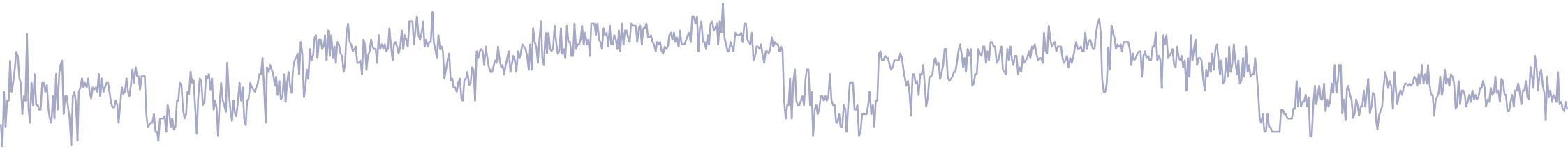
Health-related quality of life in patients with cancer:

From mean group measures

to predictive individual indicator

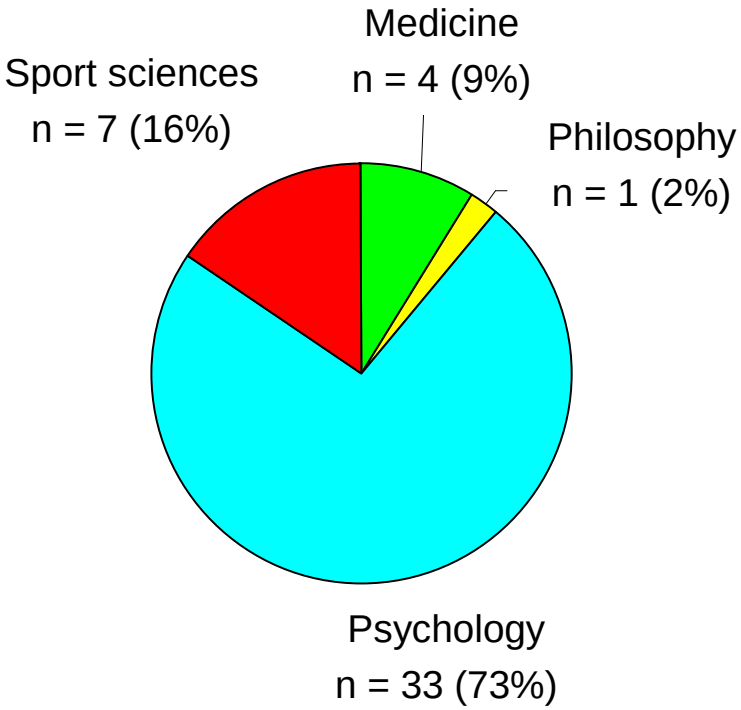


Pr. Grégory Ninot and Pierre Senesse

EA 4556 Epsylon Research Unit
Montpellier, France
www.lab-epsylon.fr

A research unit bridging health and human sciences

Researchers



170 members

- 46 lecturers and full professors
- 5 clinicians
- 64 PhD students
- 6 post-docs
- 1 engineer
- 44 associates
- 3 admins

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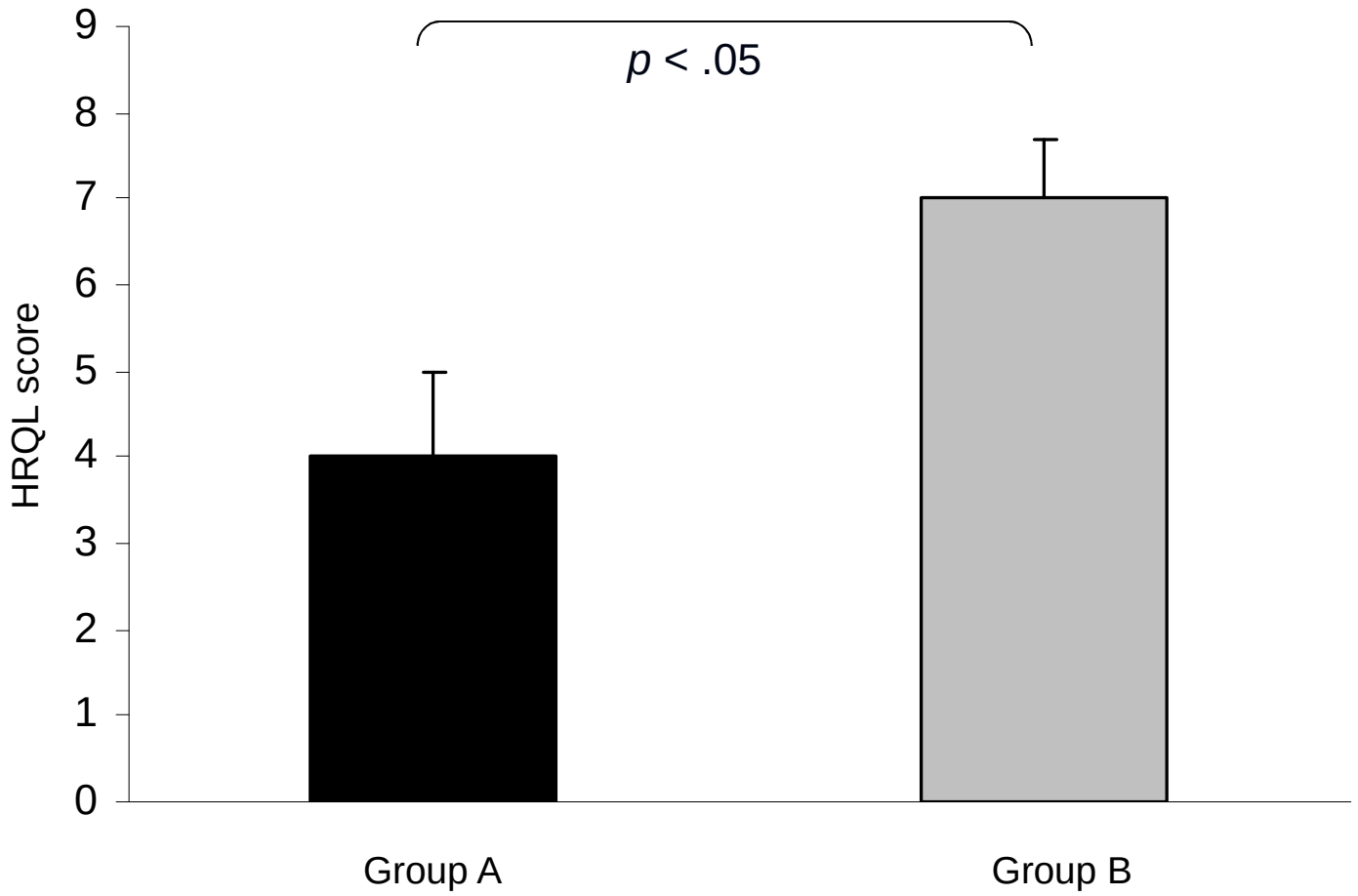
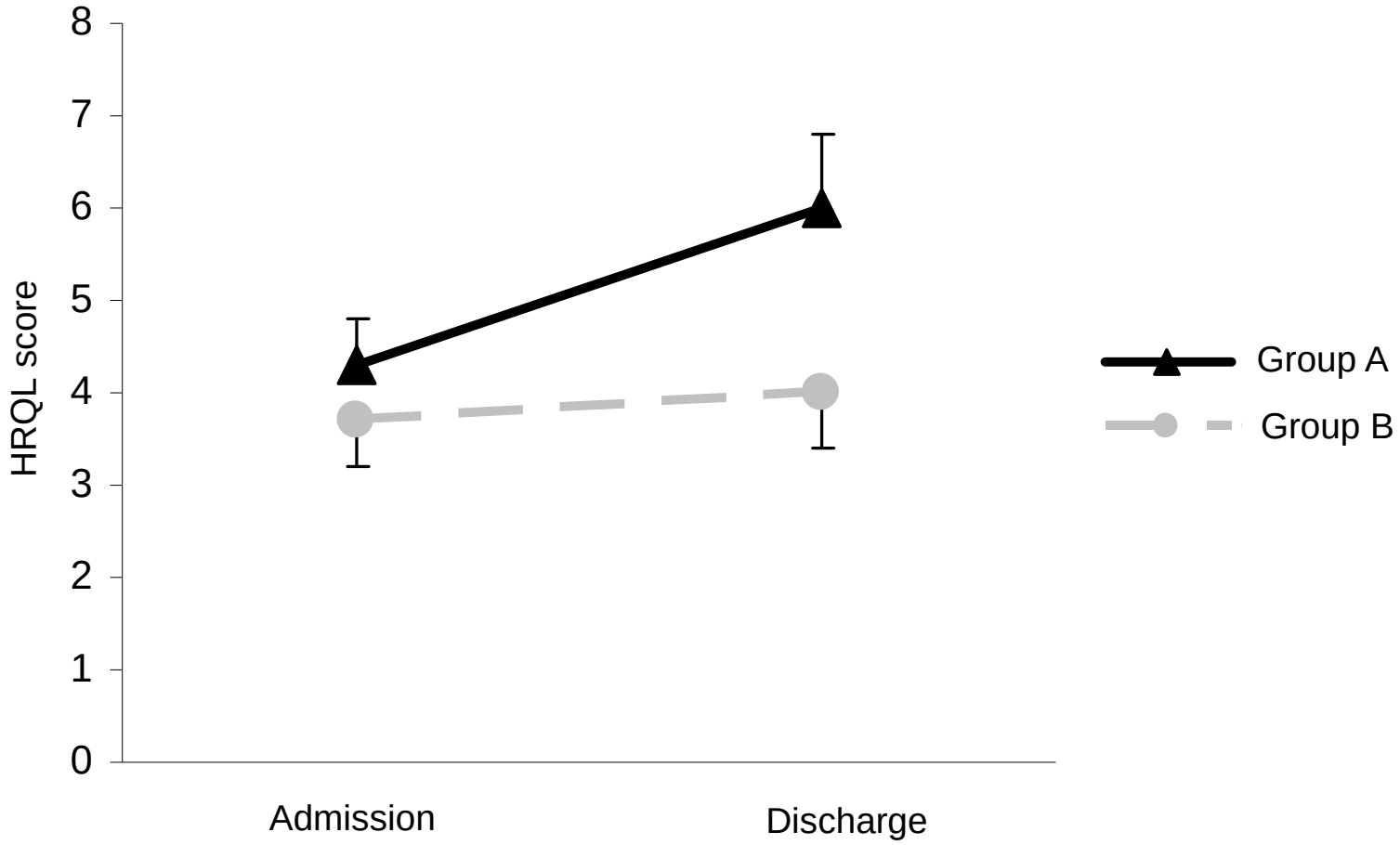
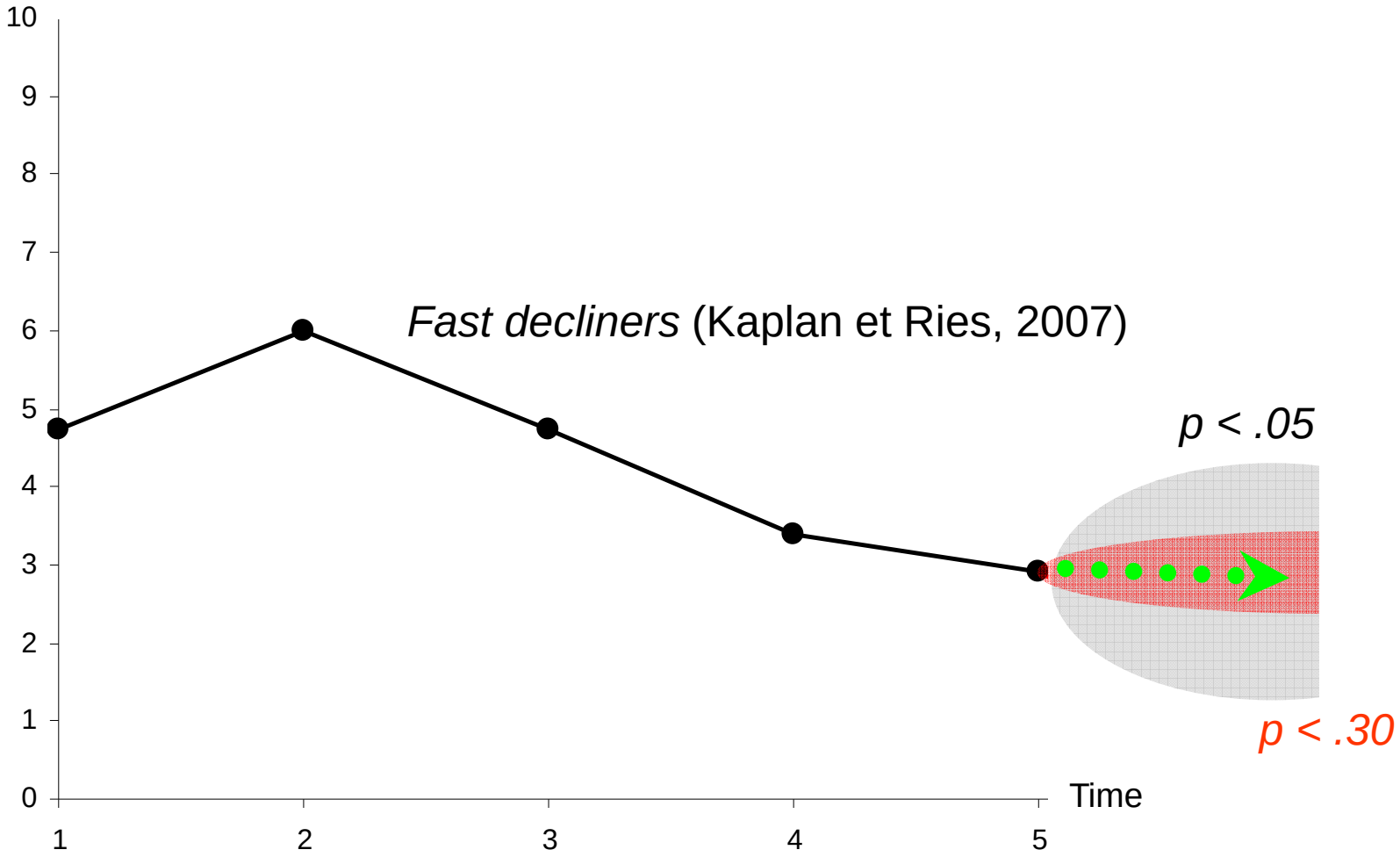
Discriminative function



Evaluative function



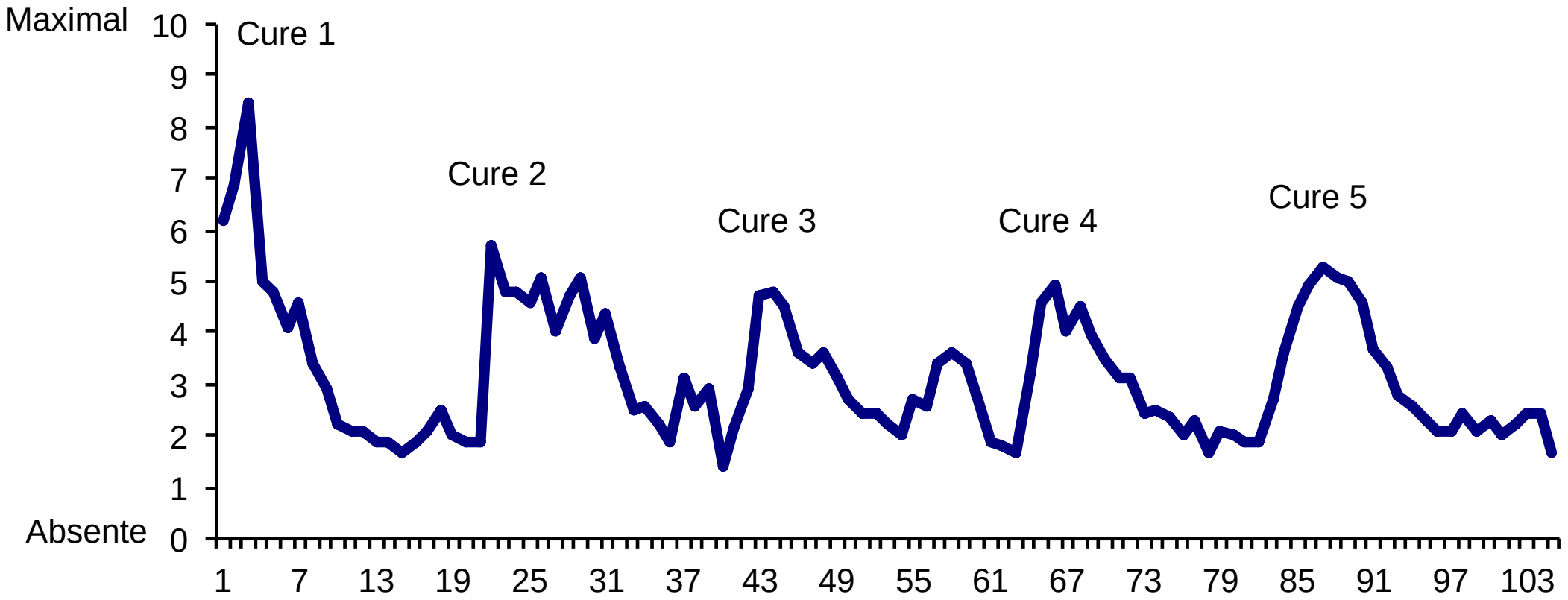
Explaining and forecasting?



Fatigue during breast cancer treatment:

the worst symptom altering HRQL

(Stone *et al.*, 2003)



Daily self-perceived fatigue during chemotherapy (Ninot *et al.*, 2013)

Inter-individual approach

Theoretical aspects

- Classical law neglects time (Prigogine, 1994)
- HRQL level (attitudes + social stereotypes)

Methodological aspects

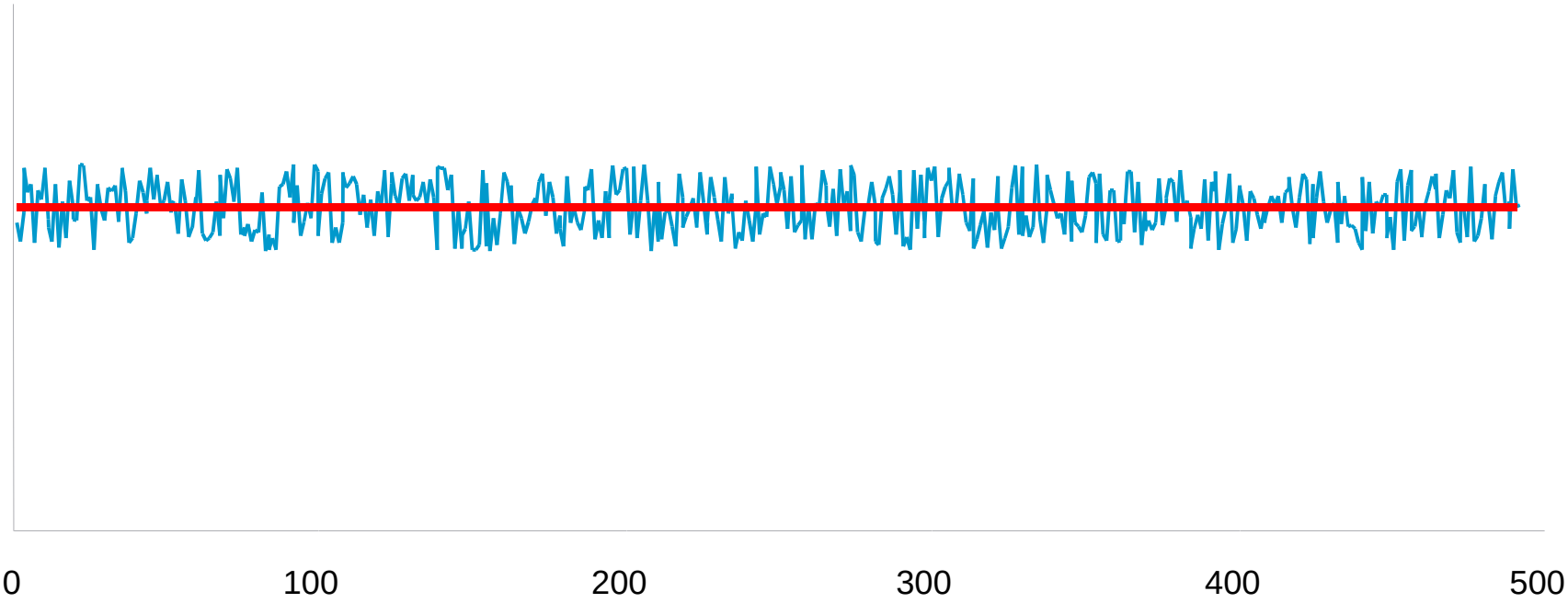
- Few repeated measures (< 6)
- Many subjects required (n > 100)
- Gaussian statistics

Psychometric aspects

- Long instruments (e.g., QLQC30 = 30 items)
- Weak sensitivity (e.g., likert scales < 6)

Inter-individual approach	Intra-individual approach
Theoretical aspects	
- Neglecting time - Level	⇨ Historicity (Nowak & Vallacher, 1998) ⇨ *Level* + instability + dynamics ⇨ Rate = product of a complex system
Methodological aspects	
- Few repeated measures - Many subjects - Gaussian statistics	⇨ Best witness of self = self ⇨ Time series analyses ⇨ Cellular automata (Nowak *et al.*, 2000)
Psychometric aspects	
- Long instruments - Weak sensitivity	⇨ Brief instrument (Robins *et al.*, 2001) ⇨ High sensitivity (VAS)

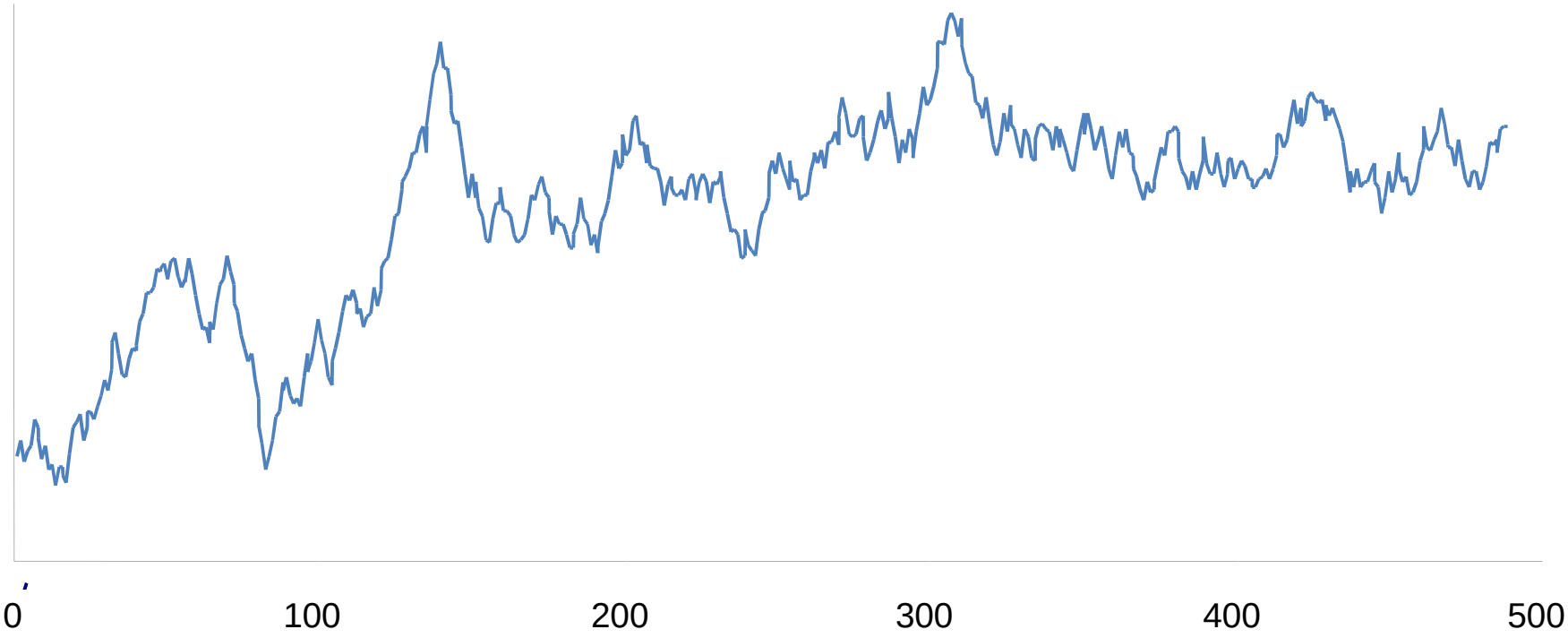
Individual daily change



Random fluctuations around a reference value ⇨ as a personality trait

Auto-correlation ⇨ NS (0,0,0) : $y_t = \mu + \varepsilon_t$ White noise

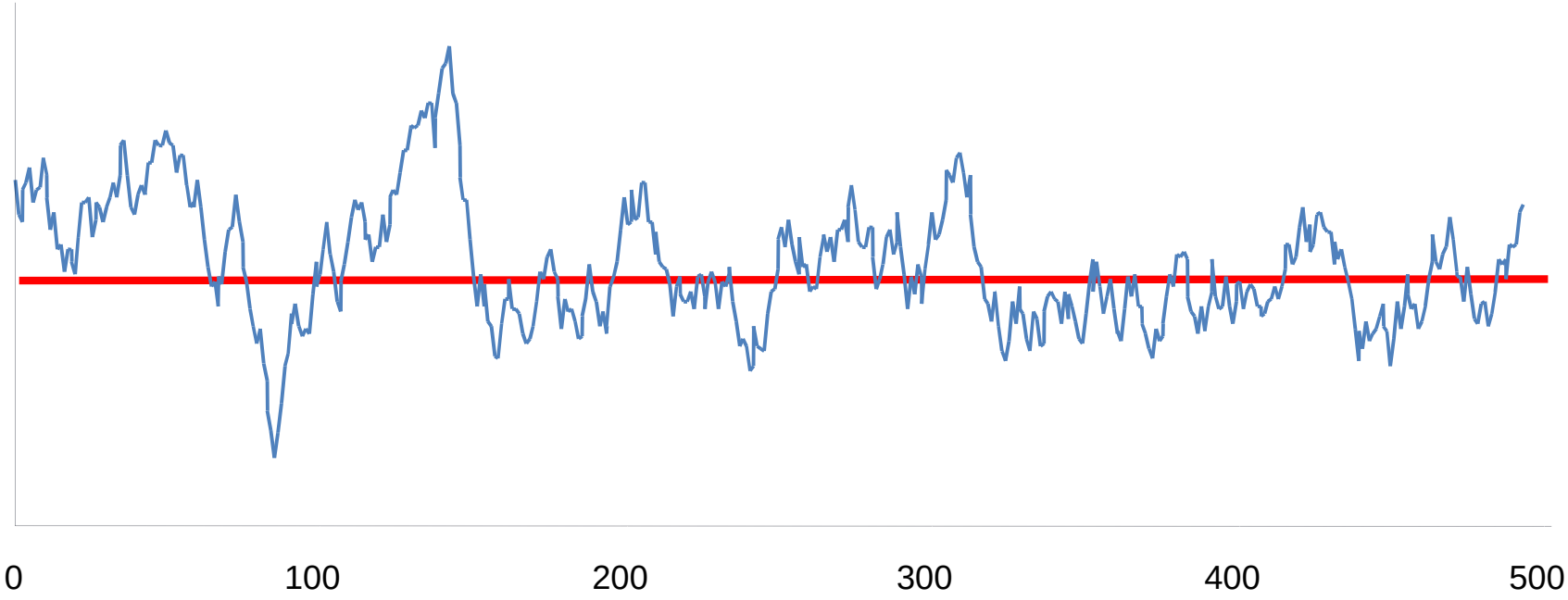
Individual daily change



Accumulation of random impacts ⇨ as a psychological state

Auto-correlation ⇨ $p < .05$ (0,1,0) : $y_t = y_{t-1} + \varepsilon_t$ Brownian motion

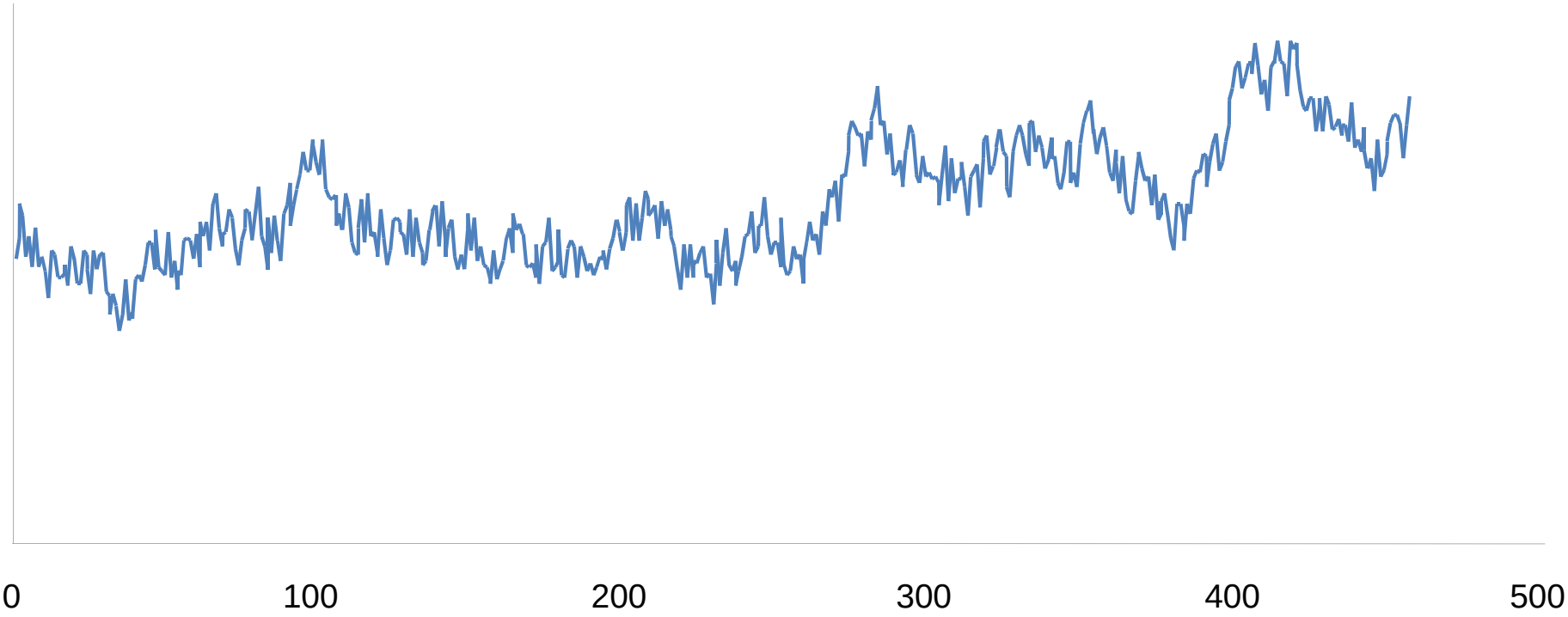
Individual daily change



Relaxation oscillations around a fixed point attractor ⇨ steady state

Auto-correlation ⇨ $p < .05$ (1,0,0) + cste : $y_t = \mu + \phi y_{t-1} + \varepsilon_t$ Homeostasis

Individual daily change

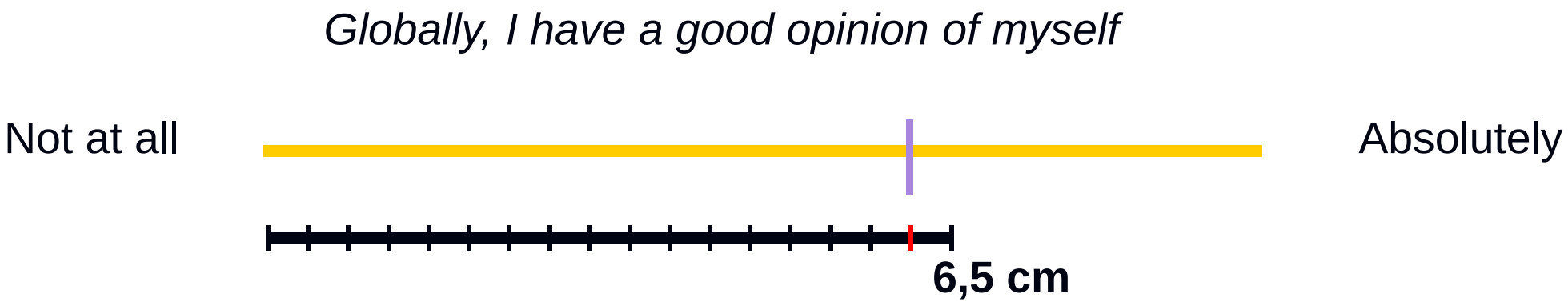


Random change around a local reference slowly evolving ⇨ dynamic balance

Auto-correlation ⇨ $p < .05$ (0,1,1) $y_t = y_{t-1} - \theta\varepsilon_{(t-1)} + \varepsilon_t$ Pink noise

Instrument

- Physical Self Inventory 6b (Ninot *et al.*, 2006; Fox and Corbin, 1989)



- Random presentation of items
- Measure error item
- Personal zone of comment

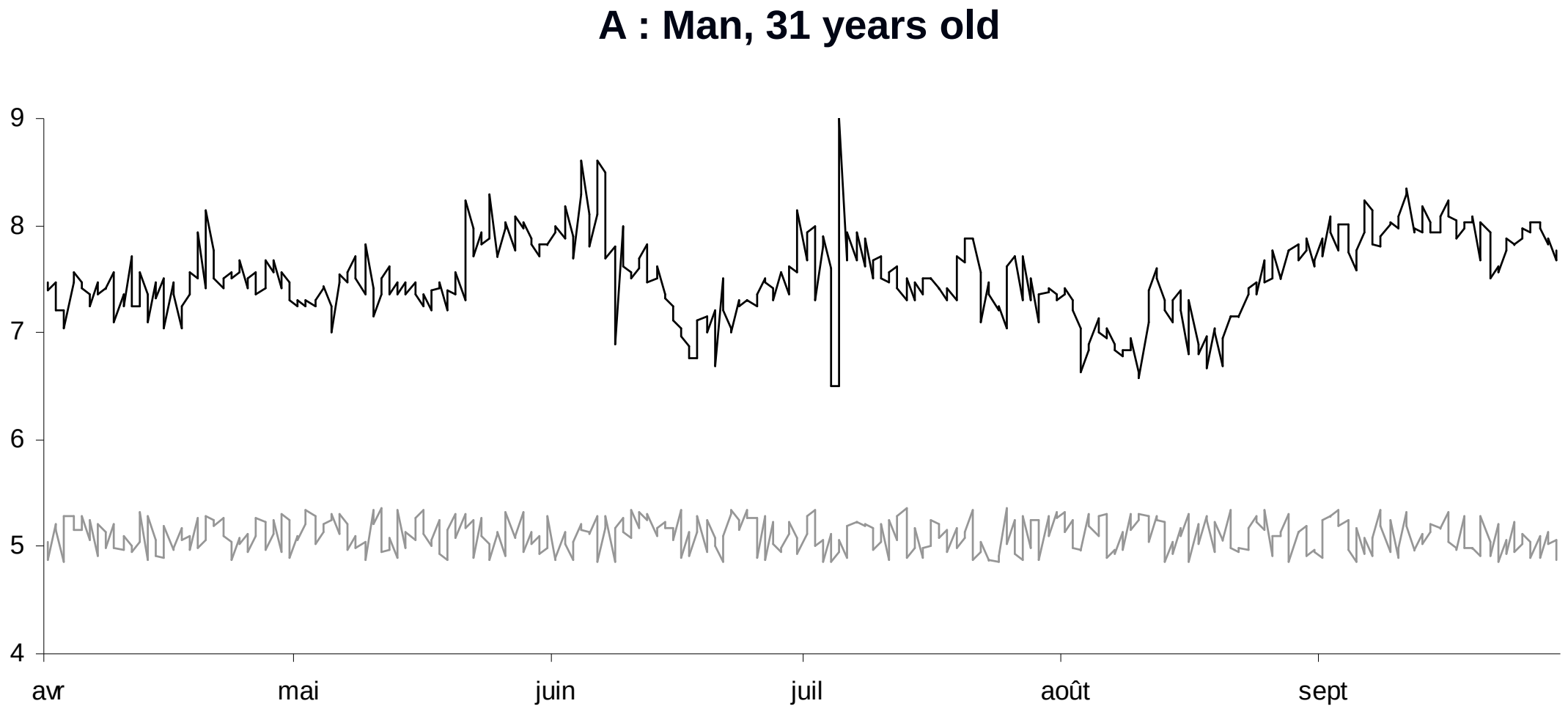
Experimental design

- Self-assessment twice a day (7:00 – 9:00 AM and PM)

Time series analysis

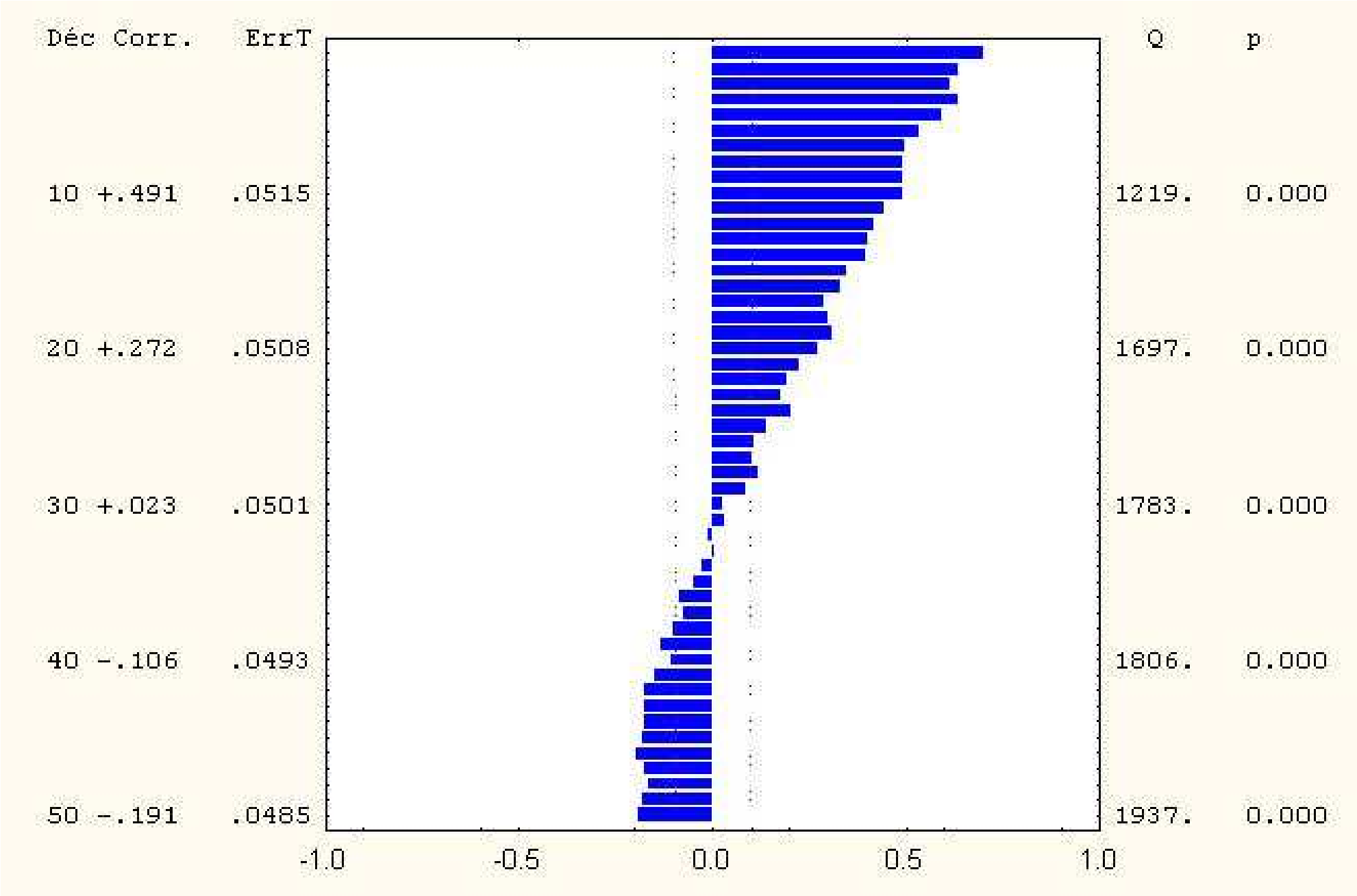
- Auto-correlation, Autoregressive Integrated Moving Average, fractal analyses

Example of times series

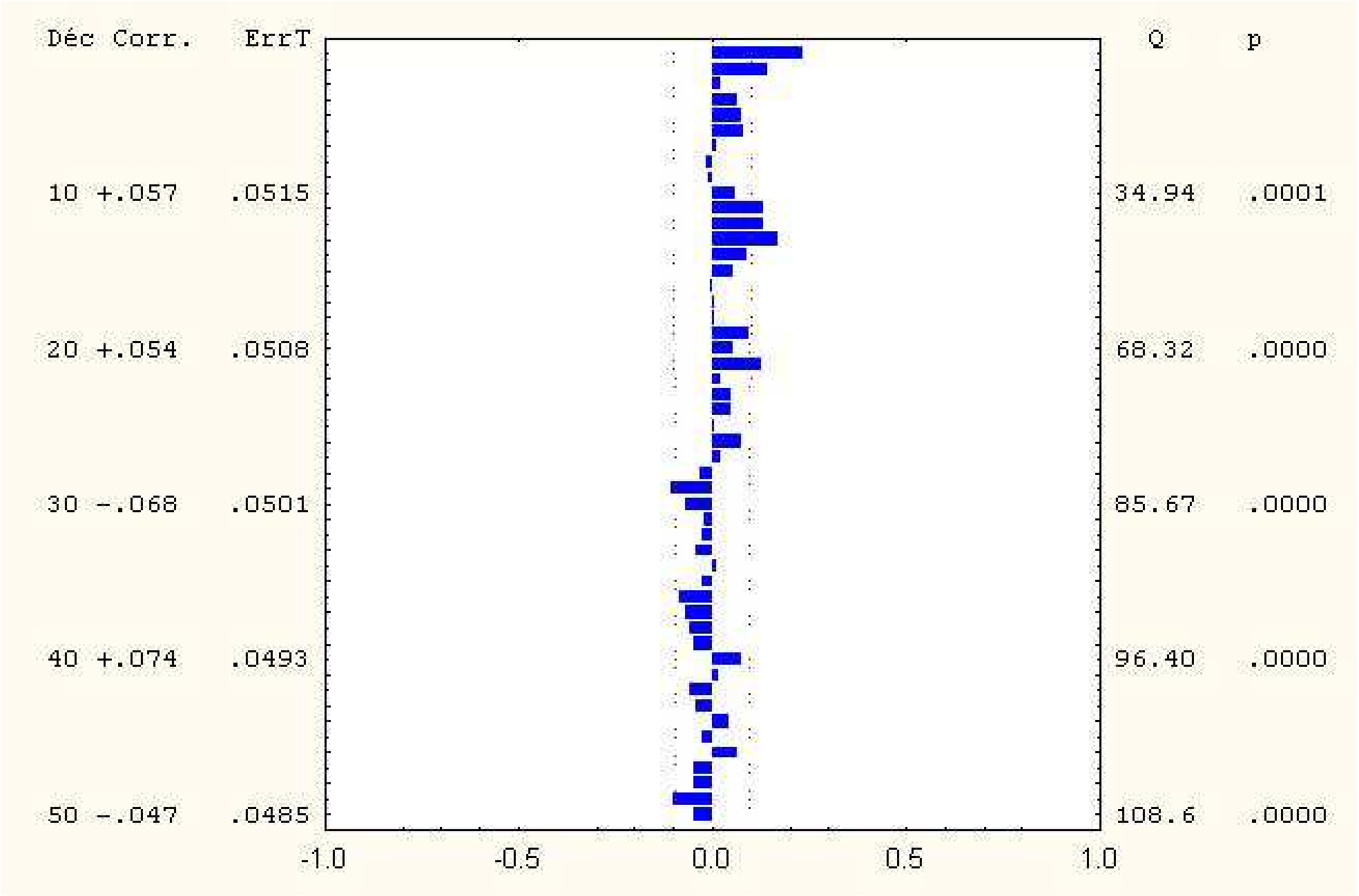


Time series of global self-esteem and measurement error item over a 6-month period (self-assessment twice a day, between 7:00 and 9:00, AM and PM)

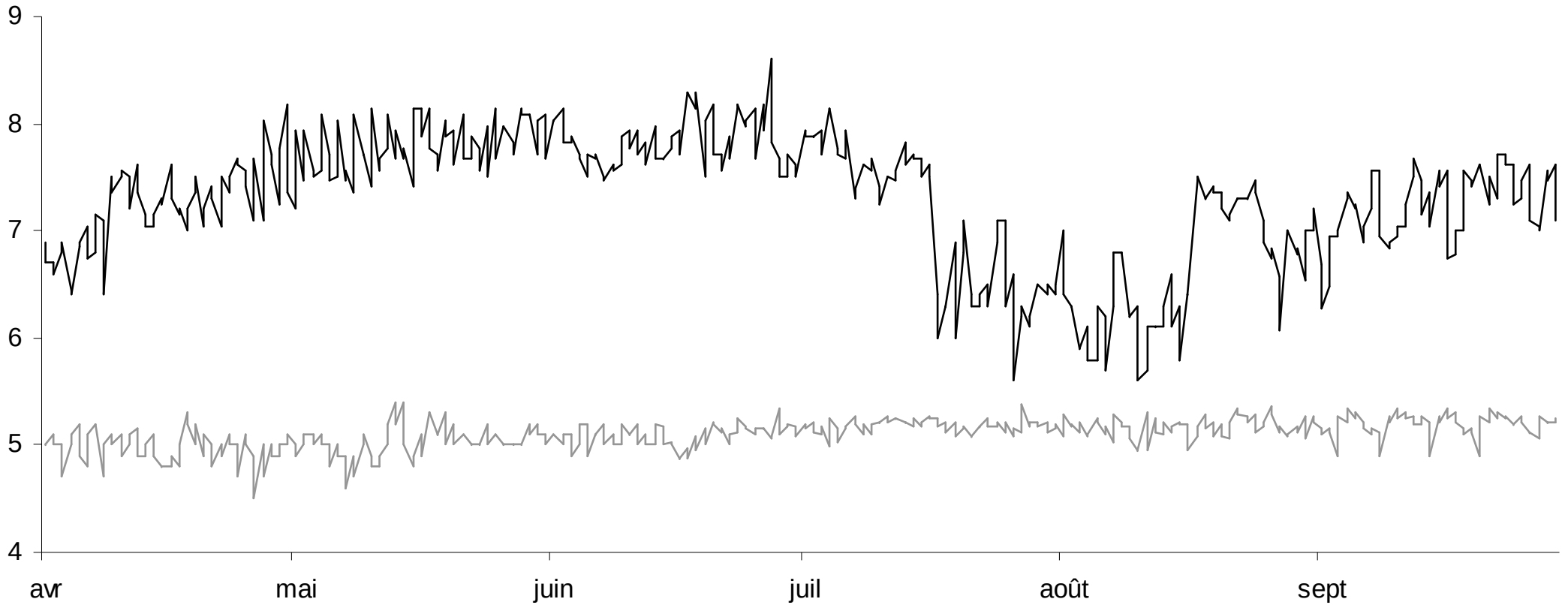
Time series analysis : Auto-correlation function



Time series analysis : Auto-correlation function



F : Woman, 29 years old



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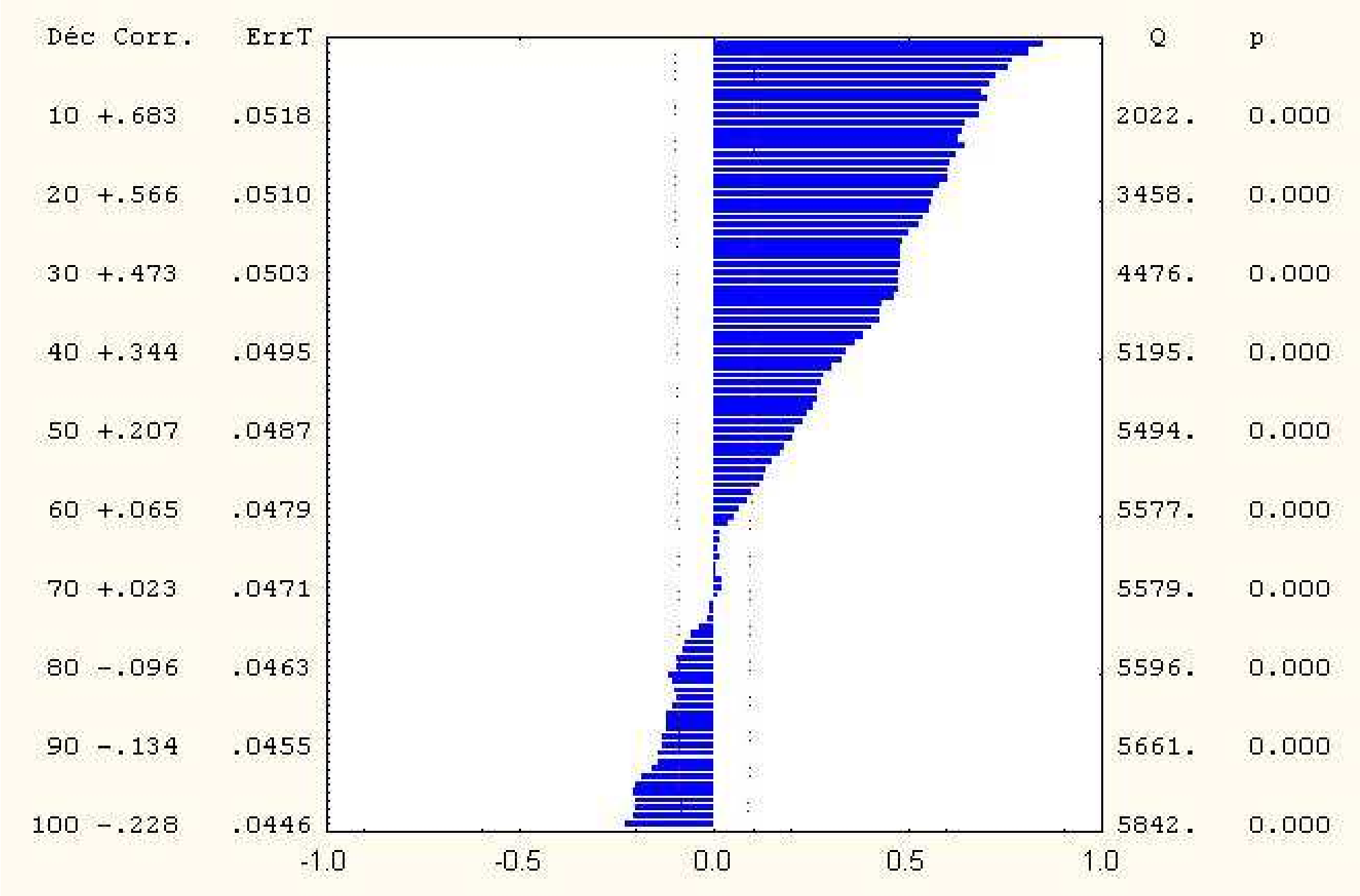


Instability (SD, Range, ADM)

- Self-esteem > measure error item (Ninot *et al.*, 2004; 2005)
- Inter-individual difference = indicator (Kernis *et al.*, 1993; Nezlek, 2002)

Historicity (ACF)

- Short term historicity ⇨ continuity of self (Tap, 1980; Tesser *et al.*, 1996)

⇨ resistance to change (Vallacher & Nowak, 2005; Vallacher *et al.*, 2002; Knowles & Lin, 2004)

⇨ self-verification (Swann, 1990)

⇨ personality (McCrae & John, 1992)

ARIMA : ecological condition

	6 months	1 year	512 days (17mths)
n	8	8	4
Observations	364	728	1024
ARIMA (0,1,1)	**8 / 8**	**48 / 48**	**24 / 24**
Publication	Ninot *et al.* (2005) JP	Ninot *et al.* (2004) IDR	Delignières *et al.* (2004) NDPLS

ARIMA models obtained in adults ($p < .001$)

ARIMA : experimental condition

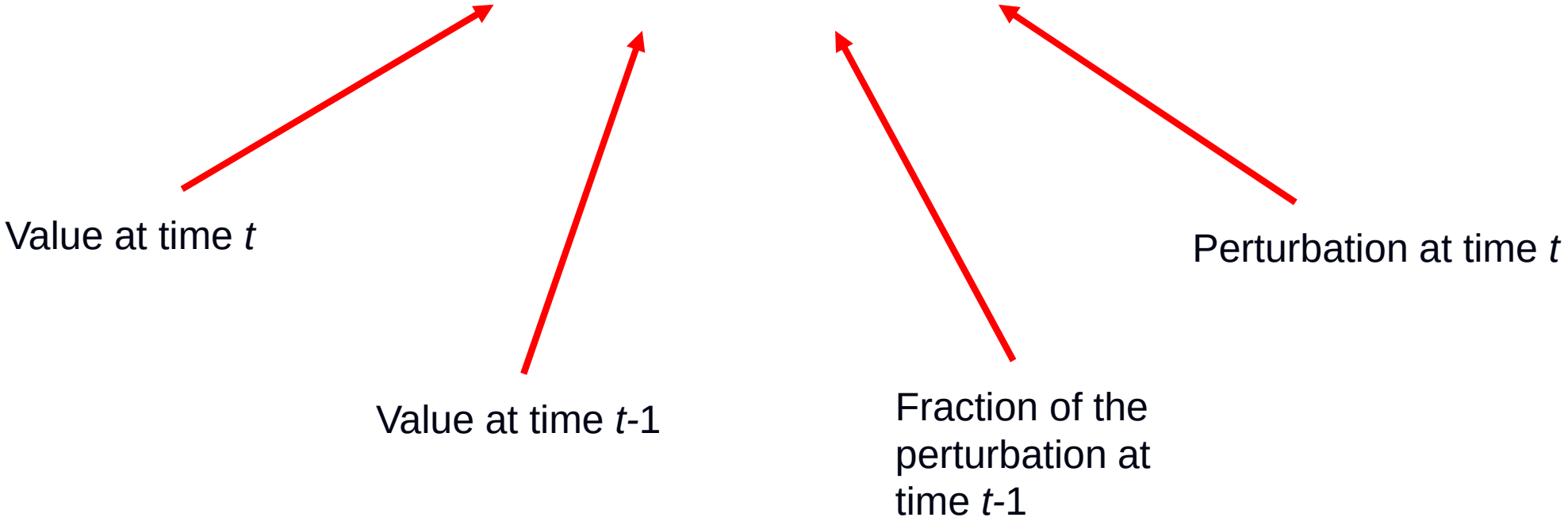
4.15 hours
Experimental
51
41 / 48
Ninot *et al.* (2004) IDR

(0,0,0) : $y_t = \mu + \varepsilon_t$

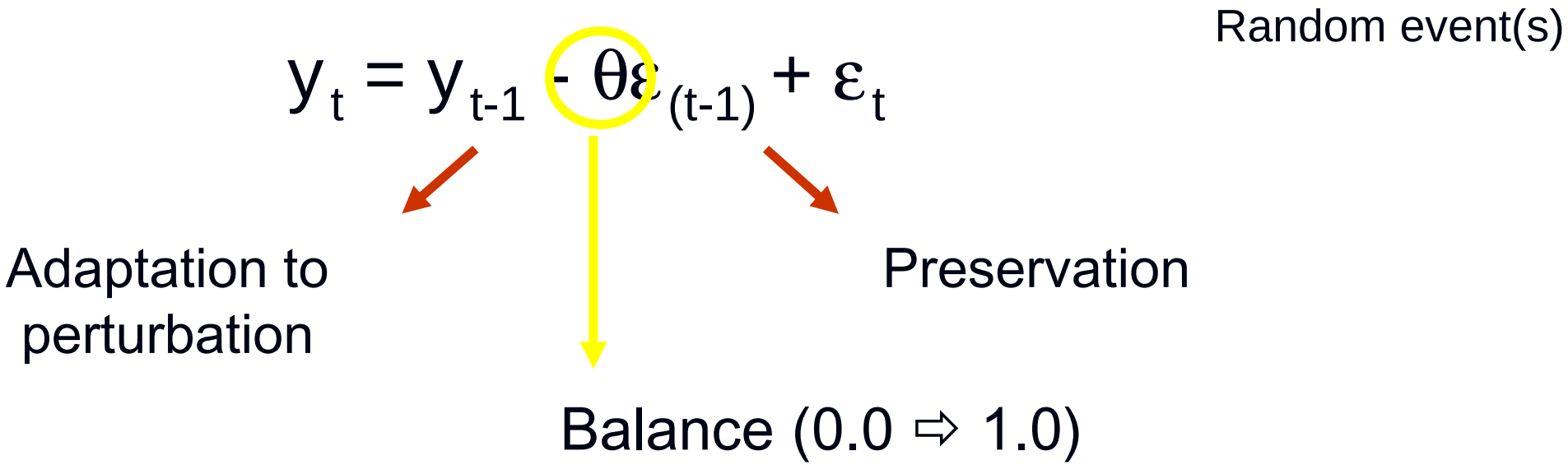
ARIMA model obtained in 8 adults ($p < .001$)

Moving average model ARIMA (0,1,1) without significant constant

$$y_t = y_{t-1} - \theta\varepsilon_{t-1} + \varepsilon_t$$



Mathematically: random variations around local value changing slowly



Without significant constant

A local equilibrium around a slowly varying reference value

Dynamical adjustment (Ninot *et al.*, 2004, 2005; Delignières *et al.*, 2004)

Dynamics

ARIMA :

- Same dynamics (0,1,1)
- Self-esteem evolves slowly under influence of life events
- θ determines the balance between preservation and adaptation

Fractal analyses ⇨ 1/ *f* noise

- ubiquitous phenomenon in biological systems

(West & Shlesinger, 1990)

- intrinsic properties of stability and resistance to perturbations

(Schmidt et al., 1991)

- characteristic signature of adaptive, young and healthy systems

(Haussdorf et al.,

1 - Detect very quickly HRQL alteration

Possible interpretations:

- Uninformed knowledge about cancer disease
- Untrained disease management (routine or acute situation)
- Presence of comorbidities and complications (depression, sleep trouble…)
- Low social support

Possible consequences:

- Increase of risk of exacerbation or aggravation
- Increase of unhealthy behaviors
- Appearance of new disease
- Deterioration of communications with clinicians, caregivers and close persons

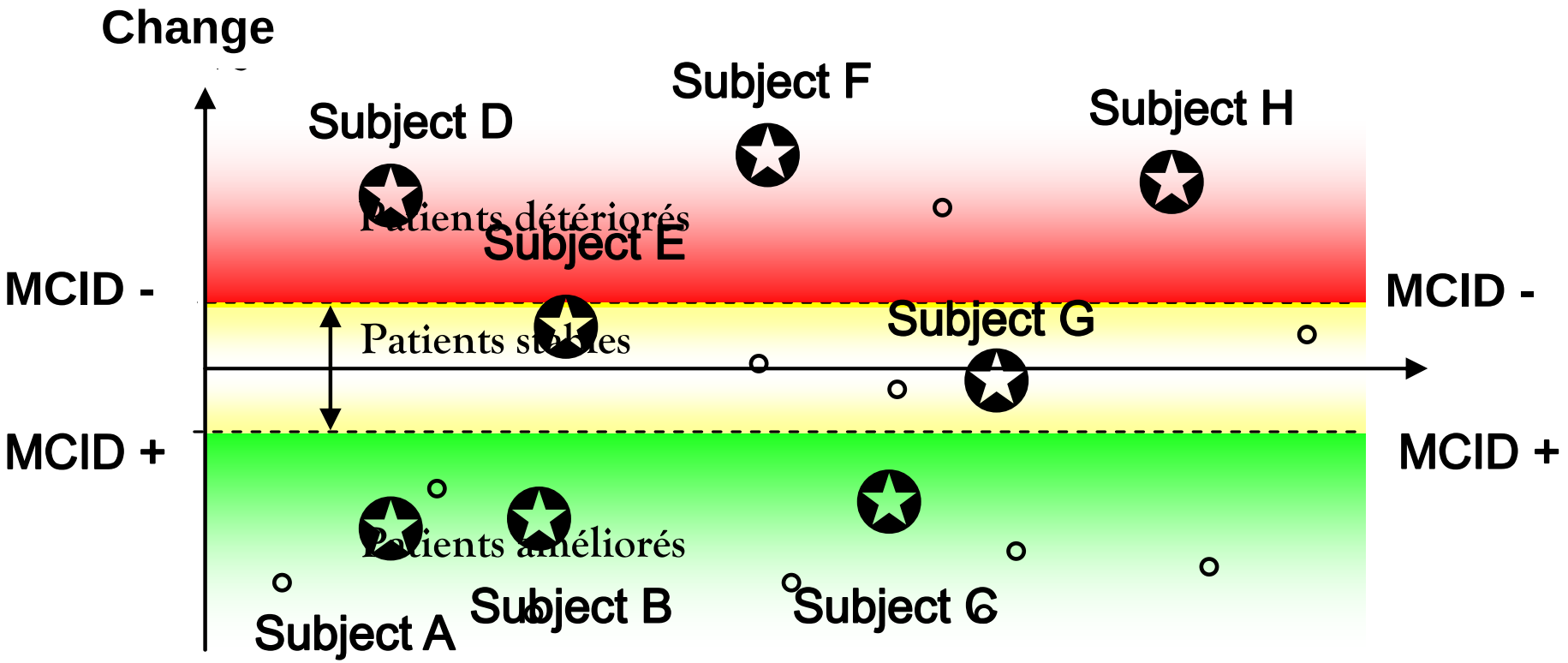
(Ninot, 2013)

2 - Debate with the team and personalize supportive care strategies

Fonctional	Psychological	Relational
- Treatment adjustment - Concomitant drug - Complementary tests - Exercise - Nutrition	- Complementary tests - Adherence to therapy - Disease management - Psychological intervention	- Social support - Group support session - Disease management - Local care network - Patients associations - Social network

(Moullec et al., 2011)

3 - Following treatment / care efficacy

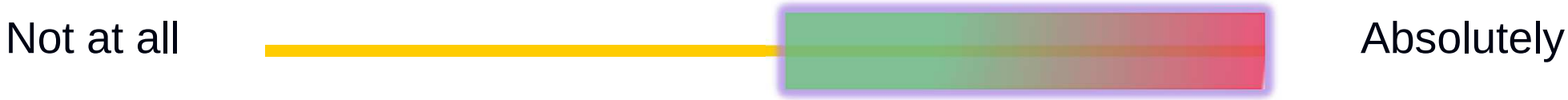


Minimally Clinical Individual Change (MCID)

(Ninot, 2014)

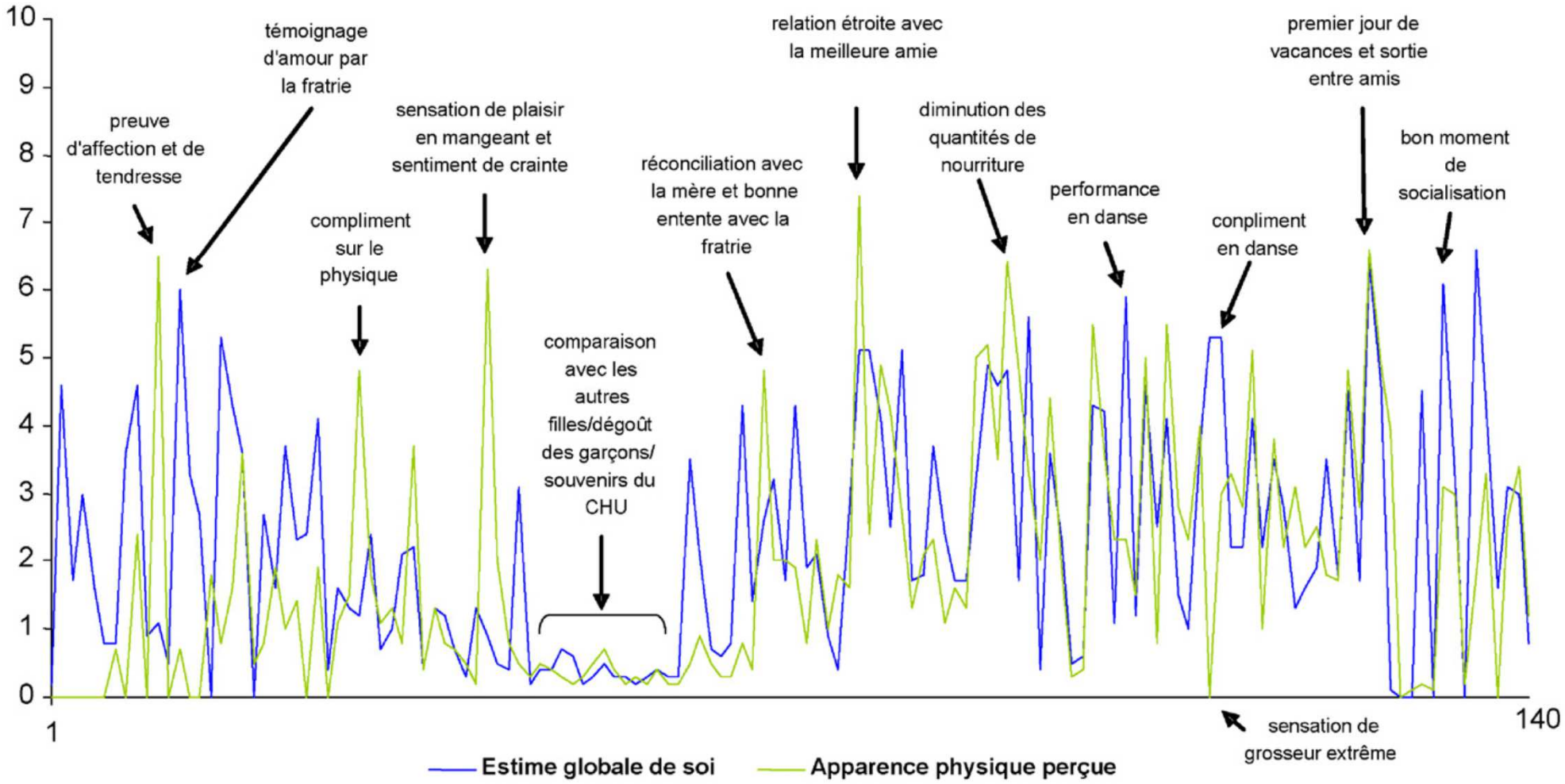
4 - Accompanying a person with a chronic disease

- patient-reported outcomes will improve communication between clinician and patient, enabling a common understanding of the severity of the patient's disease



(Ninot, 2014)

5 - Therapeutic value of retrospective presentation?



(Monthuy-Blanc *et al.*, 2008)

6 - With the help of electronic devices

- delivering personalized disease management message

- monitoring comprehensive cancer support care

(Ninot *et al.*, 2010)

The 4 P's of Medicine

Predictive, Personalized, Preemptive, and Participatory (Zerhouni, 2008)

HRQL and uncertainty for shared decision

Uncertainty (Leplège, 1999)

Dynamics of HRQL scores and related health behaviors

Case manager, serious game, E-Health, nutrition counseling…

A universal questionnaire?

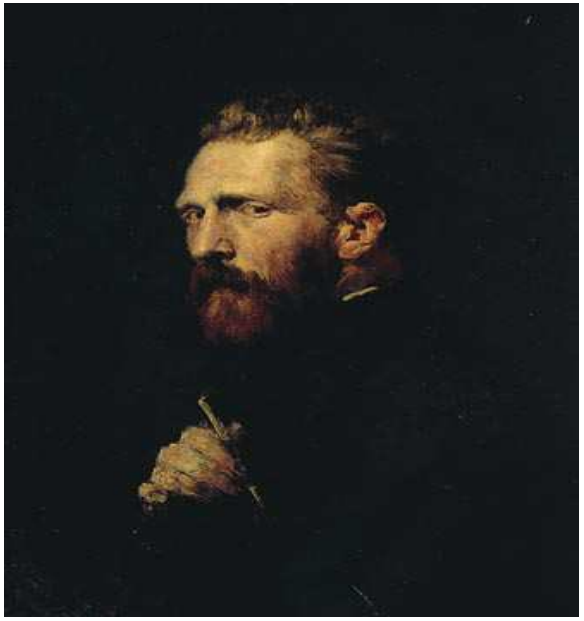
Brief instrument repeatedly used to analyze, model and forecast (Ninot, 2014)

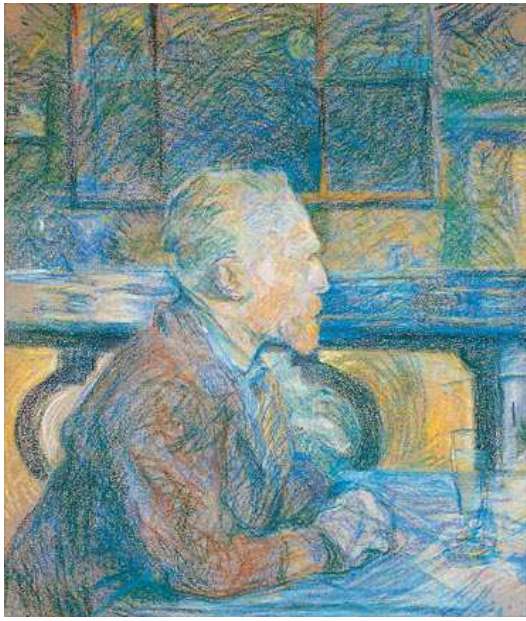
Engaging clinical use of VAS to follow dynamics of symptoms (Senesse *et al.*, 2014)

Conclusion

Intra-individual (e.g., follow up)

Inter-individual (e.g., phase III, RCT)





Conclusion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Conclusion

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gregory.ninot@univ-montp1.fr

European Journal of Applied Psychology, 51, 205-216 (2001)

A PSYCHOMETRIC TOOL FOR THE ASSESSMENT OF THE DYNAMICS OF THE PHYSICAL SELF

NINOT, G., FORTES, M. & DELIGNIERES, D.
E.A. "Sport, Performance, Health", Faculty of Sport Sciences, Montpellier, France[1]

The Journal of Psychology, 2005, *139*(4), 315–330

Individual Differences Research, 2004, *2(2)* 137
ISSN: 1541-745X www.idrg.org/idr/

The Dynamic Adjustment of Physical Self in Adults

Grégory Ninot*, Marina Fortes, Didier Delignières, & Christophe Maïano
University of Montpellier I, France

The Dynamics of Self-Esteem in Adults Over a 6-Month Period: An Exploratory Study

GRÉGORY NINOT
MARINA FORTES
DIDIER DELIGNIÈRES
Laboratory Symbolic Processes for Health and Sport
University of Montpellier I, France

Nonlinear Dynamics, Psychology, and Life Sciences, Vol. 8, No. 4, October, 2004.

The Fractal Dynamics of Self-Esteem and Physical Self

Didier Delignières[1], *University of Montpellier I, France*
Marina Fortes, *University of Montpellier I, France*
Grégory Ninot, *University of Montpellier I, France*