Critical Point on my research

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In fact, currently, my research is blocked by two problems, one with the clinic, the other with stabilometry.

Critique of my postural clinical examination

Clinically, I perceive the limits of my examination [1]. Admittedly, it remains seated on solid foundations: the trajectory of movement around one or a group of articulations is directed by two independent factors: The geometry of articular surfaces and the force vectors developed by the muscles. If the trajectory does not follow the law imposed by the geometry of surfaces, there is a problem. This problem may be related to postural hypertonia, which is very easily verified if a manipulation of an entry of the postural system makes the problem disappear immediately...

The logic of this examination, deduced from principles, is rigorous, but it observes only isolated sectors of the body, the clinician does not look at the posture of the whole body. The exact contrary of the Portuguese's examination [2], built on experience, in an inductive logic, but not justified logically by deduction of principles.

I am currently looking for a general law of asymmetries of the body, with the help of Serge Helbert in particular [3]. Movement analysis systems [4] should also help us to base this more comprehensive clinical examination.

We are on a track that starts from the couple vestibule/eye using the logic of lateralities. We have two legs, two hands, two eyes, two vestibules, we cannot use both at once to act: we shoot with one foot, we write with one hand, we aim with one eye, we stabilize on one vestibule. My hypothesis is that there is a dominant vestibule from which the regulation of postural tonic activity by the direct and crossed pathways that arise from ipsilateral vestibular nuclei would be defined. A first justification of this principle of vestibular dominance is provided by the z axis of the Cartesian referentials of the vestibules, because they are not parallel; they do not give the same references of verticality. Let's admit a time (???) that we do not see very well how they could work together. A priori the vestibule whose axis Oz is aligned with the visual vertical by the

inclination of the head [5], would be designated to be the dominant vestibule. But ???

Critique of my stabilometric signal analysis.

V. Belyaev [6], V. Usachev [7] and K. Inamura [8] definitively falsified the logical basis of my analysis of the stabilometric signal by showing that the postural system is involved in two aspects of our adaptation to the gravitational field: stabilization of body mass and return of the blood mass in the veins. I have never considered the stabilometric signal under this double aspect, I carefully mixed up everything under the sole point of view of the stabilization! ... The most gross logical fault involved by this error is that I believed in the myth of a mean position of the center of pressure [9], myth on which most of the stabilometric parameters are based. But the value of this statistical data depends on the duration of the recording, there is not « ONE mean position » of the center of pressure.

The first work of reconstruction of the stabilometric signal analysis consists in defining in this signal what belongs to the stabilization and what belongs to the venous return.

Duration is the first criterion of distinction since the work of Inamura [8[clearly indicated the relationship of venous return with oscillations of one minute. What happens once a minute cannot have anything to do with the stabilization phenomena which must be much faster to respond to destabilizations of any kind that affect body mass.

A first indication on the duration of the stabilization phenomena is simply oriented by Newtonian mechanics: the period of a pendulum measuring 100 centimeters is about two seconds, or thirty times less than the period of venous return. Of course, the body of the man is not a pendulum, but we can agree to model it as a pendulum.

A second indication is provided by the Fourier analyzes of the stabilometric signal. I have never encountered this analysis with the maximum amplitude of the oscillations being around 0.5 Hz. Although we do not have a full right to use the Fourier transformation for a signal which presents the properties of the stabilometric signal, one can nevertheless agree to infer from this evidence that we have no right to reduce the phenomenon of stabilization of body mass to what happens in two seconds.

In all logical rigor and for the moment, nothing allows us to define a criterion of duration which separates, in the stabilometric signal, the data related to the venous return of the data related to the stabilization of
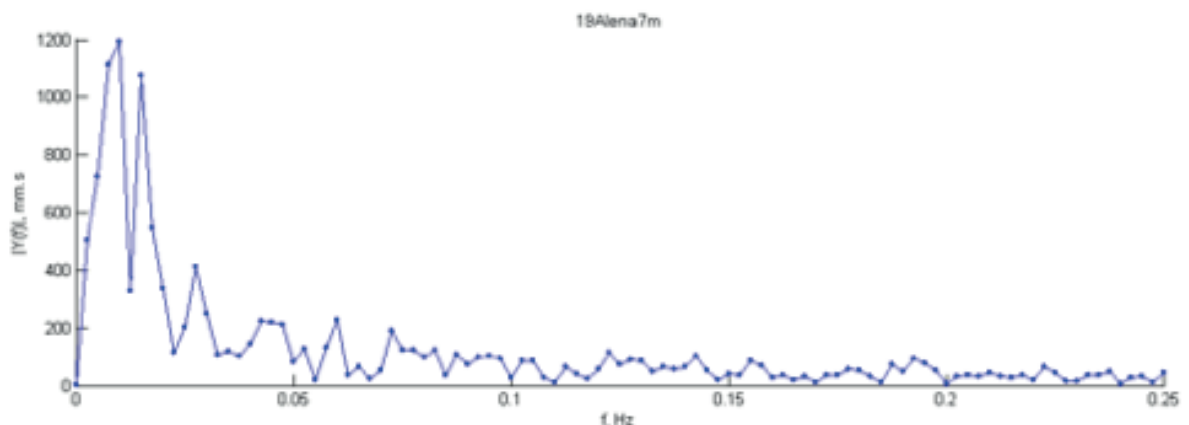
the body mass, we can only to affirm that these phenomena take place in durations of different dimensions.

In the absence of a firm general criterion of distinction between the two phenomena, we are obliged to consider a critique of each stabilometric parameter, taken one by one.

Usachev has already shown that the speed of movement of the center of pressure hardly changes with the duration of the recording [10]. I deduce that it must be the same for the speed and acceleration of the center of gravity

The LFS and VFY parameters, or their analogs, and the intercorrelations, compare two properties / states of the center of pressure (or gravity) movements, observed over the same duration. Their values should not depend on the duration of the recording, except in case of fatigue or loss of vigilance, which remains to be verified.

The interpretation of Fourier's transform must henceforth pay attention of two very different facts, without it being very well known how Fourier transform distinguish them, if not by the frequency of the different peaks

FFT d'un enregistrement stabilométriqiue d'une durée de sept minutes. (V.Belyaev & V. Usachev)
In the band 0 - 0.25 Hz is 98% of the signal power. The graph clearly shows three high-amplitude peaks:
First peak: 0.01 Hz (T »100 s or 1 min. 40 s)" Slow tide "(Rollin Becker, 1997; Michael Kern, 2005);
Second peak: 0.015 Hz (T » 67 s) - slow postural vibrations; (Inamura,1990)
Third peak: 0.028 Hz (T » 35 s) - tissue motility.

And what's to be done with parameters that depend exclusively on the coordinates of the mean position of the center of pressure: X-mean, Y-mean, Area, autocorrelation in X and Y, Collins curves? Can we keep them by defining, a priori, ONE mean position of the center of pressure BY REGISTRATION DURATION?

Forty years of practice of stabilometry by French posturologists [11] force me to recognize that the values of some of these parameters calculated on recordings of 51.2 seconds, provided indications considered interesting by clinicians, even if these values are not strictly defined.

This clinical impression was partially justified by a statistical study of the repeatability of one of these parameters according to the duration of the recording [12]. The average of three thirty-second records provides acceptable repeatability of the Area parameter of the 90% confidence ellipse.

In fact, observing the movements of the center of pressure during the first minute of Belyaev's seven-minute recording shows that they circle around like an attractor. And Usachev notes that this kind of pressure center movement is usual, according to his experience. Then after about a minute the center of pressure migrates to another region of the sustentation basis. The distances traveled by these movements of migration are much more important along the anteroposterior axis than along the right-left axis, which corresponds to this "impression" of the clinicians that the Y-mean parameter, taken alone, is an unreliable parameter, without interest. While the X-mean parameter is considered more reliable ...

For these historical reasons and until proven otherwise, I propose that we consider it acceptable that the values of the X-mean and Area parameters of the 90% confidence ellipse, calculated on thirty-second records, continue to be included in stabilometric signal analysis programs for clinicians.

The time of the dictatorship of reason is over according to the epistemologist Gaston Bachelard, it is necessary to convert to the imaginary [13], the clinical sense has its place in the "scientific" field.

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