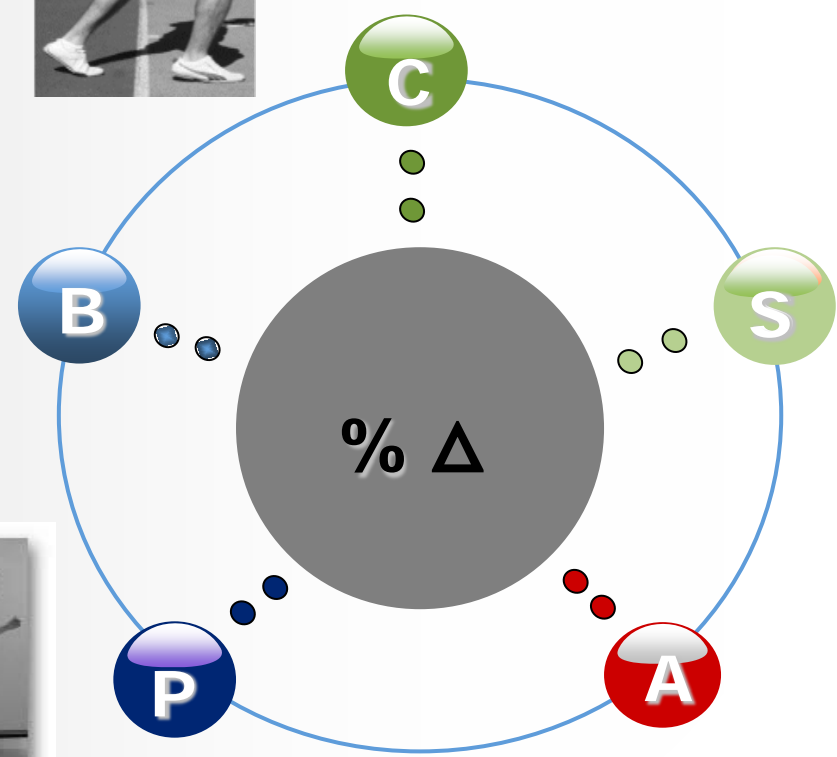
Split jump  
71%



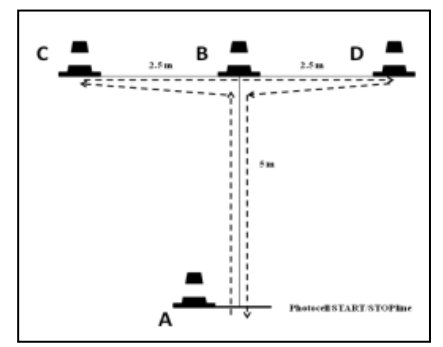
Tandem Walk  
(10st)  
123%



Triple hop



40m Sprint  
with ball

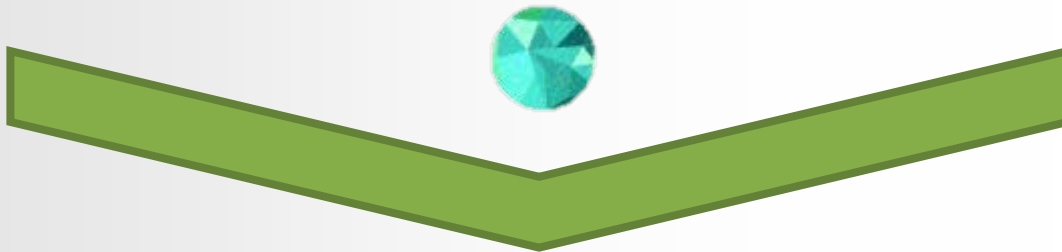


Mat



# Conclusions

The higher differences showed between groups in coordination and balance test allow us to remark the importance of this ability for these population.



**PROPOSED BATTERY TEST COULD HELP IN EVIDENCE-BASED CLASSIFICATION IN CP FOOTBALL**



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