

# Evaluating Coordination and Performance in Boccia Players: towards Evidence-Based Classification



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# Something about Boccia



Independent sport from CPISRA  
since 2013

What?



Eligible Physical Impairments:

**Ataxia    Hypertonia    Atethosis**  
**ROM   Imp. Strength Power   Limb Def.**

Whom?

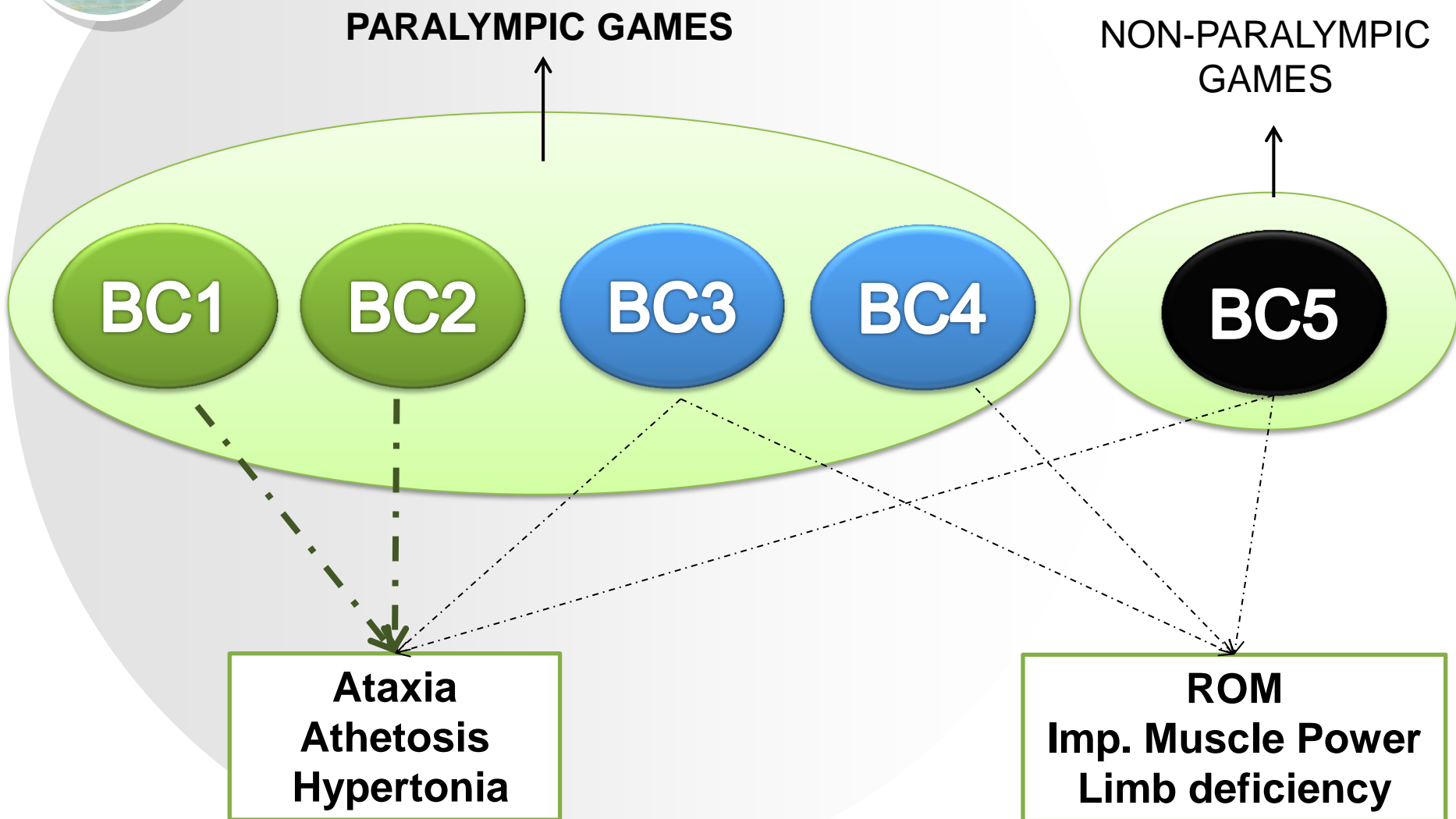


A throwing game of precision.  
Placing balls as closest to the target ball.

Game?



# Sport Classes in Boccia





# Key Factors in Boccia

**Grasping  
Ability**

**Movement  
Coordination**

**Range of  
Movement**

**Trunk Control**

**Strength**





# Methods: Participants

Boccia players	
Number	16
Age	28.6 ± 15.38

INCLUSION Criteria	EXCLUSION Criteria
Eligible 1 & 2 Boccia classes	Eligible for BC3 (ramp player)
≥1 year of regular competition. Participation at Spanish National level	Surgery or Botulin Toxin A injections in the last 6/12 months
-	Contraindications to participate in PA (*)



\* Thompson et al ( 2014)



# Coordination Tests I

## Gross Motor Dexterity

### Block & Box

Evaluation of hand function

- Thumb function
- Clamp function



Bbox

### Ball & Box

Evaluation of hand function

- Fingers/ hand function
- Grasping function



Bball

2 x trials of 60 s (2 min of resting period)



Goodman et al (1991); Arnould et al (2007); Plat et al. (2005)



Reina et al., (2013); García-Vaquero et al (2014)

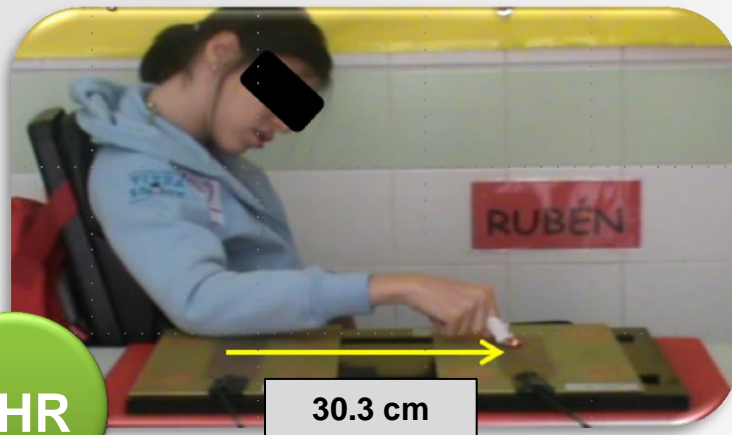




# Coordination Tests II

## Tapping tests

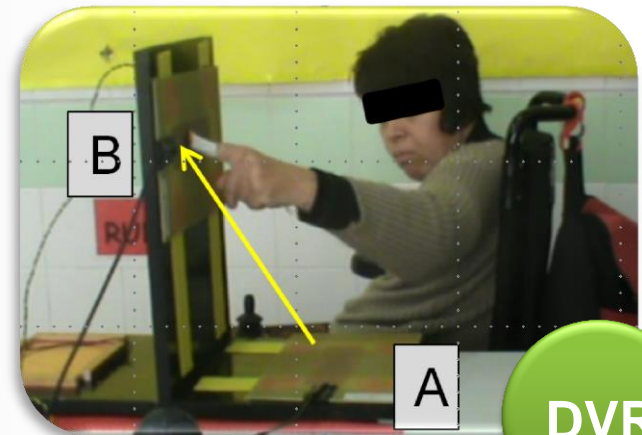
### Horizontal & Discrete



DHR

Throwing arm x 10 contacts x 2 trials

### Vertical & Discrete



DVR

Throwing arm x 10 contacts x 2 trials





# Coordination Tests II

## Tapping tests



*Vertical & Discrete with Ball*

*Vertical & Continuous with Ball*



DVB

CVB

Throwing arm x 1 Trial x 60 s







# Coordination Tests III

## Manual Dexterity

*Elbow flexed*



*Elbow extended*

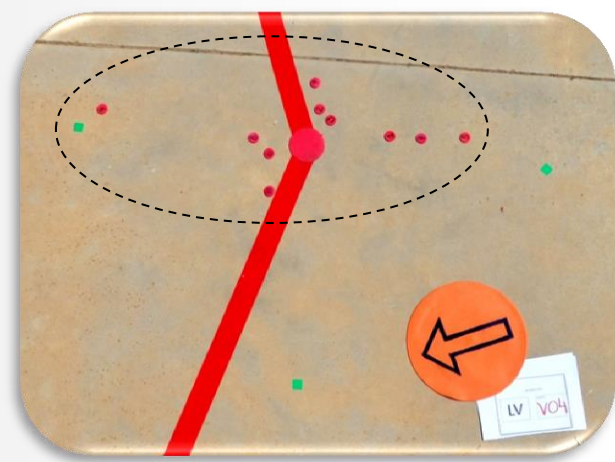
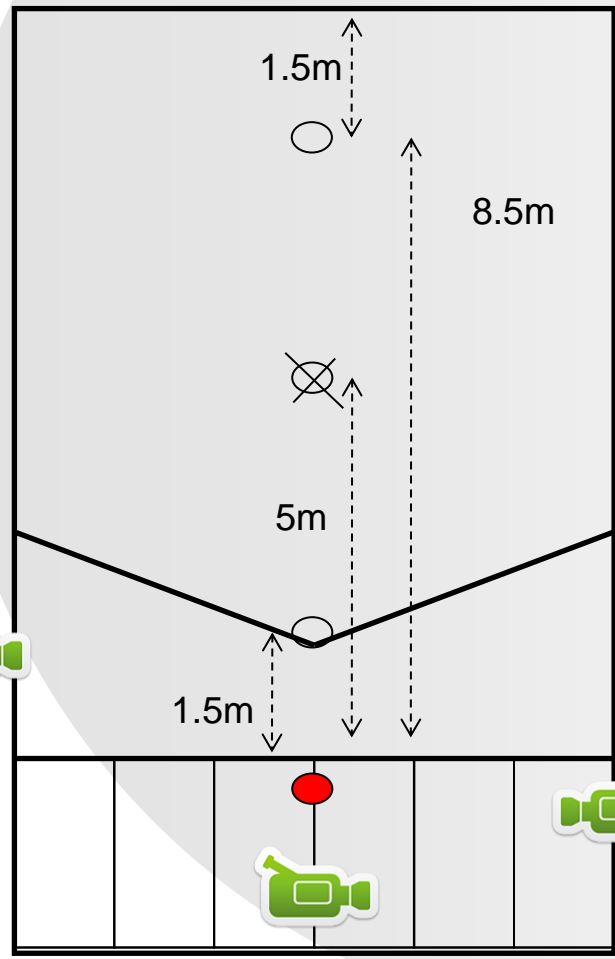


2 x trials x each position x 30 s (30 s of resting period)

Best trial was used for analysis



# Performance Test



**x 10 throws**






## Performance Variables

Constant Error	X axis: right v left Y axis: long v short
Absolute Error	X & Y axis
Radial Error	Dispersion from target



# Research Questions

-  Is there any relationship between Bbox, Bball and the a new continuous & vertical tapping test with ball?
-  Is there any relationship between continuous and discrete (tapping) coordination tests?
-  Does this battery of tests help us to measure activity limitation in an eligible players sample for athetosis, ataxia and hyperthonia?



# Conclusions

1. Good correlation between Bbox, Bball, finger tapping tests and CVB.
  - CVB might be a more specific test to measure activity limitation in Boccia players with ataxia, athetosis and hyperthonia.
  - The execution time for the CVB can be reduced to from 60 s to 20 s or 40 s.
2. TT looks to be the variable with higher weight on performance prediction in the coordination tests.
3. Performance only correlates with 2/3 continuous test used.
4. Correlations between Bbox and Bball and Absolute Error in Y axis, could be considered a performance parameter regarding force regulation.
5. In the future the number of tests to be used to measure coordination can be reduced

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