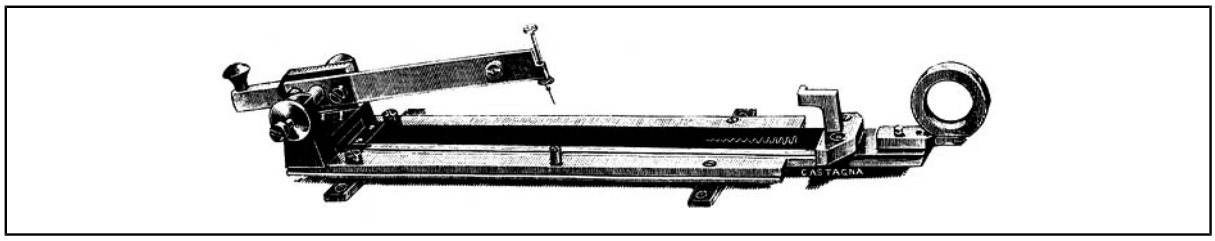
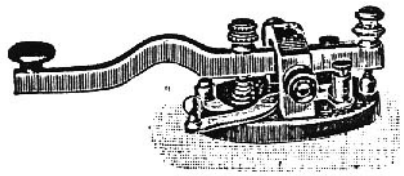
The Neuramœbimeter. A Short Guide to "Hirn und Zeit"

Henning Schmidgen



Neuramœbimeter. Taken from Castagna, Ludwig. n. d. Neuramöbimeter nach Hofrath Prof. Dr. Sigm. Exner und Prof. Dr. H. Obersteiner. Wien.

The Neuramœbimeter is a simple instrument for measuring reaction times in human beings. Invented in the late 19th century, it presents itself as a compromise-formation between chronoscopic and chronographic laboratory devices. More concretely, it combines features of a telegraph key and a tuning fork. Devoid of a contact, the telegraph key here culminates in an elongated spring, carrying a bristle or needle. The spring is arranged in such a manner that, similar to a tuning fork, it oscillates in lateral direction exactly 100 times per second. As long as the Neuramœbimeter remains at rest, the needle lies on a rectangular glass plate.

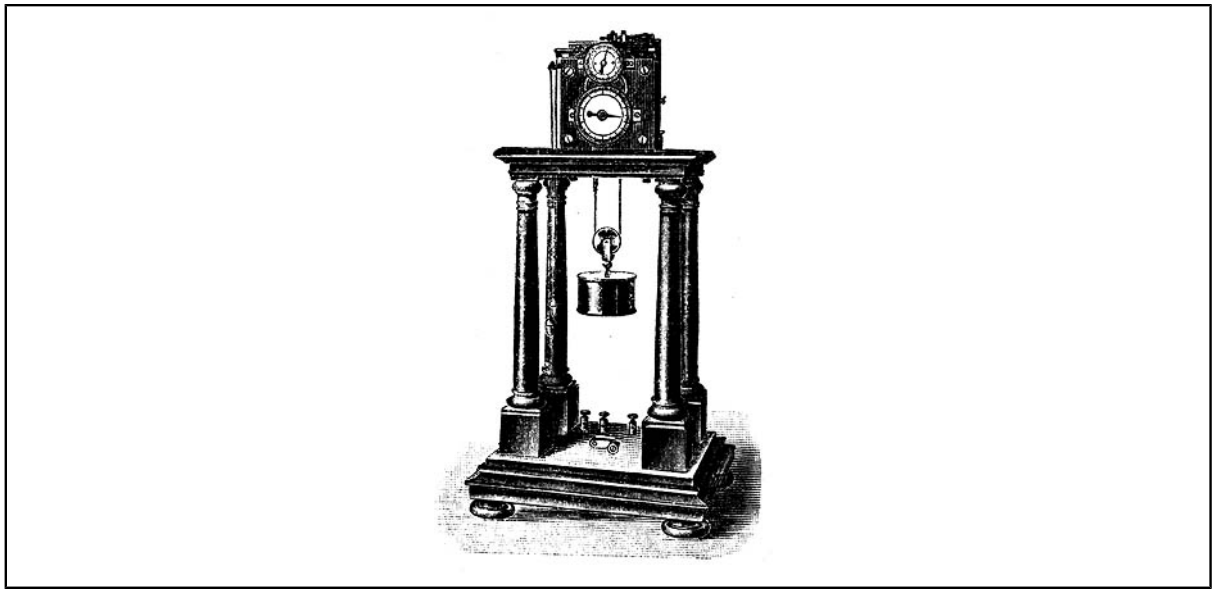


Telegraph key. Taken from Zimmermann, E. 1903. XVIII. Preis-Liste über psychologische und physiologische Apparate. Leipzig, p.39

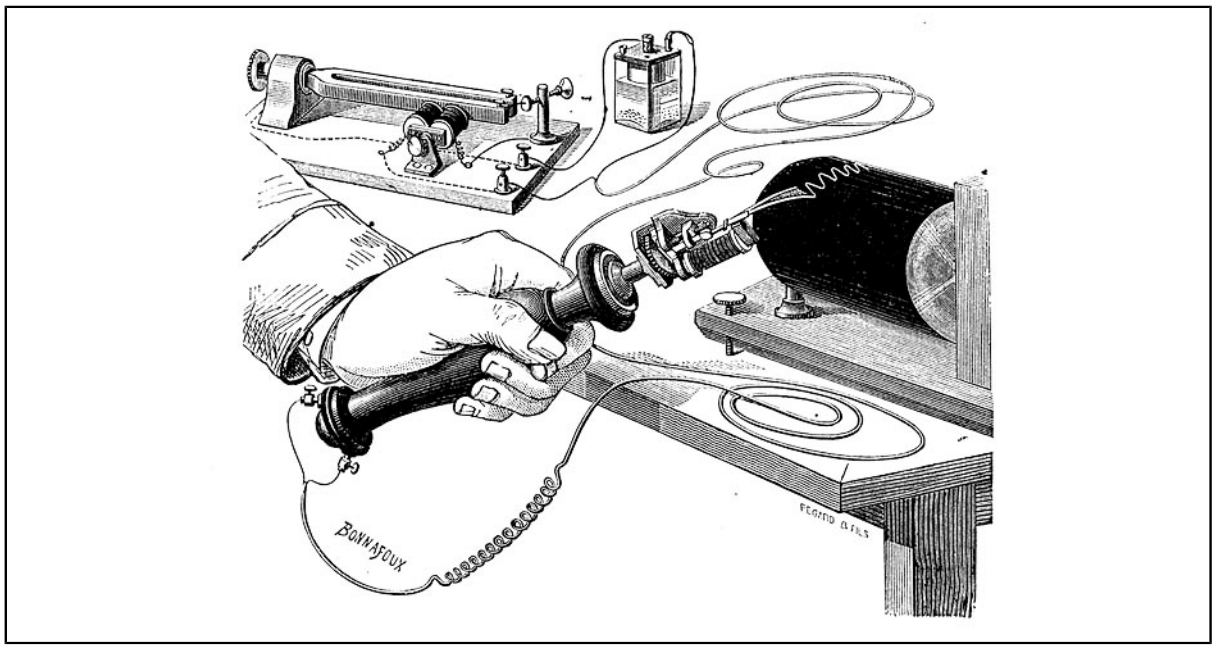
In order to perform a time measurement, the experimenter first must cover the glass plate with soot, obtained by exposing it to the smoke of an turpentine or gas lamp. He then sets the spring into motion by manipulating a ring-like trigger mechanism situated opposite the telegraph key. The glass plate starts to move toward the operator and the needle is scratching its oscillatory movements into the soot. The registering process has begun. At this point, the test person already knows what to do. He or she is to react as quickly as possible to the clearly audible sound of the triggering mechanism. Pushing down the telegraph key removes the needle from the moving glass plate and brings the registering process to an end. Counting the numbers of recorded spring vibrations eventually gives the time for the reaction process, with a precision of up to 1/100 of a second.

Traces of a Chronographic Tuning Fork. Taken from Marey, Jules É. 1875. La méthode graphique dans les sciences expérimentales. Physiologie Expérimentale. Travaux du laboratoire de M. Marey 1: 123-164, p.137.

The neuramœbimeter measures time by picturing it, and it pictures time by writing it. As much a chronoscopic as a chronographic device, it was introduced to the world of science in 1873 by the Viennese physiologist Sigmund Exner. Following Exner's ideas and plans, a local instrument maker, Heinitz, furnished the innovative instrument. It experienced a rather brilliant career but quickly fell into oblivion. In 1874, the Austrian psychiatrist Heinrich Obersteiner, a friend of Exner's, rushed to apply the neuramœbimeter as a 'simple method for studying the cerebral performance in the mentally ill.' Ten years later another Vienna-based Sigmund, future author of the *Traumdeutung*, used it for measuring the impact of cocaine on what he called the 'psychological time of reaction'.

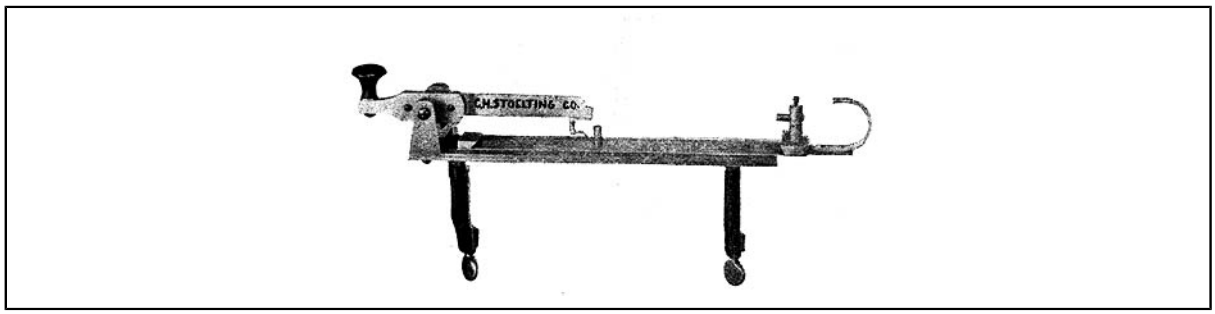


Chronoscope by Hipp. Taken from Zimmermann, E. 1904. Apparate zu experimental-psychologischen Untersuchungen nach Angaben des Herrn Prof. Dr. Sommer. Leipzig



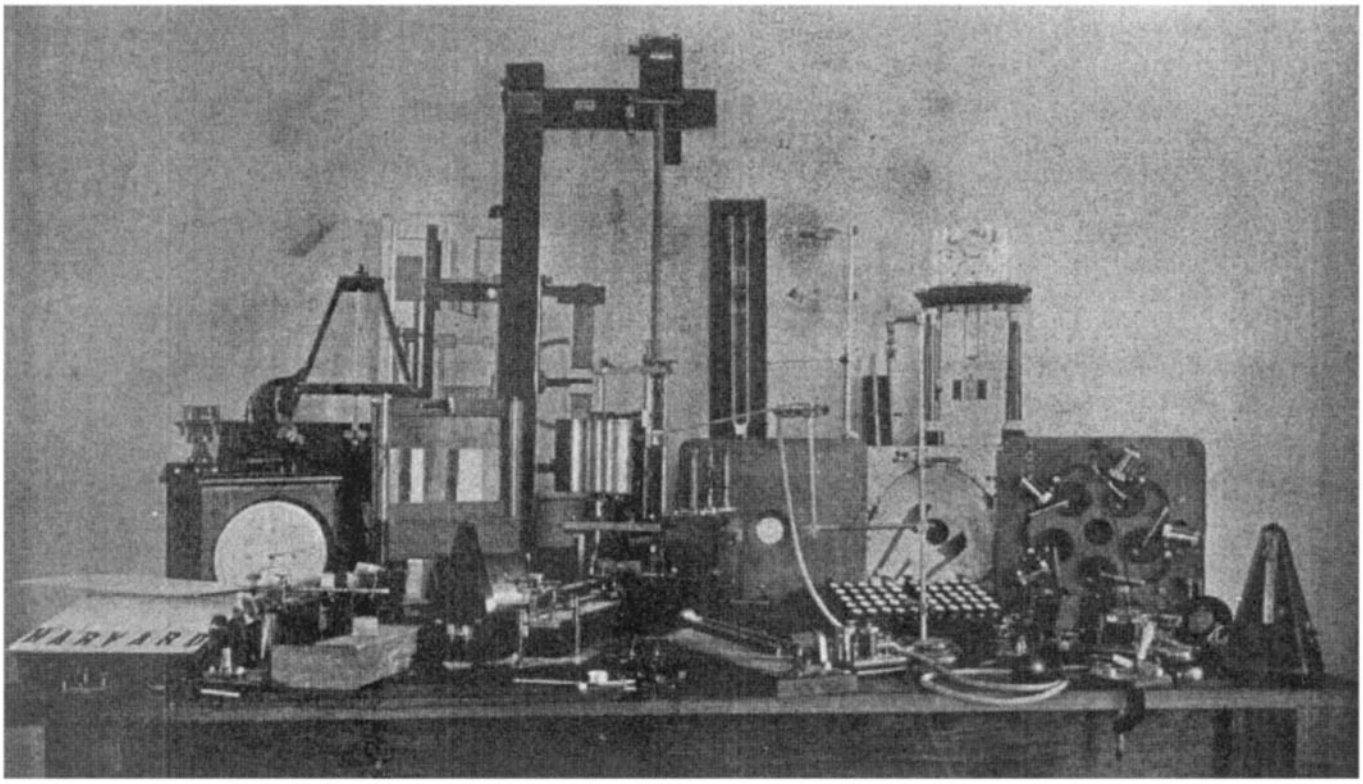
Chronograph by Marey. Taken from Breguet, Louis. 1877. Catalogue Illustré: Appareils et matériaux pour la télégraphie électrique, instruments divers, électricité - physique mécanique - météorologie, physiologie, machines magnéto-électriques de gramme, lumière électrique. 3rd ed. Paris, p.95.

In 1890, William James referred to Exner's instrument in his *Principles of Psychology* in the section devoted to the temporal conditions of brain activity. James mocked the 'chronograph philosophers' who made use of this and similar timing devices in psychological research. Hugo Münsterberg was not impressed. When he came to Harvard in 1893 in order to organize the local psychology lab, he quickly acquired a neuramœbimeter. Shortly thereafter the striking instrument vanished from sight. In 1930, it re-surfaced in a trade catalogue issued by the Stoelting Company in Chicago. Thereafter it was no longer mentioned in articles and books nor pictured in trade catalogues.



Exner's Neuramoebimeter. Taken from Stoelting, C. H. 1930. Apparatus, Tests and Supplies for Psychology, Psychometry, Psychotechnology, Psychiatry, Neurology, Anthropology, Phonetics, Physiology, and Pharmacology. Chicago, p.69/70.

The name that Exner had chosen for his device significantly contributed to this development. From the very beginning, ‘neuramœbimeter’ seemed awkward. It provoked ideas about ‘amœba’ and the ‘amoibaion’. It also suggested ties between neurology and the Moebius strip. In fact, Exner had derived the term from the Greek word *amoibë*, which he translated as ‘response’ or ‘exchange’. As a consequence, the instrument’s name literally translated into ‘nerve-reply-measurer‘. In the late 19th century, there was only one such name given a similar device that could compete with this esoteric designation. In 1865, the Dutch physiologist Franciscus Donders had baptized his rather complicated instrument for measuring the physiological time of psychological processes ‘noëmatachograph’, i.e. ‘speed of thought writer’.



Instruments for measuring the time of psychological processes (1893). Taken from Münsterberg, Hugo. 1893. Psychological Laboratory of Harvard University. Cambridge, Mass.: University Press of Cambridge, Mass., p.12, table VI.

Obersteiner was the first to propose a more appropriate label. Quoting from Exner, Obersteiner argued in 1874 that the instrument in question was meant ‘to measure the temporal duration of a way that a specific psychological process has to run through’. As a consequence, he suggested calling the instrument ‘psychodometer’, a word derived from the Greek *psyche* (soul) and *hodos* (way). James and other authors in the English-speaking world readily adopted the new term. Münsterberg begged to differ. Instead he used a short phrase which described the operative features of the device. In his writings, the ‘neuramœbimeter’ turned into a ‘reaction-time instrument with vibrating arm and smoked slide.’

The twists and turns of this history helped cause the neuramœbimeter to become invisible. While historical instruments continue to disappear, in this case the vanishing from sight seems highly ironic. The neuramœbimeter was meant to record time. Time, however, did not respond in any similar way.

This text is an excerpt from the preface to Hirn und Zeit: Die Geschichte eines Experiments, 1800-1950. Berlin: Matthes und Seitz, 2013, pp.7-15. An alternate version appeared in David Link and Nils Röller (eds.), *Objects of Knowledge, of Art and of Friendship: A Small Technical Encyclopaedia* (pp.94-96). Leipzig: Institut für Buchkunst, 2011.

If you are interested in accessing historical sources discussed in “Hirn und Zeit” and obtain additional information, here are some suggestions:

Chapter 2: Cambridge 1951 – Camera Silenta

Sound Proof Room in the Yale Psychological Laboratory (1895)

Short Biography of Edward Wheeler Scripture (1864-1945)

Scheme of the Cerebral Reflex from Ludwig Lange’s “New Experiments Concerning the Process of Simple Reactions to Sense Impressions” (1888)

Chapter 5: Königsberg 1850 – What is an Event?

Short Biography of Hermann Helmholtz (1821-1894)

Helmholtz on the “Methods of Measuring Very Small Portions of Time, and Their Application to Physiological Purposes” (1853)

Laboratory Note Book by Hermann and Olga Helmholtz (1850)

Emil du Bois Reymond “On the Time Required for the Transmission of Volition and Sensation Through the Nerves” (1866)

Chapter 7: Paris 1889 – Central Peripheries

Christoph Aeby’s scheme of the course of fibres in the human brain and spinal marrow (1883)

Models of Human and Animal Brains at the Harvard Psychological Laboratory (1892)