



EXISTENCE OF AESTHETIC-KINEMATIC CORRELATIONS IN GRAND BATTEMENT IN YOUNG RECREATIONAL DANCERS

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Introduction

“A great jazz solo consists of

1% magic

99% stuff that is

Explainable

Analyzable

Categorizable

Doable”

M. Levine, *The Jazz theory book*

- The case of dancers

E. Muybridge, *A woman dancing* (1887)



Are there correlations between kinematical and artistic evaluations ?

- Global trend: Jurys/public favor large ranges of motion (ROM)



1962

1979

1996

2003

E. Daprati, M. Iosa and P. Haggard, "A Dance to the Music of Time: Aesthetically-Relevant Changes in Body Posture in Performing Art", *PLoS ONE* **4**, e5023 (2009).

- Measurable kinematic parameters are related to the perception of movement's "beauty"

C. Torrents, M. Castaner, T. Jofre, G. Morey and F. Reverter, "Kinematic parameters that influence the aesthetic perception of beauty in contemporary dance", *Perception* **42**, 447 (2013).



Why young recreational dancers ?

- Population still learning basic movements
- “Imperfect” movements and aesthetics
 - *In a professional population variability would be less important and correlations harder to show*
- How to improve one’s performances ?
 - *Become conscious of key parameters*
 - *Learn “good” motor strategies*



The protocol

Population

Movements

Data recording

Data analysis

- Population
 - *The dancers (recreational)*

N = 16	12 ♀ / 4 ♂
Age	15 ± 3 years
Dancing from	8 ± 4 years
Practicing	9 ± 4 hours/week

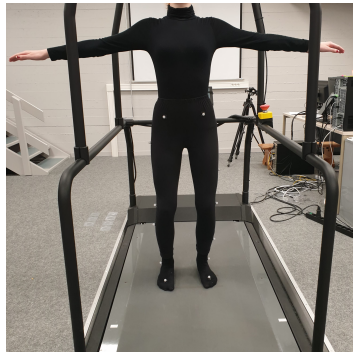
- *The jury (professional)*

N = 5	4 ♀ / 1 ♂
Age	26 ± 4 years
Dancing from	19 ± 5 years
Practicing	15 ± 9 hours/week

No prior knowledge of the dancers

Overview

Grand battement

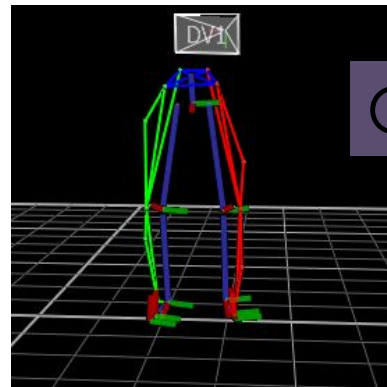


3D kinematics

Vicon

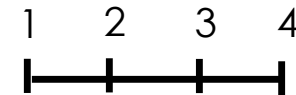
8 cameras

120 Hz – 16 markers



Artistic evaluation

Questionnaire

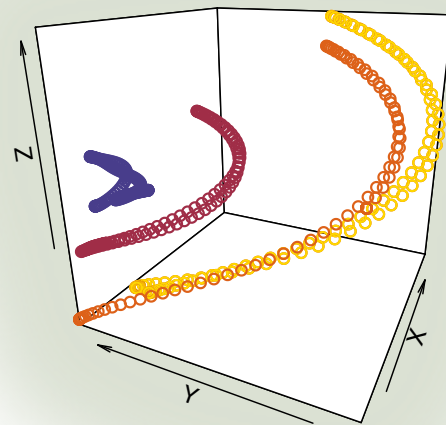


Correlations ?



3D kinematics

- Lower limb's accurate tracking

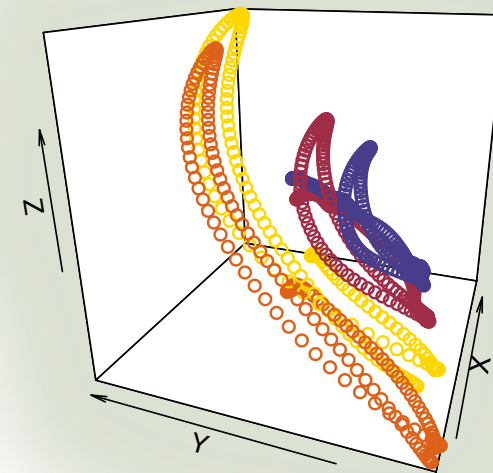


Thigh

Knee

Ankle

Toe



Example of "good" grand battement

and

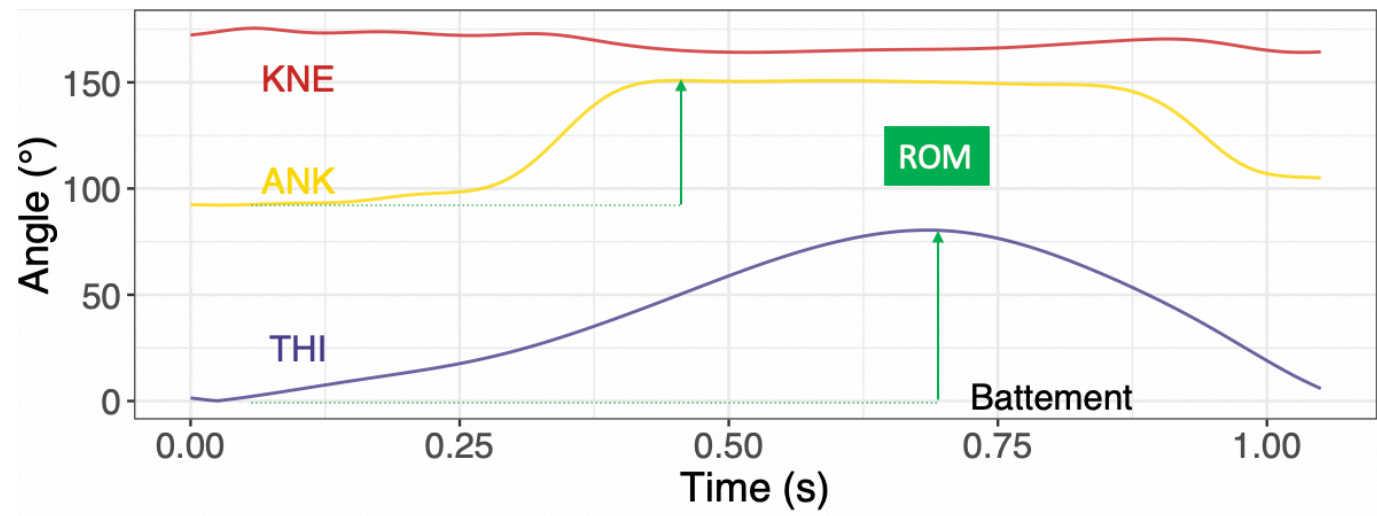
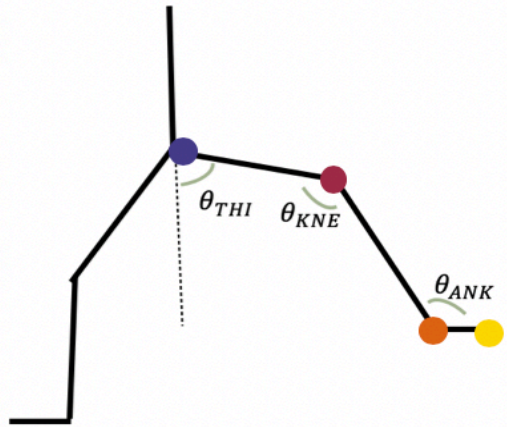
"wrong" grand battement





- Computation of angles vs time → ROMs

+ duration, maximal thigh and ankle speed



+ Jerk (measure of smoothness)



S. Balasubramanian, A. Melendez-Calderon and E. Burdet, "A Robust and Sensitive Metric for Quantifying Movement Smoothness", *IEEE Transactions on Biomedical Engineering* **59**, 2126 (2012).



Artistic evaluation

- Global items (/24)
conventions of classical dance

8 items



- Technique (/4)

Evaluation from
video recording

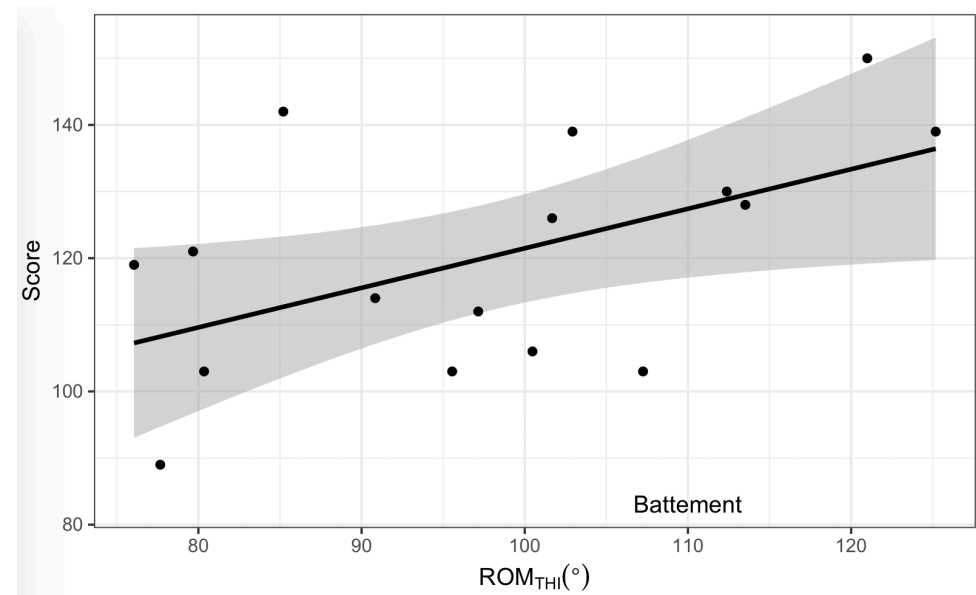
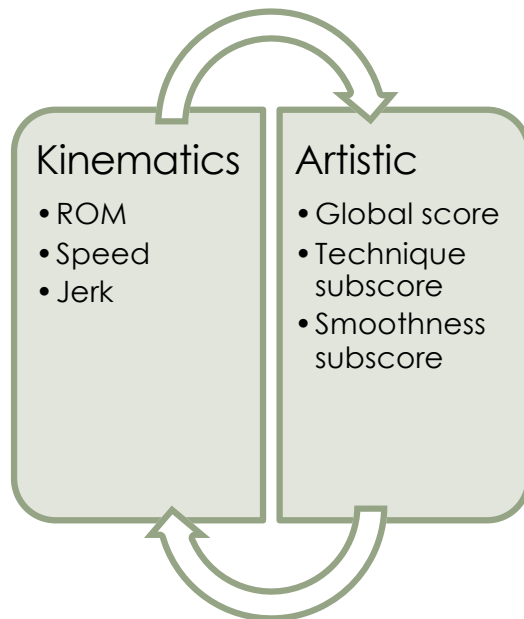
- Smoothness (/4)



M. Angioi, et al, "Association Between Selected Physical Fitness Parameters and Aesthetic Competence in Contemporary Dancers", *Journal of Dance Medicine & Science* **13**, 115 (2009).

Correlations

- Pearson's correlation coefficient r between all pairs of parameters
 - *Linear correlation*
 - *Should be close to 1 (or -1)*



Summary

Take home message

- Jury's score ↗ if thigh angle is such that
 - ROM ↗
 - Maximal speed ↗
 - Jerk ↘ (smoother)

