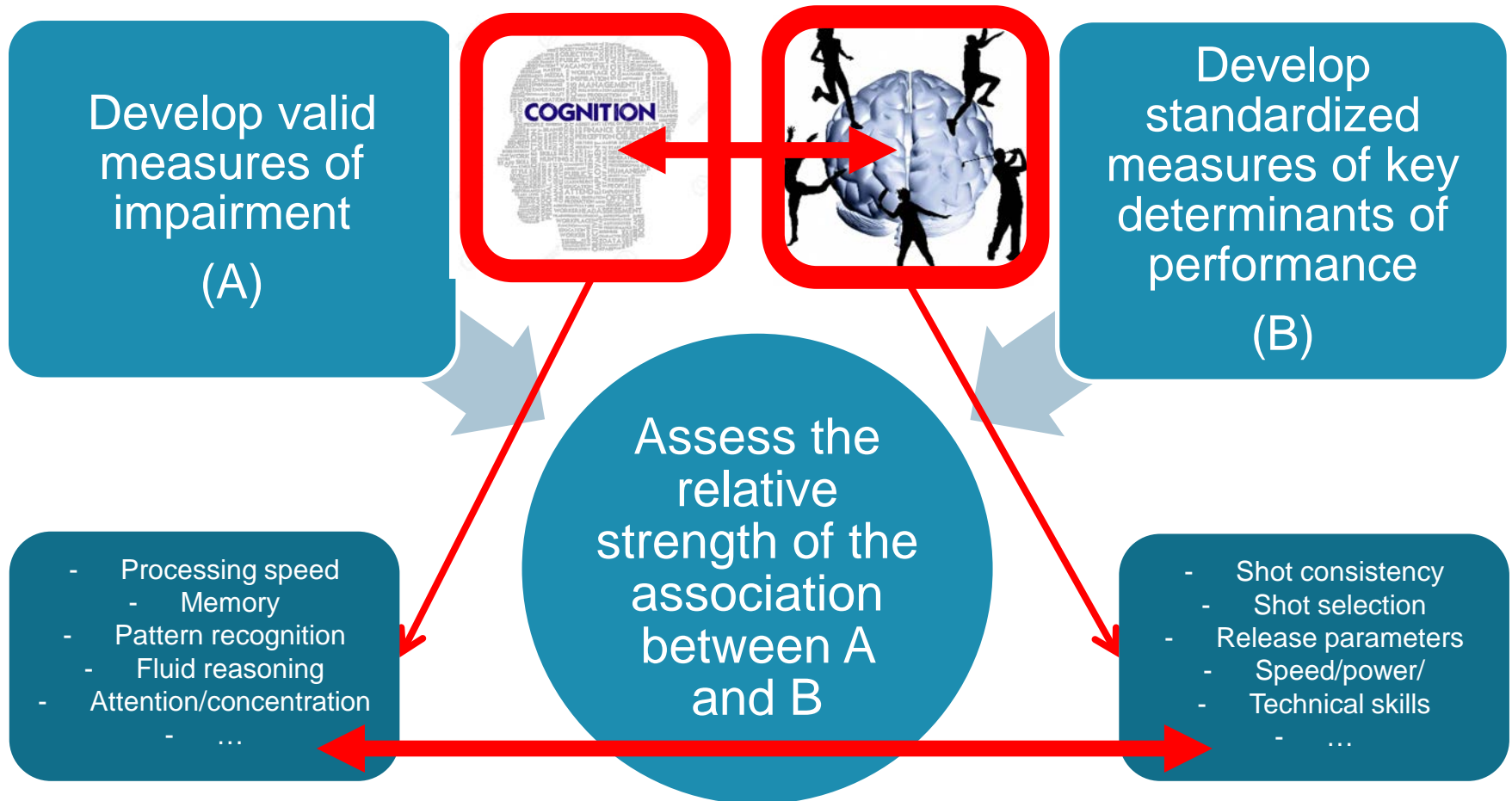


How the cognitive-motor dual-task paradigm can contribute to the development of **evidence-based classification** systems for athletes with intellectual impairments



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VISTA, Toronto, Sept 2017

# Evidence-based classification



# Impact of cognition on sport performance

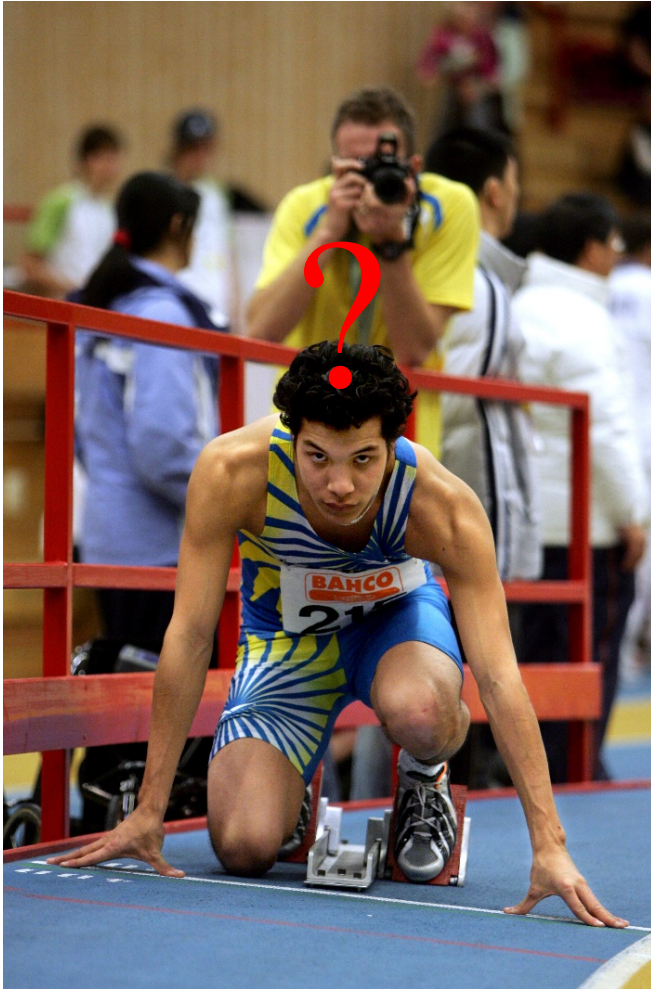


# Other II-sports on the Paralympic program

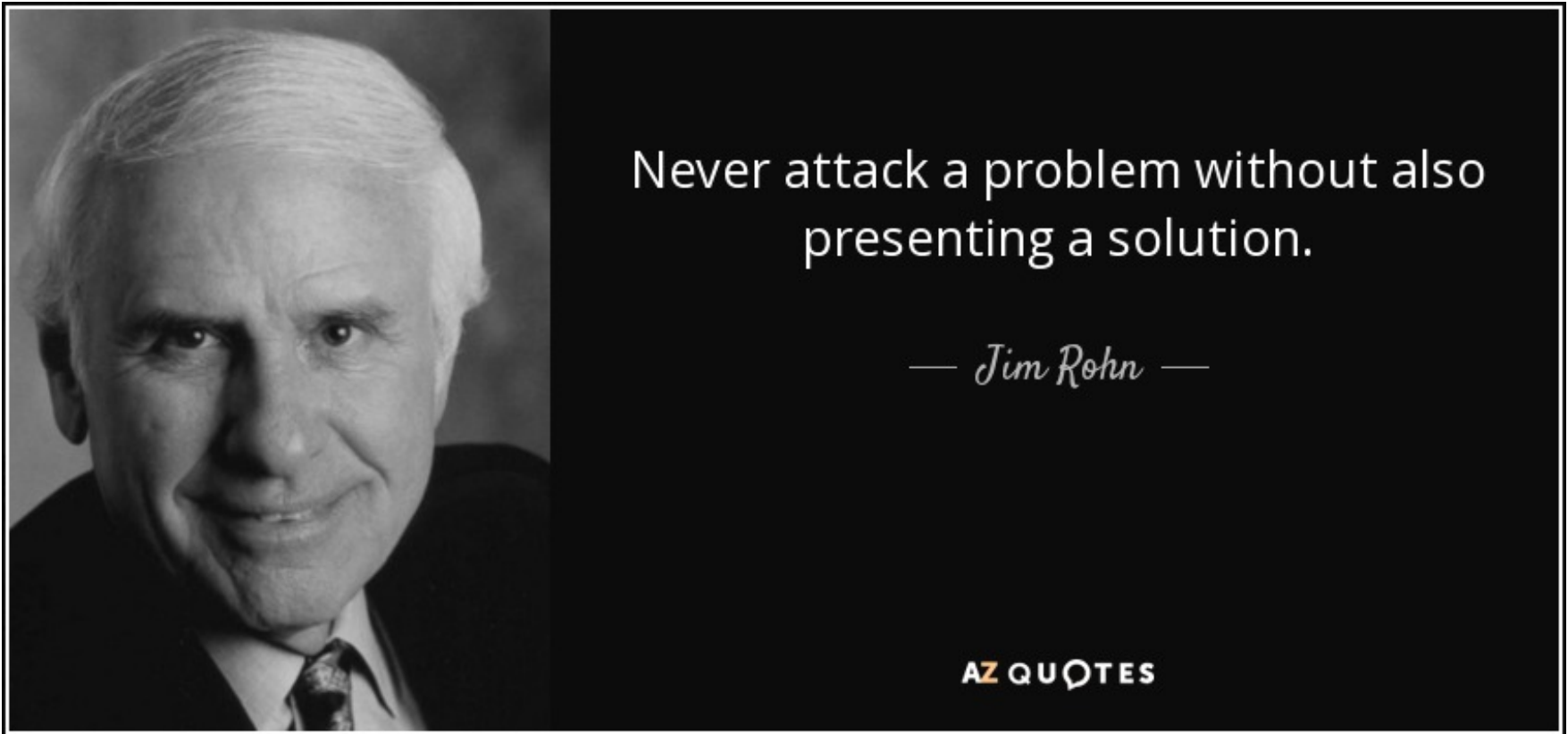




# Not included: 100m sprint



# Cognitive-motor dual-task paradigm



# Multitasking



***“The ability to do several things at the same time”***

*Source: Merriam-Webster’s Learner’s dictionary*

# Dual-tasking

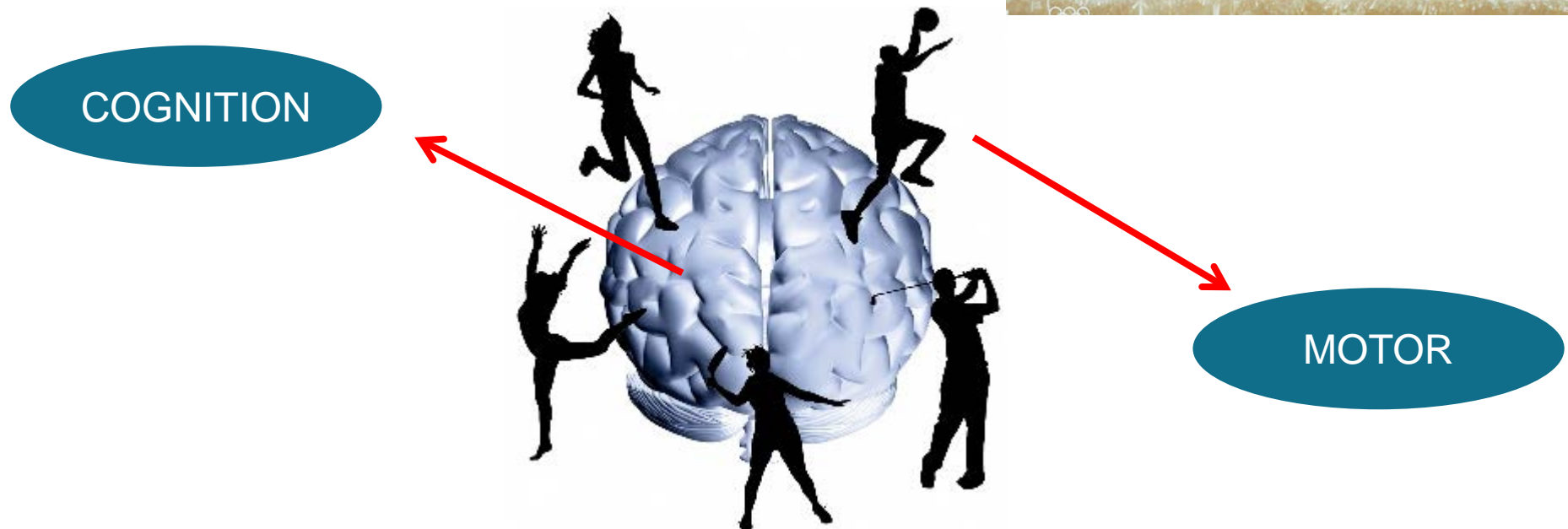


***“The simultaneous performance of two tasks with distinct goals”***

*McIsaac, Lamberg, & Muratori, 2015*



# Sport is a multitasking environment



ELITE ATHLETES ARE ABLE TO:

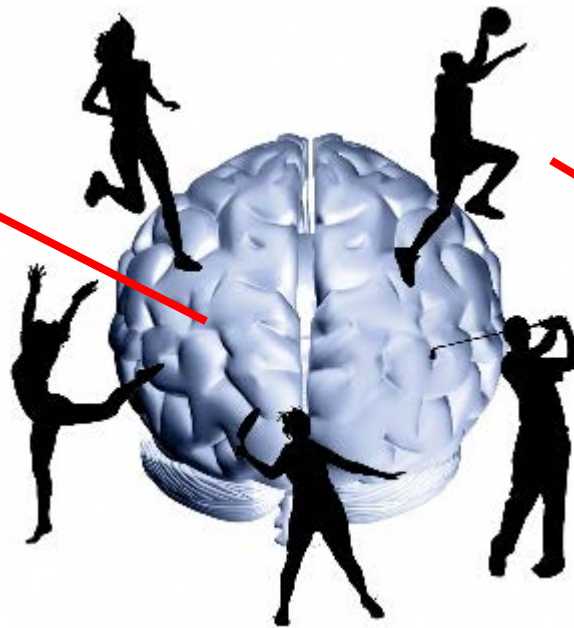
- ⇒ Successfully combine the motor and cognitive demands of the sport to optimize performance
- ⇒ If-athletes: limited resources available => DUAL-TASK COSTS!

# Method – pilot study

COGNITION



*Multiple object tracking*



*Single leg stance*

MOTOR

# Motor task - One leg stance eyes open



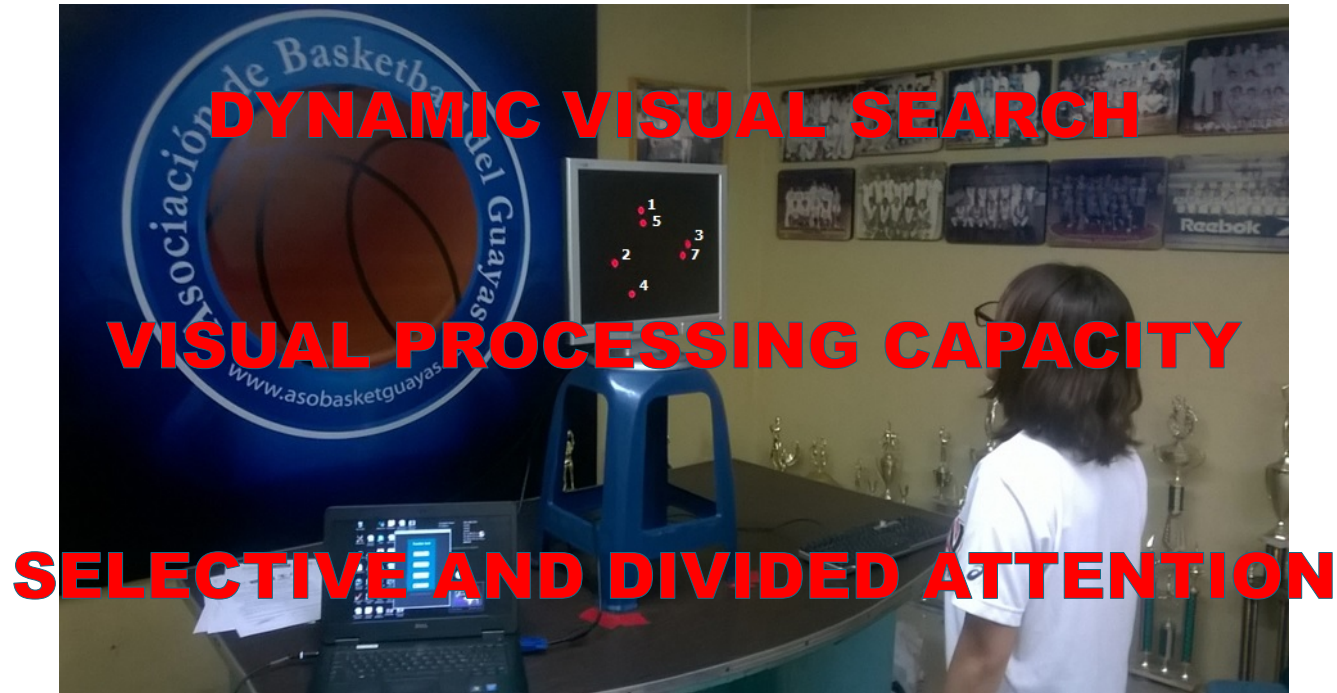
- Static balance
- On the balance beam
- 60 seconds (6 x 10 seconds)

# Cognitive task - Multiple object tracking





# Multiple Object Tracking (MOT)



- Tracking targets (1-4)
- Distractors (1-4)
- Velocity ( $2^{\circ}/\text{sec}$  –  $10^{\circ}/\text{sec}$ )
- 10 sec/trial, 15 trials, difficulty index  $\uparrow$

# Dual-task pilot study - sample

## II-athletes

- INAS Global Games (Ecuador)
- $n = 103$  (33 ♀, 70 ♂)
- $IQ = 61 \pm 9$
- $Age = 22 \pm 2.4$

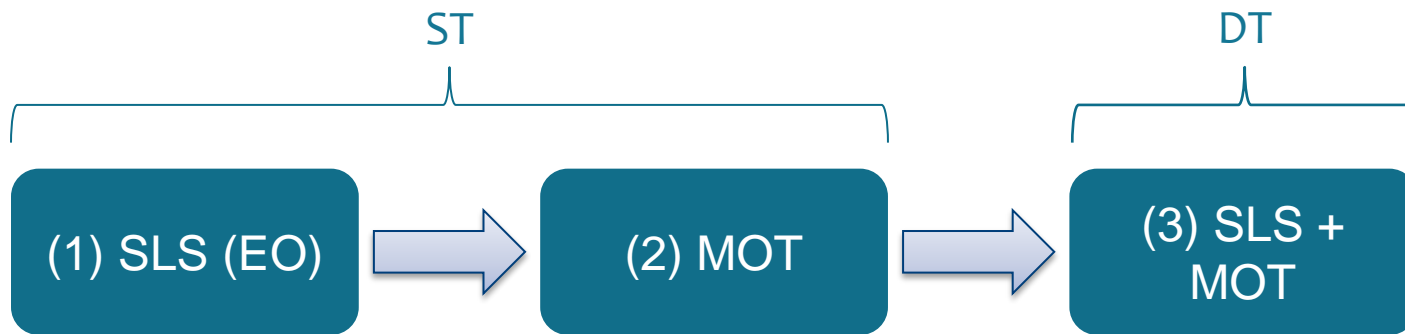
## Comparison (non-II)

- KU Leuven (Belgium)
- $n = 103$  (33 ♀, 70 ♂)
- Matched for age, gender, sport, training volume



No Down-syndrome  
No physical  
comorbidities

# Procedure



Both legs  
6 x 10sec



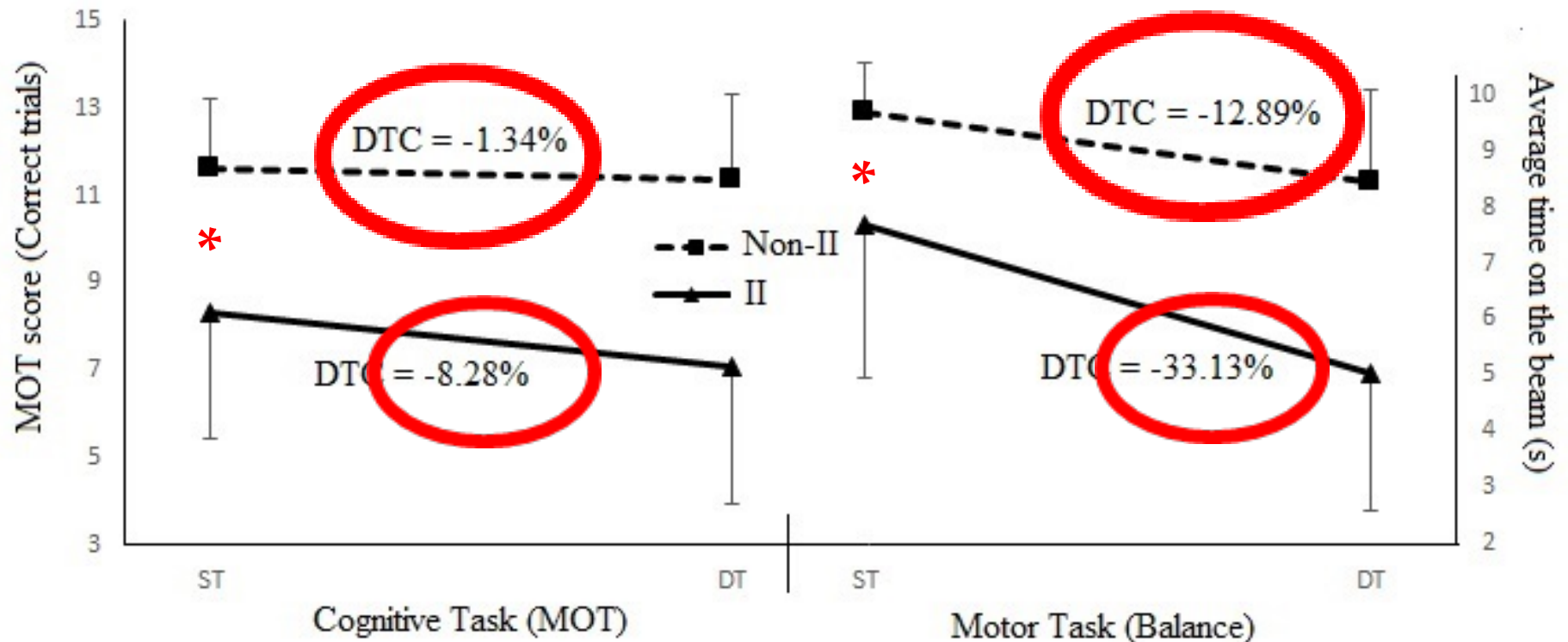
Max. 15  
stages



Combined



# Results DUAL-TASK costs





# Conclusion

- Cognitive-motor dual-task paradigm is an ecologically valid way to investigate the relation between cognitive function and motor performance of elite athletes with II
  - Poor balance control in people with II => (impaired) cognition related to balance control
  - Athletes with II have difficulties to successfully combine cog and motor task demands
  - Higher DT costs for II-athletes compared to non-II athletes, higher DT costs for balance compared to cog task
- ⇒ Cognitive-motor dual-task paradigm to be considered a potential method to demonstrate the impact of II on performance, even in sports with relatively low cognitive load.

# Implications for future research

- **Assessment of cognitive function**

- Difficulty level adjusted to participant (tailored)
- Various cognitive factors relevant to sport (reaction time, memory, pattern recognition, ...)
- Executive functions

- **Assessment of postural control**

- Posturography – static & dynamic
- Balance movement & timing action lab

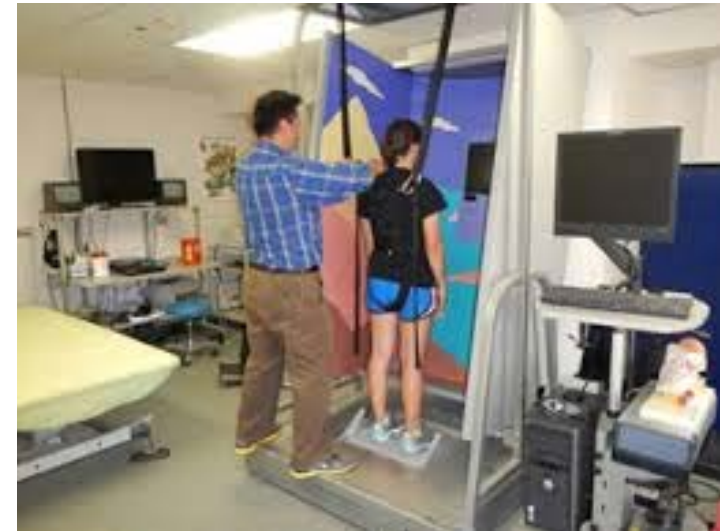
- **Assessment of KPI's (sport specific)**

- **Control samples (4)**

- II vs non-II/athletes vs non-sportive controls

- **Design**

- Training/RCT
- Field test vs lab conditions





Classification Research Partner

# Thank you

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