

Evidence-based in ATA[©]



Dr Pascal Prévost

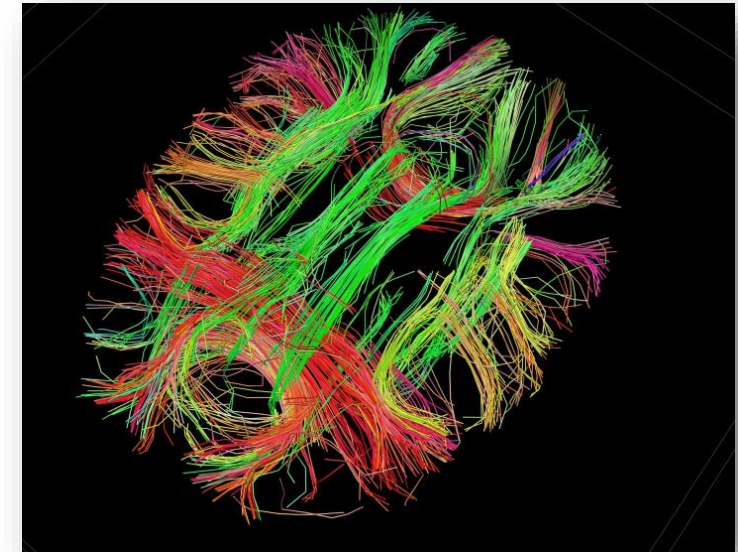
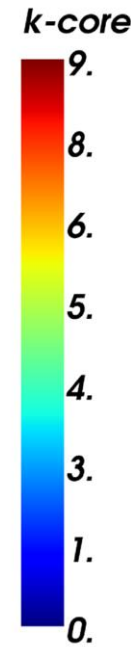
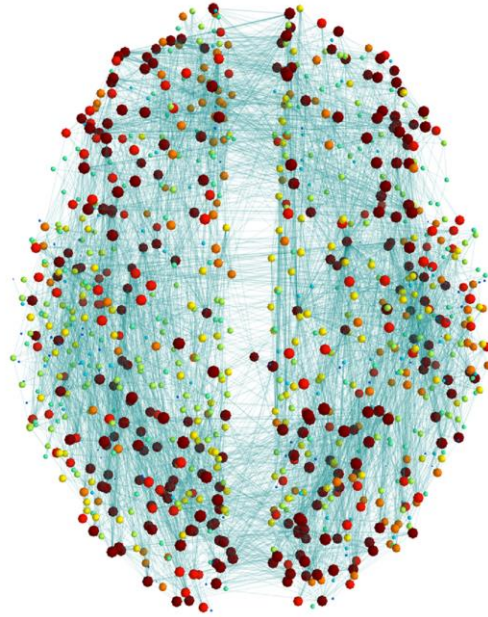
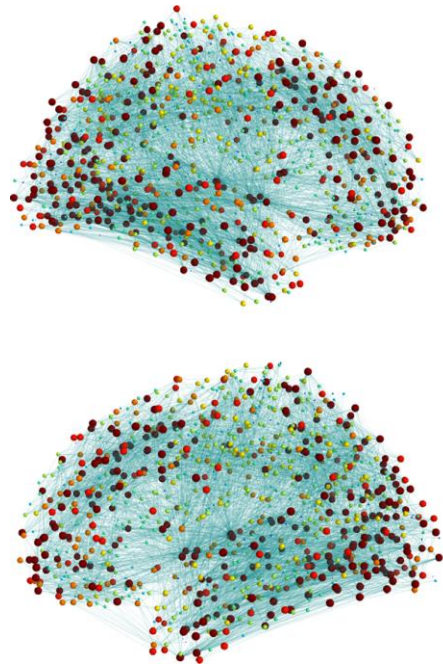
Scientific journey is not always easy 😊

fact vs. opinion

evidence vs. belief

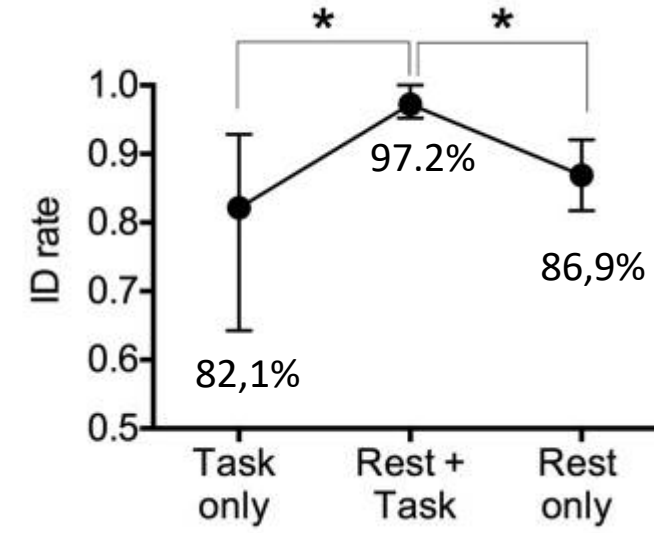
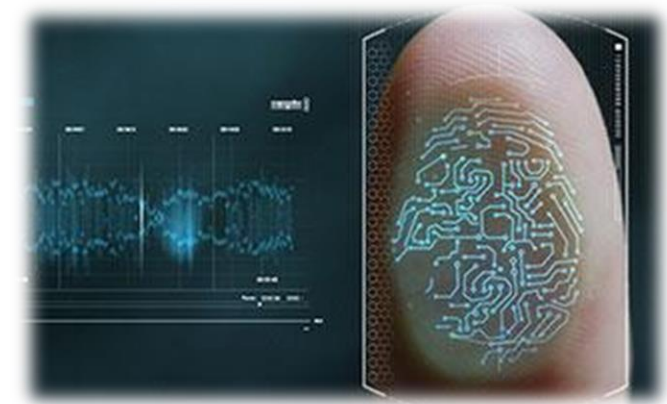
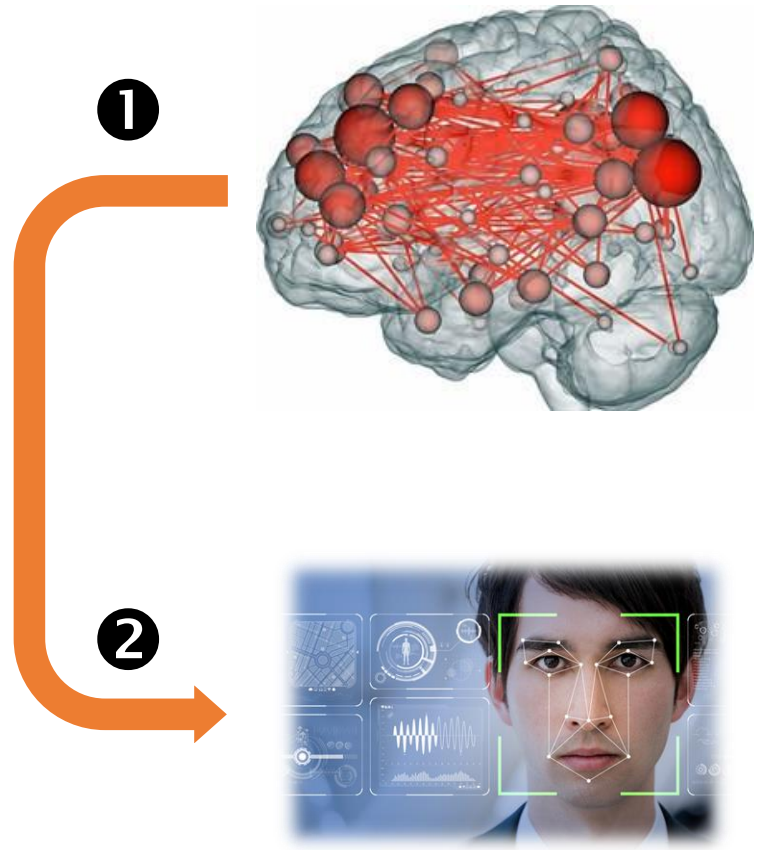


Connectome → Each brain has a unique network of connections





So each brain is unique → « cognitive signature »



(D'après Finn et coll., 2015)

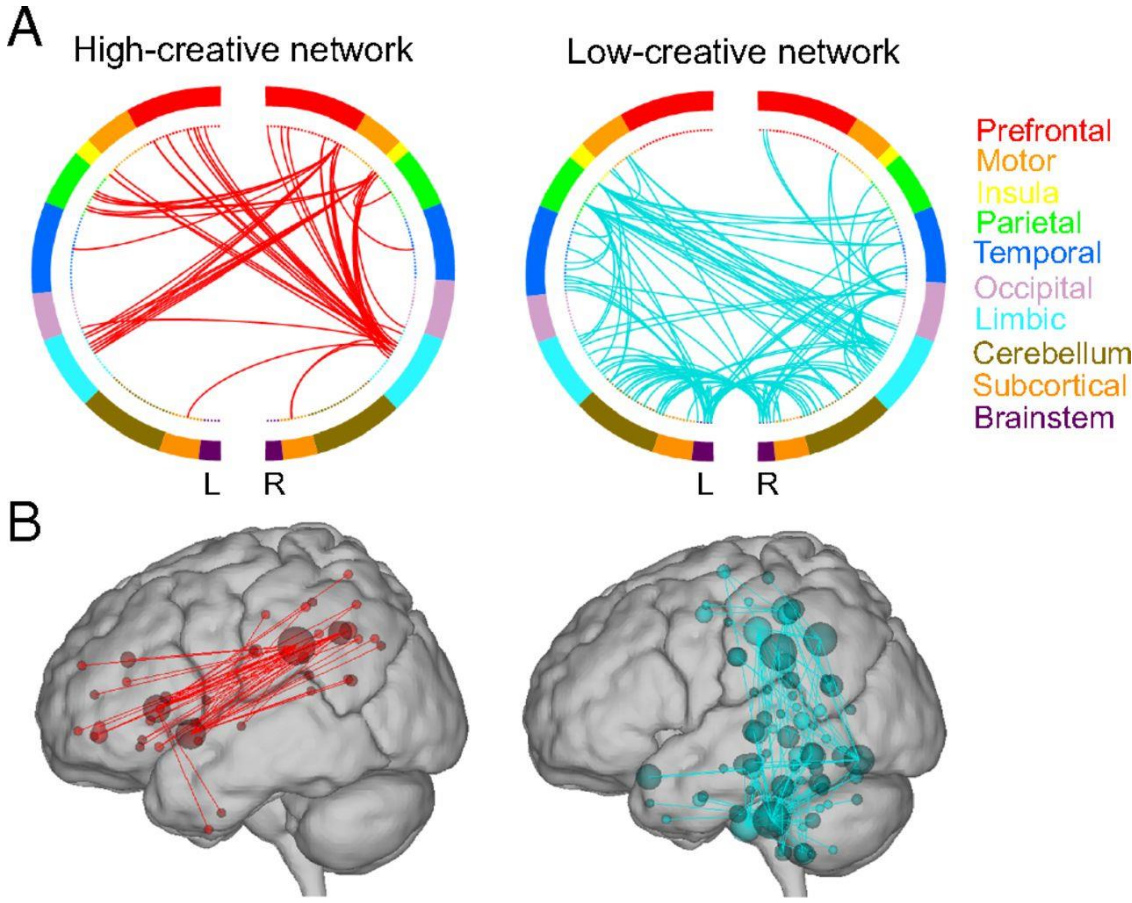


Robust prediction of individual creative ability from brain functional connectivity

Roger E. Beaty^{a,1}, Yoed N. Kenett^b, Alexander P. Christensen^c, Monica D. Rosenberg^d, Mathias Benedek^e, Qunlin Chen^f, Andreas Fink^g, Jiang Qiu^f, Thomas R. Kwapił^h, Michael J. Kane^e, and Paul J. Silvia^c

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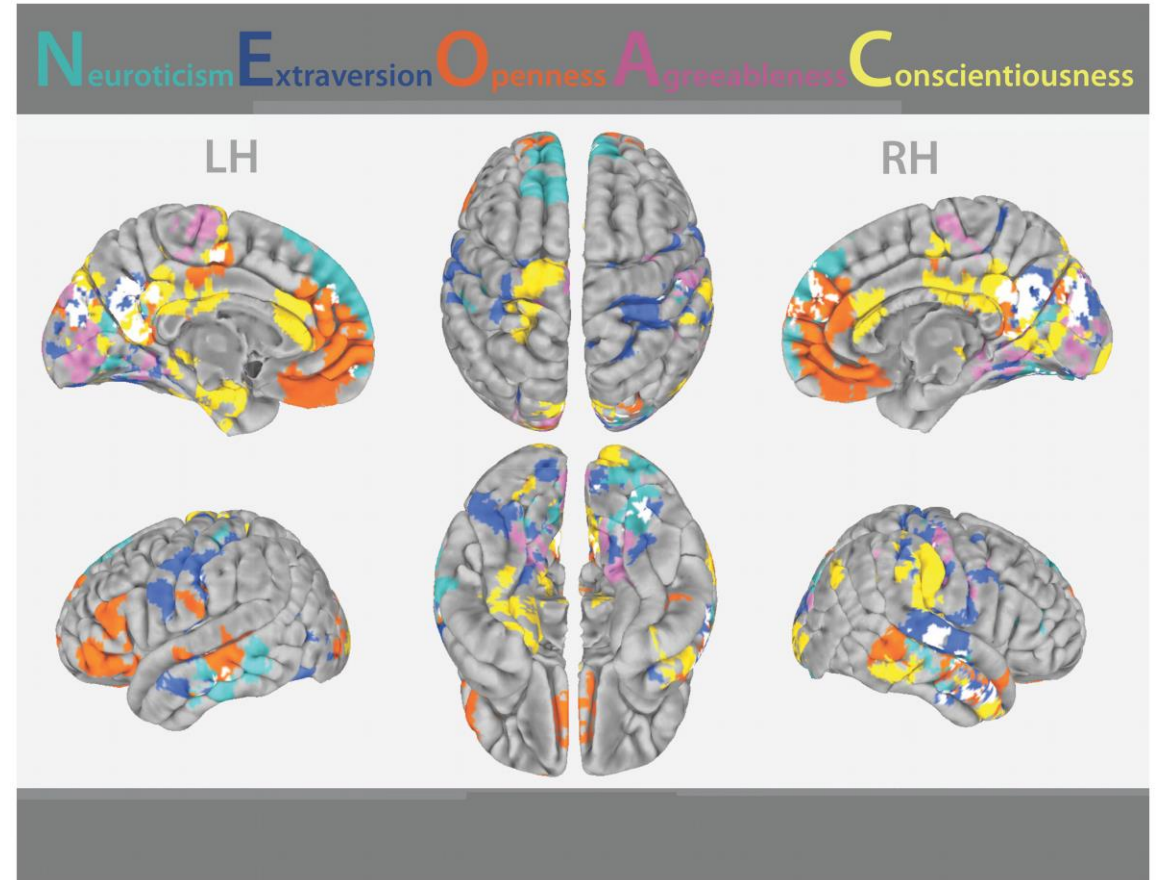
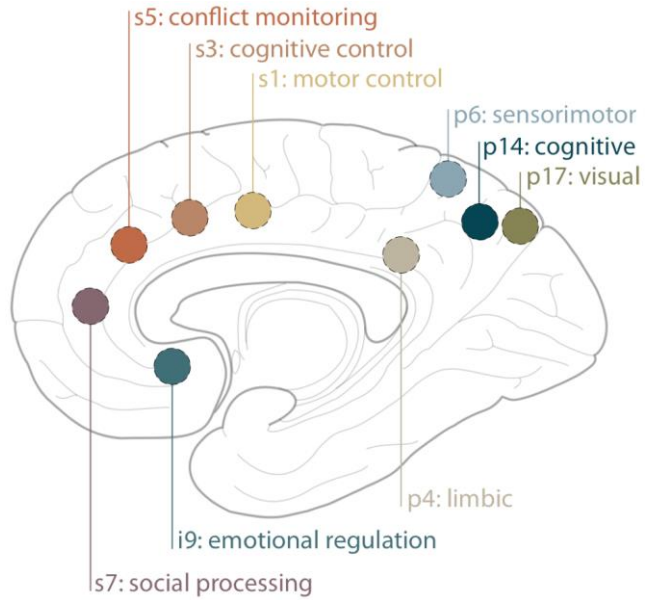
Edited by Olaf Sporns, Indiana University, Bloomington, IN, and accepted by Editorial Board Member Michael S. Gazzaniga December 4, 2017 (received for review July 31, 2017)





Personality Is Reflected in the Brain's Intrinsic Functional Architecture

Jonathan S. Adelstein¹, Zarrar Shehzad², Maarten Mennes¹, Colin G. DeYoung³, Xi-Nian Zuo^{1,4}, Clare Kelly¹, Daniel S. Margulies^{5,6}, Aaron Bloomfield¹, Jeremy R. Gray², F. Xavier Castellanos^{1,7}, Michael P. Milham^{7,8*}



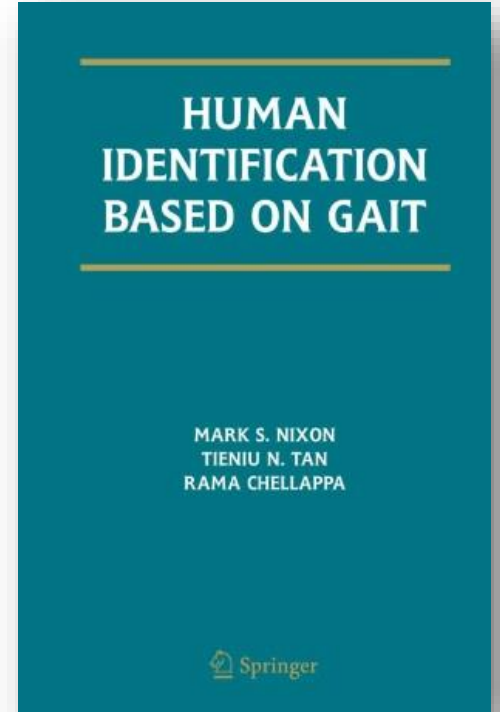
Citation: Adelstein JS, Shehzad Z, Mennes M, DeYoung CG, Zuo X-N, et al. (2011) Personality Is Reflected in the Brain's Intrinsic Functional Architecture. PLoS ONE 6(11): e27633. doi:10.1371/journal.pone.0027633



How do we move?

A subject that has fascinated researchers for many years:

Ability to identify individuals on the basis of their movements → gait recognition



(Approach now used to identify a person in a crowd)



Plantar pressure data are unique between individuals

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SOCIETY
Interface

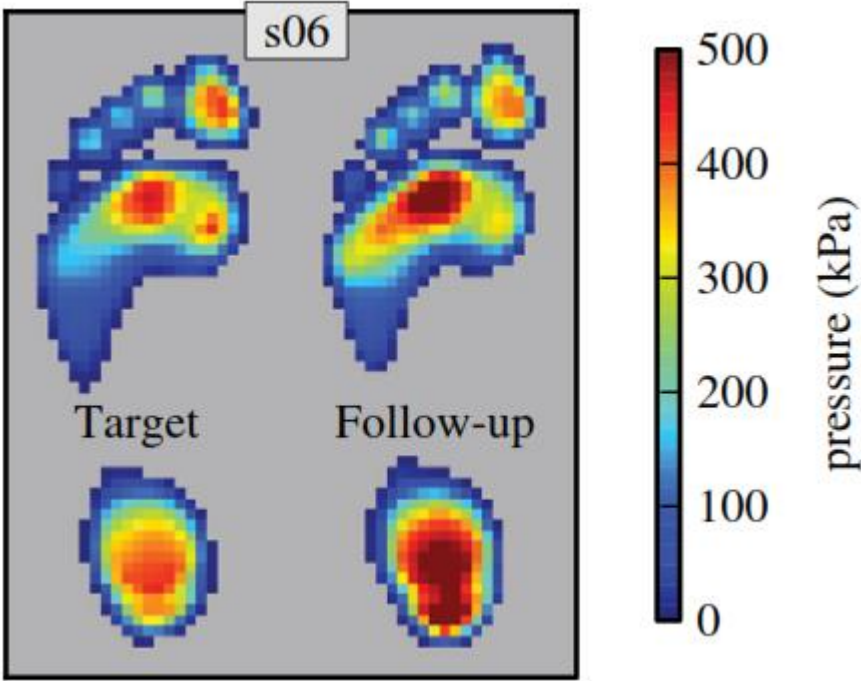
J. R. Soc. Interface (2012) 9, 790–800
doi:10.1098/rsif.2011.0430
Published online 7 September 2011

Gait recognition: highly unique
dynamic plantar pressure patterns
among 104 individuals

Todd C. Pataky^{1,*}, Tingting Mu², Kerstin Bosch³,
Dieter Rosenbaum⁴ and John Y. Goulermas⁵

Normal unshod walking at
own pace:

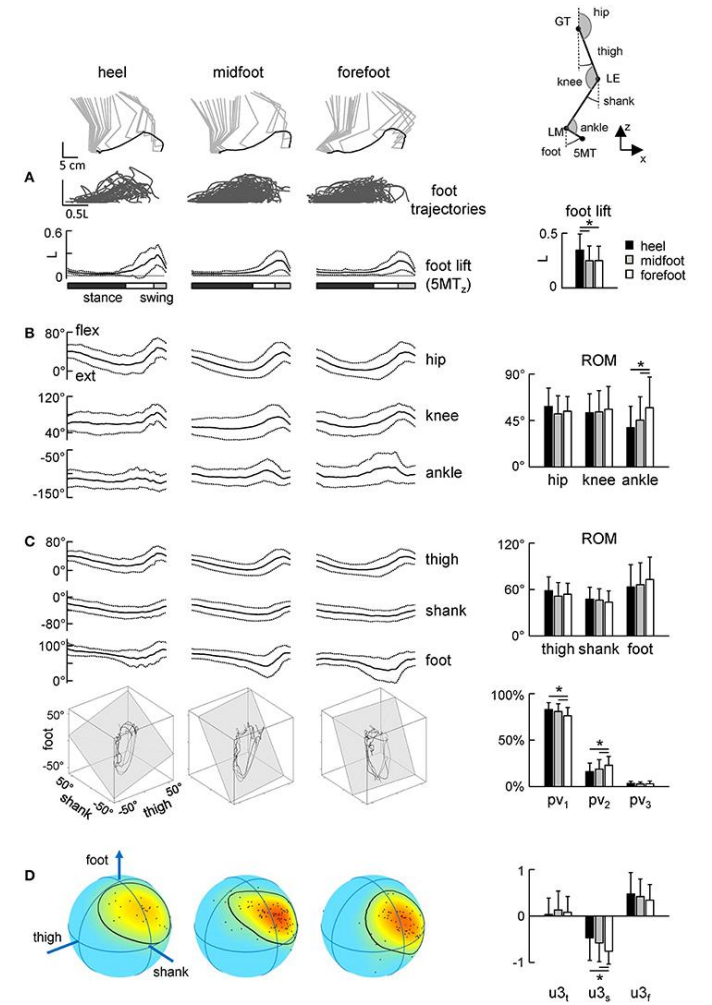
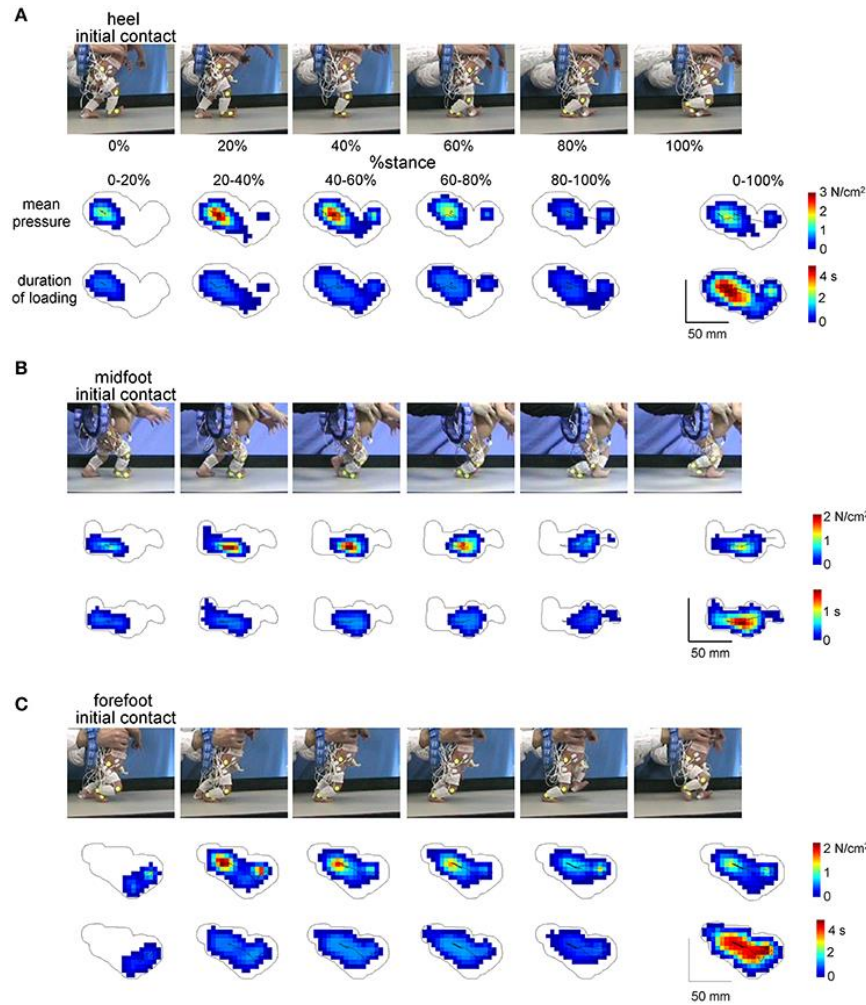
- High quality biometry derived from foot pressure;
- Classification rate of 99.6% in 104 individuals



Pedobarography(*)

(*) graphic recording of plantar pressure

Plantar pressure of 3 different foot contact patterns in newborns



(D'après Sylos-Labini et coll. 2017)



“Gait characteristics of the coronal and transverse plane as well as medio-lateral ground reaction forces provided more information on an **individual’s unique movement pattern** than gait characteristics of the sagittal plane and ground reaction forces in vertical or anterior-posterior direction.

From a temporal perspective, gait characteristics during the early stance were **more unique** than those of the mid / late stance.

Thus, the **uniqueness of human gait** is predominantly encoded in movements of the coronal and transverse plane during early stance.” (Holtz et al. Plos One, 2021, p.11)



Motor control → managing the complexity of our bodies

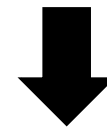
A first approach in Soviet Union (1947)



Nikolai A. Bernstein

Same motor task → performed in several ways with a similar end result

Nervous system → capable of producing different patterns of muscle activity for the same movement



Inter-individual variability EEG or EMG ==>
gateway to this ability to cope with its
degrees of freedom



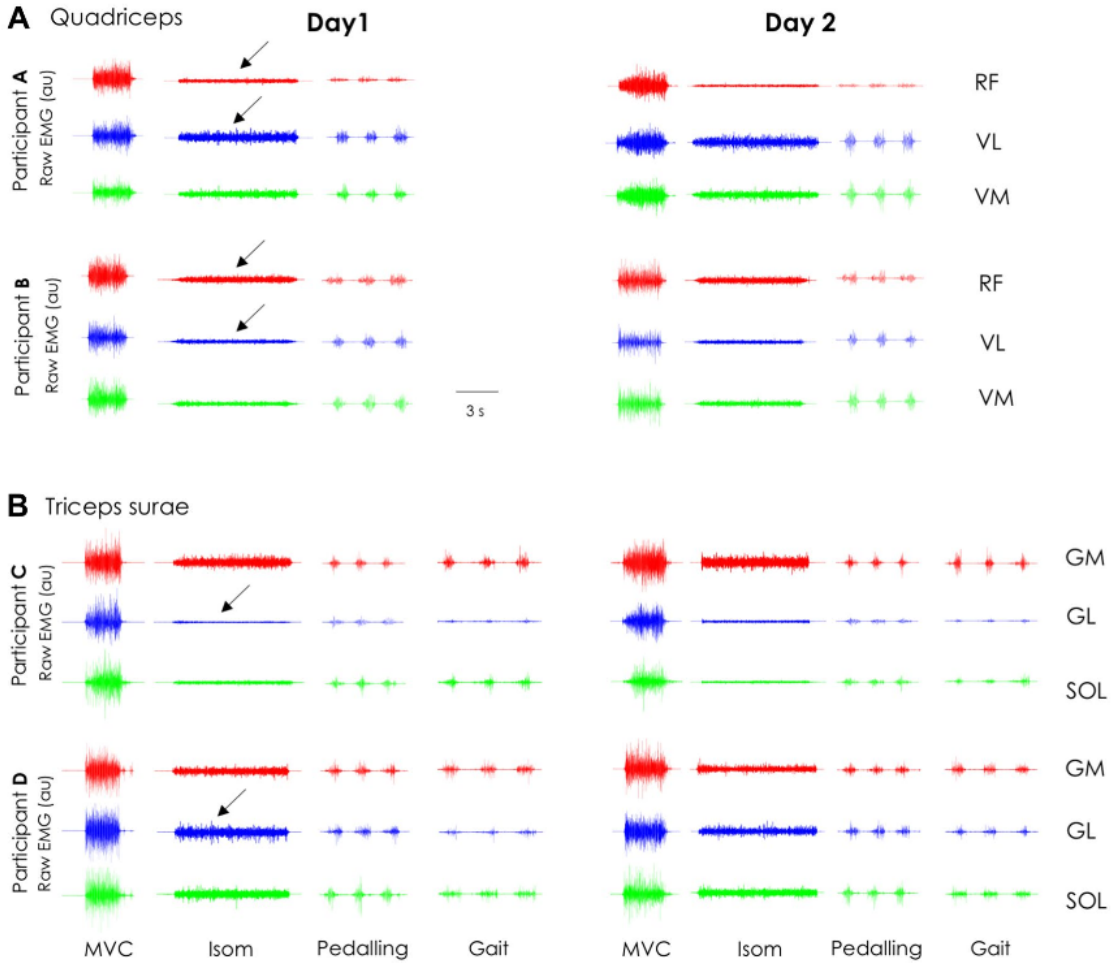


Neuromuscular activation strategies...

Variability is not experimental noise.

The variability results from real differences in the activation strategy

Each participant has his or her own muscle activation



(D'après Crozier et coll., 2019)



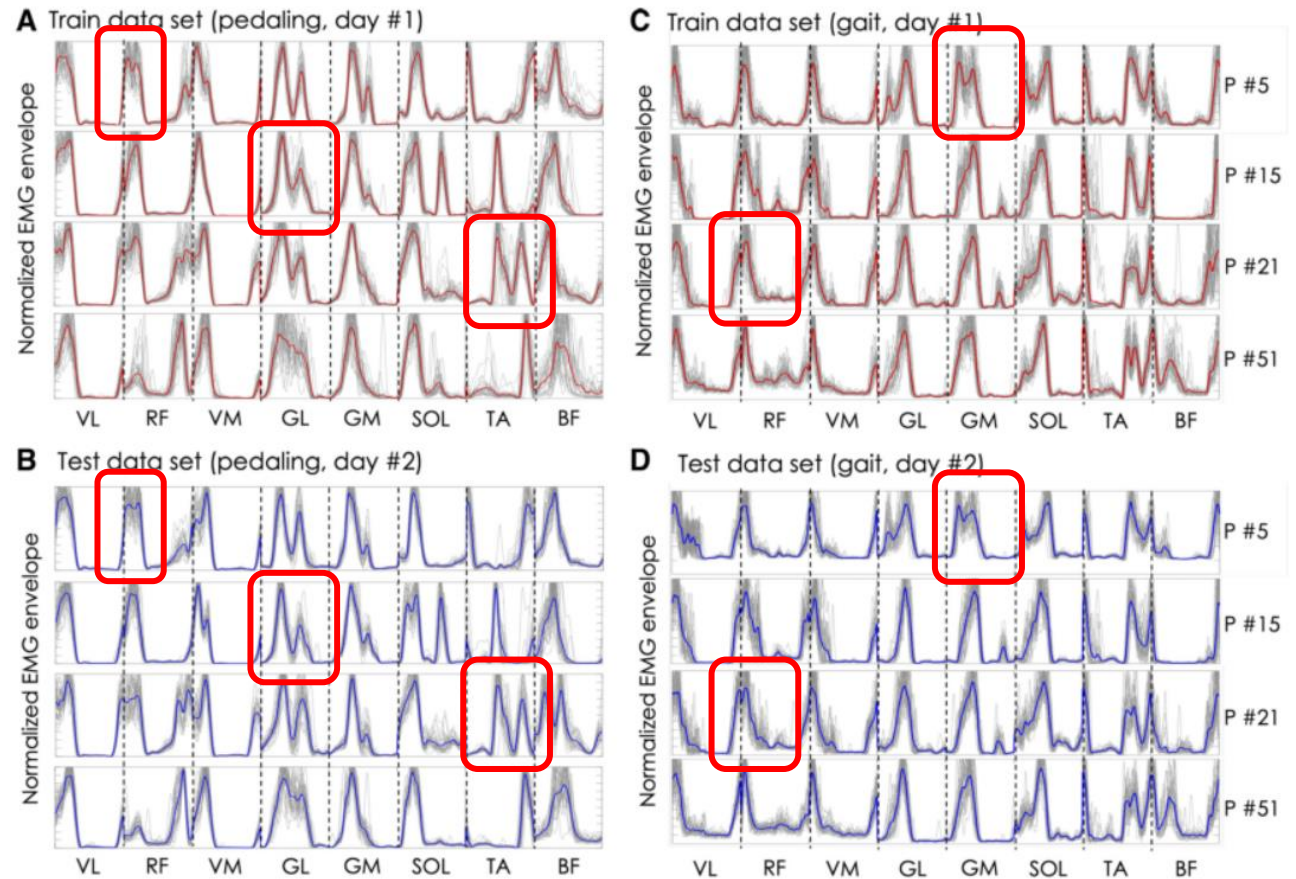
Move in your own way

- 30 cycles of movement
- Normalisation / Max
- 8 muscles analysed
- Use of machine learning



« Signature »
or
« Preference »

4 examples of individuals



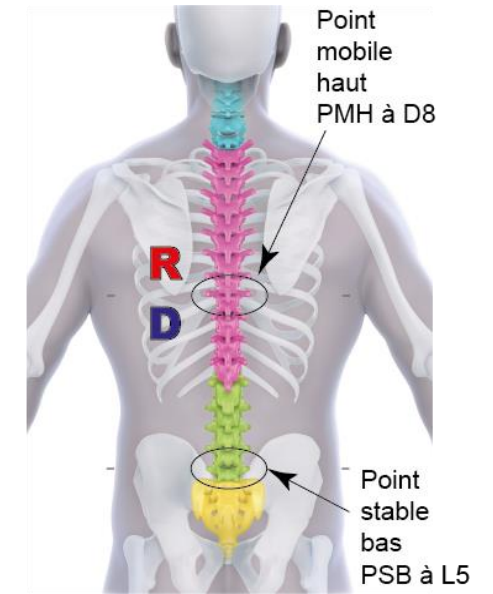
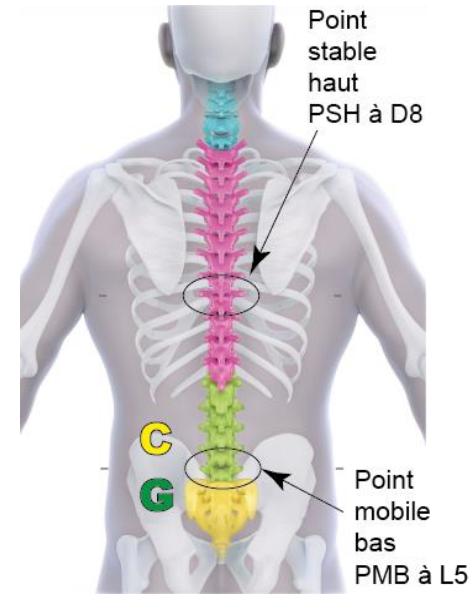
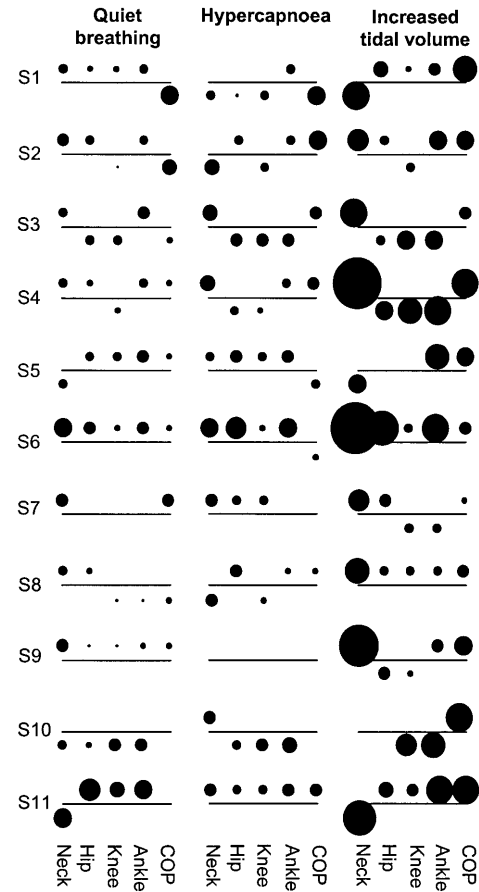
(D'après Hug et coll., 2019)



Specific mobilities...

P.W. Hodges · V.S. Gurfinkel · S. Brumagne
T.C. Smith · P.C. Cordo

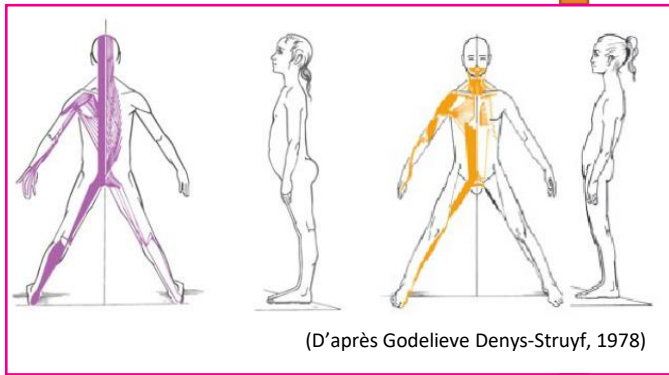
Coexistence of stability and mobility in postural control: evidence from postural compensation for respiration



(Théraulaz et Hippolite, 2019)



...in connection with preferential muscle chains



Díaz Arribas et coll. (2009)

Single-blind RCT

7 primary care centres and 6 research centres

137 patients diagnosed with non-specific low back pain

After 6 months, improvement in pain, functional capacity and quality of life respectively.

Díaz Arribas et coll. (2015)

RCT : CT vs GDS-G vs GDI

21 primary care physiotherapy units

461 people with subacute and chronic low back pain

After 1 year, improvement of the qRM score score of +0.7 vs +1.5 vs +2.2 respectively





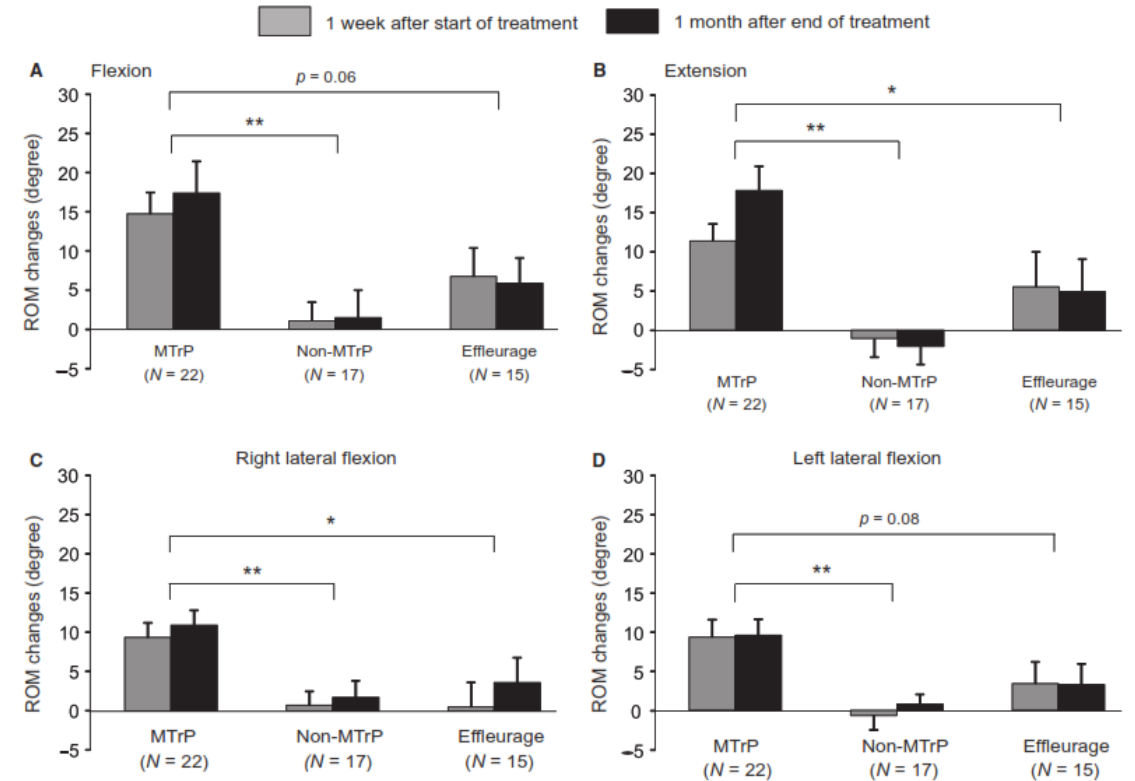
...with results when using MTrPs for acute low back pain

63 patients

- 23 : MTrP
- 21 : non-MrPs
- 19 : effleurage massage

3x / wk during 2 wks

VAS + RMQ + PPT

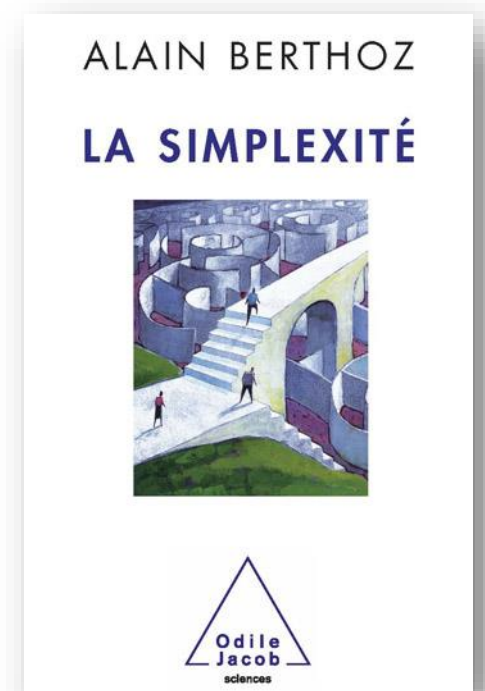


(D'après Takamoto et coll., 2015)

Our challenge... Simplicity of human movement

“Finding new solutions that reflect our experience and anticipate the future.”

“New ways of posing problems, sometimes with a few detours, to arrive at faster, more elegant, more effective actions/solutions.”

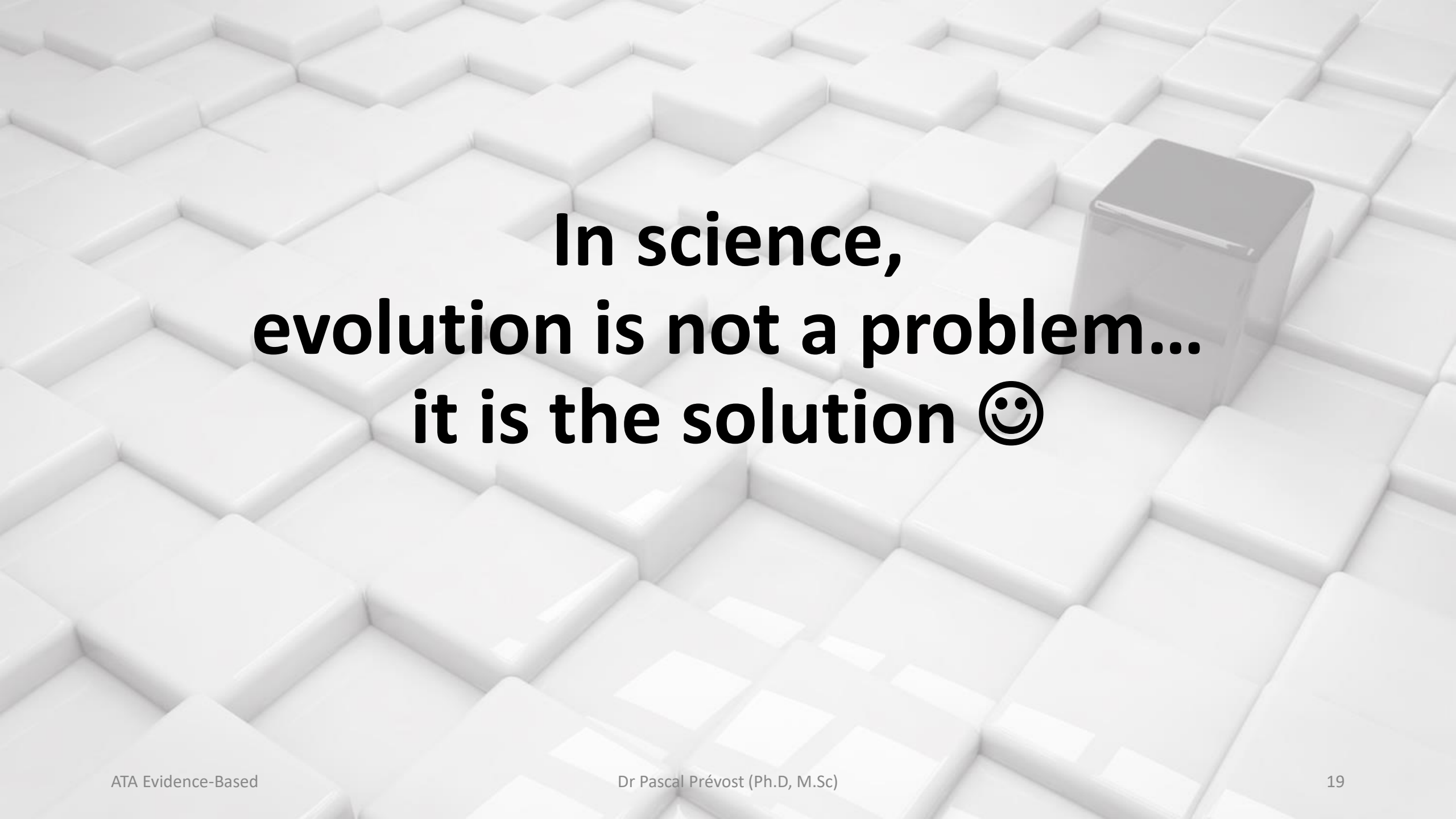


“DIFFICULT TO SEE.
ALWAYS IN MOTION IS
THE FUTURE!”



YODA





**In science,
evolution is not a problem...
it is the solution 😊**

Thank you

 **action|types**[®]
move to your next level[®]

Bertrand
THÉRAULAZ

**LA BIBLE
DES PRÉFÉRENCES
MOTRICES**

Ralph
HIPPOLYTE

INDIVIDUALISATION DE L'ACCOMPAGNEMENT :

COMMENT, POURQUOI ?

*Évaluez au niveau supérieur

AMPHORA