

Bibliothèque numérique

medic@

**Marey, Etienne-Jules. - Uniformity in
graphics records**

*In : Archives of medicine, 1880,
pp. 174-177*



(c) Bibliothèque interuniversitaire de médecine (Paris)
Adresse permanente : <http://www.bium.univ-paris5.fr/hist/med/medica/cote?marey069>

UNIFORMITY IN GRAPHIC RECORDS.

By E. MAREY, M.D.

PROFESSOR AT THE COLLEGE OF FRANCE.

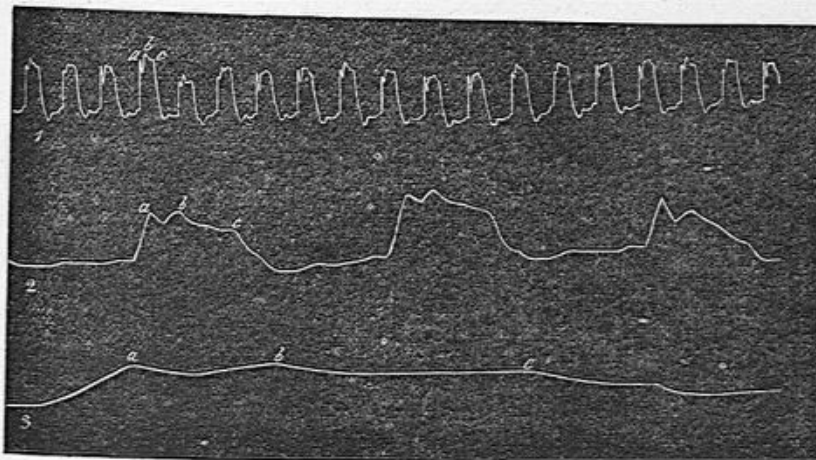
THE graphic method, whose application now extends from experimental physiology to physic, will not have acquired its full value until an agreement is entered into between those who use it, in regard to the measures, times, and rules of its *modus operandi*.

First we must adopt a direction in the reading of the tracings. This direction must be the same as that of ordinary writing from left to right. But too many authors have adopted the Oriental reading from right to left, without the slightest physiological reason for thus upsetting our visual and mental habits: only to suit the form of their instruments, as if the mind was made for the instrument, instead of the instrument to suit the mind. For the eye it is worse, since notwithstanding the warning which may have been given to the contrary, it is to the memory of visual impressions that the tracings of the physiological phenomena speak first, therefore by it are registered as images. In proof of which, if two similar tracings are presented to the eye in contrary orientation the two images inverted in regard to each other will never permit the mind to form a like ideal of the two. It is easy to see the gravity of the situation caused by a craving for discrepancy (called originality) in this matter, by causing two copies of the same sphygmographic

tracing to be put one above the other; and as we read it from left to right, the other as they read it, from right to left, you will see how difficult it is, even for the most experienced eye to make out the points of comparison between the two.

Allow me here in parenthesis to give an advice whose necessity comes to me under the shape of sad experience. Printers will often invert the stereotypes of tracings. We often meet in books with this unconscious blunder, particularly in pulse-tracing, which are thus rendered unintelligible. I would propose in order to render this mistake impossible, to affix a letter or conventional mark, indicating the upright position which the stereotype must occupy in the page.

But the most important reform would be the making of an agreement in regard to the uniform scale of the time of a graphic operation. In other terms, I consider it an urgent reform to inscribe the tracing upon a paper which shall move at a uniform rate of speed. Indeed, the tracing of a given act taken on a paper running at a certain speed of the chariot will differ entirely from those taken at different speeds, as shown by the following example :



These three tracings are of the the pulsations of the heart of a subject, taken with the same apparatus, but when the paper was on chariots running at different speeds. That is why the undulations *A, B, C*, though common to the three tracings, give lines which differ so much as to have lost the characters of their identity, showing that a uniformity in the march of the chariot, is the condition of fidelity in the results.

If it is necessary to take the tracings at a uniform speed it is equally necessary to agree upon what that speed shall be, and to use that speed agreed upon, in order to insure the uniformity of significance as well as the truthfulness of the tracings. In the stereotype here represented, figure 2 is the only one which reproduces truthfully the details of the curves: figure 1 condenses them too much: and figure 3 makes them too flat by extension.

The tracing No. 2 is obtained with a speed of the paper corresponding to 0.02 m. (two centimetres) per second. This is the most favorable metric value or time for calculation, because it allows us to measure mathematically the fractions of a second, since one-tenth of a second would correspond to a length of 0.002 m. (2 millimetres).

But if this speed of the paper is the most convenient for certain experiments, as those on the circulation of the blood, on the respiration, and on the muscular contractions; there are others, in which the paper must travel on swifter or slower chariots. Thus, for the tracing of phenomena of long duration, the speed must sometimes be as slow as 0.001 m. (1 millimetre) to the minute; whilst for the tracing of rapid acts, for instance of the nervous acts of vision by the method of Helmholtz, or by that of Du Bois-Reymond, the second needs to correspond to a speed of 1 m. (1 metre) of the paper.

I have discussed in my *Méthode Graphique*, page 461, etc.

the general reasons which must guide us in the choice of sphygmographic times, and I proposed five rates of speed, as sufficient for almost all wants. Now, upon a larger experience, and for the sake of simplicity and uniformity, I propose to reduce the number of rates of speed to be employed in physiological experiments to the three above mentioned. For the usual experiments made upon man in health or in disease,—such as those to obtain the graphics of the pulse, of the movements of the heart, of the changes of volume of organs by respiration, muscular contraction, etc.,—I think a unique speed of the chariot carrying the paper would suffice, and that the best would be that of 0.02 m. (or 2 centimetres) per second, which is easy to obtain with precision.

I submit these suggestions to physiologists and physicians with a degree of earnestness, since the more we work without uniformity of measure of time, the more we prepare elements of chaos instead of elements of science. Therefore I call attention to the necessity of agreeing on a measure of sphygmographic time, and would be happy if this appeal leads us to the adoption of uniformity in our tracings.