

*[Text posted on the site pending its publication by the journal "Manual Therapy and Rehabilitation Journal Posturology"]*

*[Le texte français est disponible à cette adresse :*

*> <http://clinicalstabilometry.freeforums.org/conditions-de-l-enregistrement-t102.html><*

*OU: > <http://clinicalstabilometry.freeforums.org/> < puis NORMES13 Texte / Conditions de l'enregistrement]*

## **RECORDING CONDITIONS - NORMES13**

### **THE ENVIRONMENT.**

Stabilometry observes and measures how a man manages to stabilize in an environment arbitrarily imposed.

*(Definition of the stabilometry, voted with 100% of votes cast)*

This essential fact must be recalled, it highlights the importance of the standardized

### **The visual environment**

*(Text voted by a narrow majority: 55% of votes cast)*

#### **EYES OPEN**

To facilitate reproduction of an identical visual environment in different places we use a cabin 240 cm high, 100 cm wide and deep, within which the subject is placed. Its walls are made of a fabric widely draped, light beige, striped monochrome, little contrast, the ticking model. The folds and stripes perform a set of vertical lines low contrast.

This device ensures a good reliability of the identity of the visual environment. When the subject is in place the subject-object distance is 90 centimeters seen in the frontal plane and 50 centimeters in the lateral plane. The geometry of objects placed in front of the subject provides the visual cues needed for good perception of the forward-backward movement, as Paulus has shown [1].

We can blame this cabin to have mobile walls: an air stream, moving subjects too close to the cabin walls can cause a barely perceptible movement of tissue and yet sufficient to alter the visual input of the postural system. So you can either to require a perfect

quiet in the room during recording, or to use walls built with materials more stable and yet identical in appearance [2].

## VISUAL TARGET

*(Text voted by a narrow majority: 56% of votes cast)*

Outside the cabin is placed in front of the subject and at his eye level, a housing (120 cm high, 40 cm wide, 30 cm deep) painted matt black, inside which hangs a plumb with the cord of 3 mm in diameter, painted white, is strongly lit by two electric incandescent tubes of 60 watts, supplied by a current of 50 Hertz. A vertical slit, 10 cm wide over the entire height of the housing, allows the subject to see the plumb line but the light sources remain hidden on the sides, inside the box.

## EYES CLOSED

We wait five seconds after the closure of the eyes to start recording.

## ILLUMINATION

No light source is present in the visual field of the subject during recording, all the measures are measures of illumination, no luminance measurement was made.

The values of illumination that are given were measured at the vertical planes of surfaces viewed by the subject.

The frontal vertical plane containing the lead wire is subjected to an illuminance of 2,000 lux.

The front plane of the housing, in its part seen by the subject, is subjected to an illuminance of 60 lux.

The inner face of the anterior wall of the cabin, seen by the subject, is subjected to a 20 lux illumination.

The inner faces of sidewalls of the cabin, seen by the subject in his peripheral vision, are subjected to an illuminance of 60 lux.

The constancy of mood lighting is achieved by placing the cabin in a room lit by artificial light. The level of this light is 120 lux.

The spectral distribution of light has not been studied.

## SITUATIONS

All our subjects were recorded in two situations: eyes open and eyes closed ... With a 5-second delay between the closing of the eyes and the beginning of the recording.

### **The sound environment**

*(Text voted at 89% of votes cast)*

No one to our knowledge has made systematic research on the auditory input of the postural system. However it is likely that it has significance.

In these conditions it is difficult to monitor something else than rather general and imprecise data: the average noise level is kept low, at about 40 dBA and any sound source that would provide a directional auditory information is avoided.

### **The magnetic environment**

Although no sensor sensitive to magnetic fields has been described in humans, some authors believe that the upright postural control system would have a magnetic input. However, even in the laboratories of these researchers, there is no system of control and even less regulation of the ambient magnetic field.

### **FEET POSITION OF THE SUBJECT**

*(Text voted at 62% of votes cast)*

The subject goes barefoot on the platform. His feet are positioned by means of a wedge placed on the platform, so that his heels touch this wedge, and are separated from nine centimeters, feet form between them an angle of  $15^\circ$  whose bisector coincides with the sagittal axis of the platform. This wedge is removed after the positioning.

### **INSTRUCTIONS**

*(Text voted at 100% of votes cast)*

We must recognize that the Stabilometry is based on a semantic bet: the same instructions given to different individuals must induce similar behavior enough in order they can be compared. It was not clear a priori that such a bet was valid. But the consistency of

results in all stabilometry laboratories proves that in fact this bet is won. It is also necessary to pay attention to the instructions that we give and how to give them; Edwards already had noticed it [3].

## MONITORING OF VIGILANCE

*(Text voted 80% of votes cast)*

The subject counts freely in his head. At the end of the recording he is asked figure he has reached.

## LIST OF THE INSTRUCTIONS

Here is the list of the instructions, which must be adhered even with the same words:

- "Arm along the body" (execution control)
  - "Keep quiet, relaxed, motionless, looking in the direction of the plummet (or closing his eyes) and count freely in your head until you are told that it's over. Is it all right? So repeat instructions. " (Control of the response)
  - "You do not need to move? ... We can start?" (Control of the response)
  - "Close your mouth, teeth do not touch"
  - "Look in the direction of the plummet! Start counting! It's gone!"
- These instructions are given on the tone of a firm order, a little dry.

## ACQUISITION

### Data

Before signal acquisition must be collected:  
Identification data (name, surname, age, sex)

Three anthropometric data: the SIZE of the subject, his WEIGHT and shoe size. [4]

(It is expected that in the first five tags at the end of the recording data file, these data will be written and in this order: height, weight, shoe size, gender and age.)

The conditions of the recording, commonly the 'status' (open or closed eyes, hard or foam floor, with or without his glasses, with or without his shoes, in usual tongue posture or not, in mandibular posture of rest or not, etc.) must be noted

All these data must be easily accessible by computer in preparation for the management of the database made by the clinician of all his recordings. The desirable place of these data is after the first five tags from the end of the file that already include, in this order, height, weight, shoe size, sex and age.

### **Sampling Frequency**

*(Text voted 92% of votes cast)*

The analog signal from the electronic device of the platform is sampled at forty Hertz, digitized, processed in real time to calculate the coordinates of the center of pressure in the Cartesian reference frame.

### **Cartesian reference frame**

*(Text voted 92% of votes cast)*

When he goes on the platform, the subject is called to place the posterior edge of his heels against the wedge; the intersection of the anterior plane of this wedge with the plane of the platform is the  $x'Ox$  axis of reference, directed to the right of the subject according to Kapteyn [5].

The  $y'Oy$  axis, directed towards the front of the subject according to Kapteyn [5], is still the bisector of the angle formed by the tangents to the inner edges of the feet.

### **The recording duration**

*(Text voted 82% of votes cast)*

Registration takes 31.6 seconds - thirty-one seconds and six tenth -. This reduced period represents an attempt to solve contradictions between clinician wishes:

- To measure as accurately as possible,
- Multiply the recording situations,
- Not to tire the patient through a prolonged stay on the platform.

To obtain the most accurate measurement possible, we will make three identical recordings of 31.6 seconds, the mean of the parameters will be used. To multiply the situations there will only one record of 31.6 seconds for each situation. [6]

## **References**

- [1] - Paulus W. M., Straube A., Brandt Th. (1984) Visual stabilization of posture: physiological stimulus characteristics and clinical aspects. *Brain*, 107: 1143-1164.
- [2] - Rossato M. (2010) Nuova metodica di esame clinico 3D in posturologia. Congress CIES Italia, Belluno 20/03/2010.
- [3] - Edwards A.S. (1942) The measurement of static ataxia. *Am. J. Psychol.*, 55: 173-188.
- [4] - Magalhães de Oliveira J. (2016) Statokinesigram Normalization Method. *Behavior Research Methods*. DOI 10.3758/s13428-016-0706-4
- [5] - Kapteyn T.S., Bles W., Njikiktjien Ch., Kodde L., Massen C.H., Mol J.M.F. (1983) Standardization in platform stabilometry being a part of posturography. *Agressologie*, 24, 7: 321-326.
- [6] - Pinsault N. (2009) De l'objectivation des évaluations posturales et de la compréhension des mécanismes de contrôle de la posture bipédique à leur application en médecine physique et de réadaptation. Thèse ISCE Grenoble, Université Joseph Fournier