Nonlinear analysis to quantify human movement variability from time-series data

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Neuromatch 3.0

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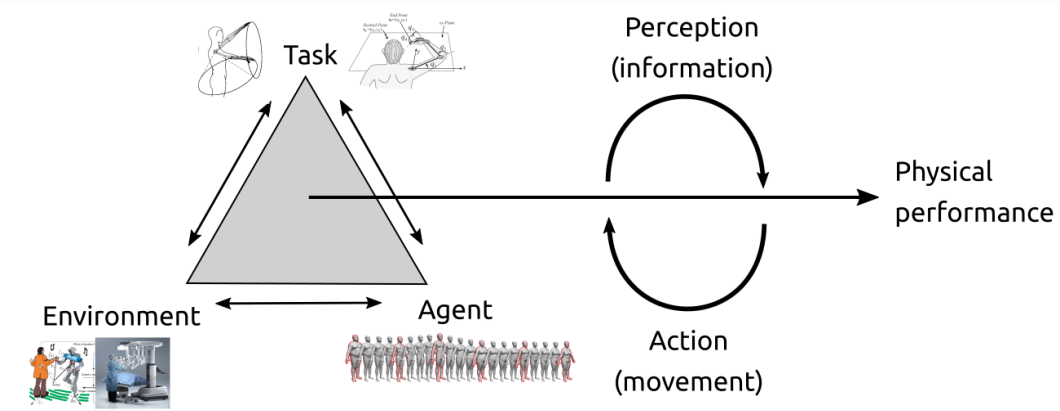
Contents

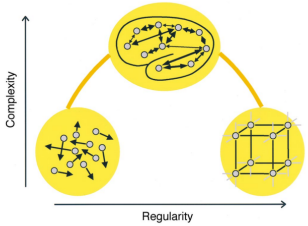
Why Movement Variability?

Modeling movement

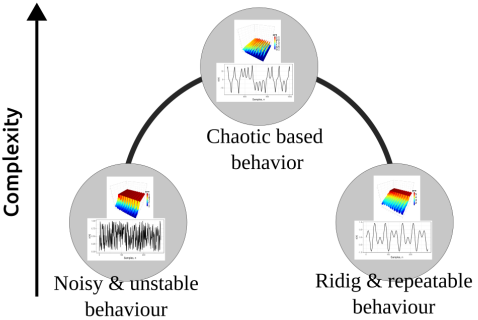


(Bernstein 1967 in **The co-ordination and regulation of movements**; Newell and Vaillancourt 2001 in **Hum Mov Sci**; Davids et al. 2003 in **Sport Medicine**; Warren 2006 in **Psychological Review**)

Modelling Movement Variability



Tononi et. al 1998

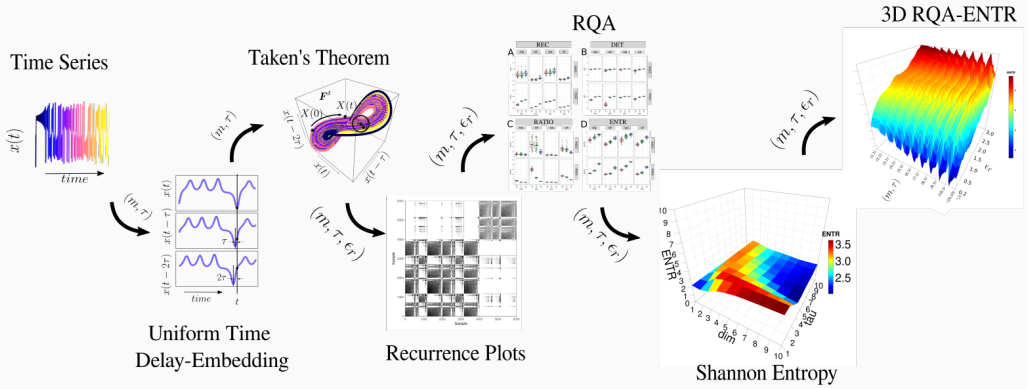


Stergiou et al. 2006

(Stergiou et al. 2006 in **Neurologic Physical Therapy**; Stergiou and Decker 2011 in **Human Movement Science**; Tononi et al. 1998 in **Trends in Cognitive Sciences**)

Nonlinear Methods

Nonlinear Analysis

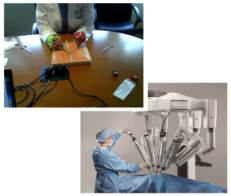


(M. Xochicale 2019 in **PhD thesis**)

Conclusions

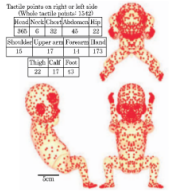
Applications of Nonlinear Dynamics

Quantification of skill learning



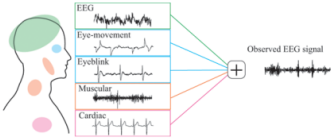
* Surgical Skills Assessment
* Robot-Assisted Surgery

Fetal behavioral development



* General movements
* Arm/Legs Movs
* Hand/Face Contacts

Nonlinear Biomedical Signal Processing



* EEG time series
* Heart rate variability
* Eye Movements

(Zia et al., 2017 in **Computer Assisted Radiology and Surgery**; Mori 2012 in **Development and Learning and Epigenetic Robotics**; Mitsukura et al., 2017 in **Electroencephalography**; Marwan et al. 2019 in **http://recurrence-plot.tk/**)

References

Xochicale Miguel
Nonlinear methods to quantify Movement Variability in Human-Humanoid Interaction Activities
In Submission to Scientific Reports
https://arxiv.org/abs/1810.09249

Thanks
Questions?