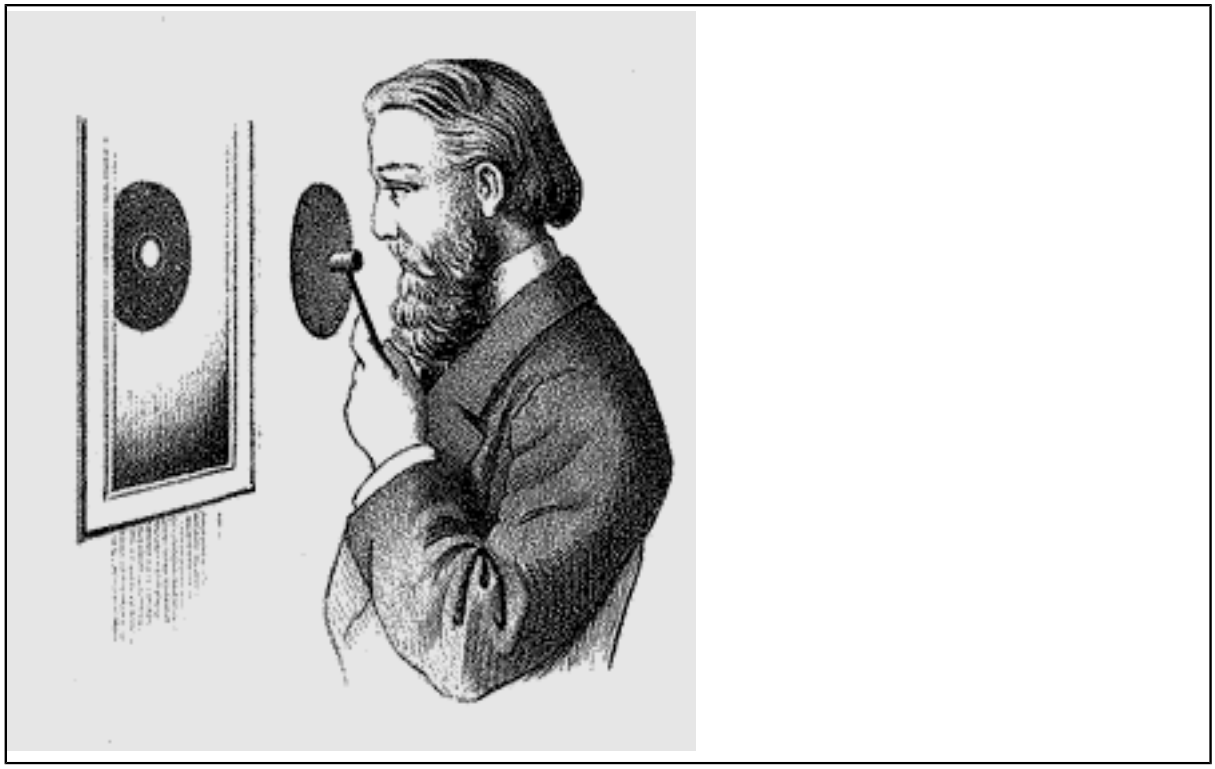
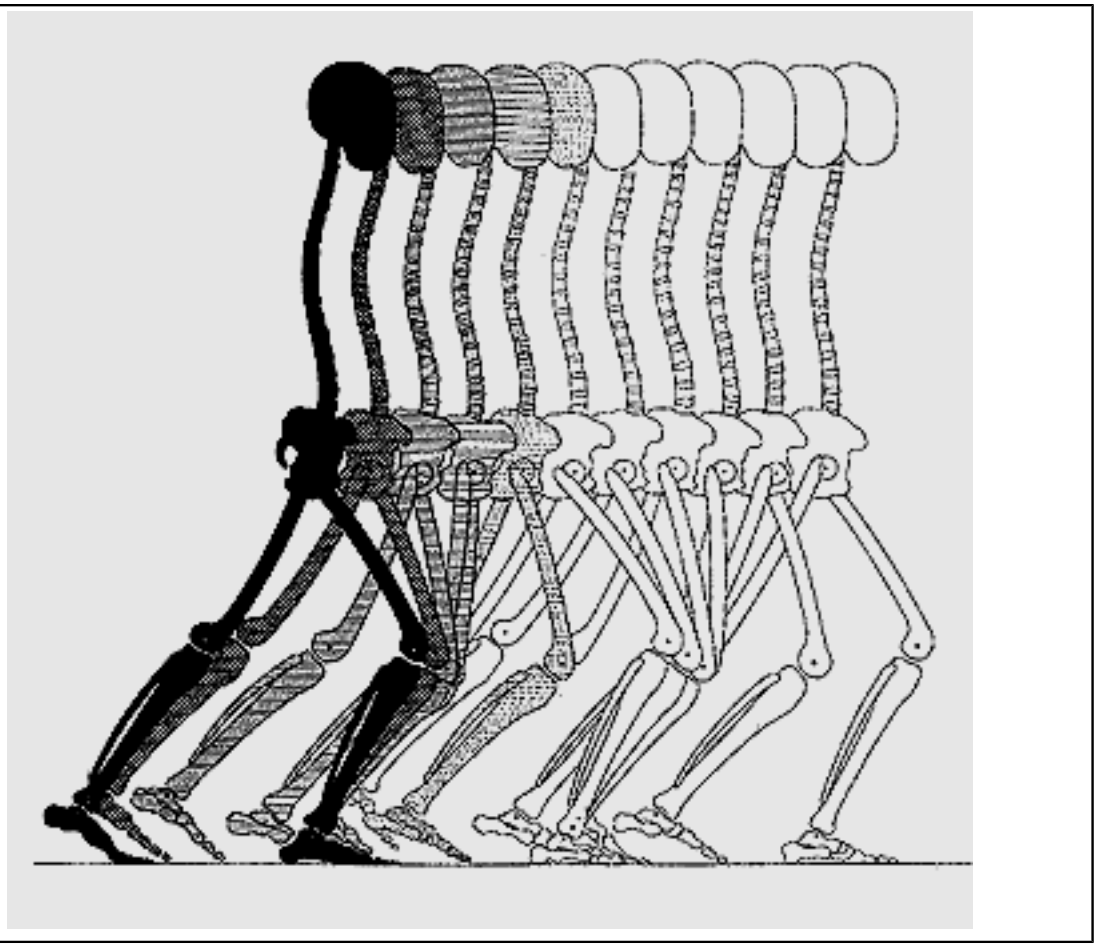
Le cœur mis à nu Movement-Images in Experimental Physiology, 1830-1860

Henning Schmidgen



Le nombre des images que l'on peut ainsi provoquer est infini. Charles Baudelaire

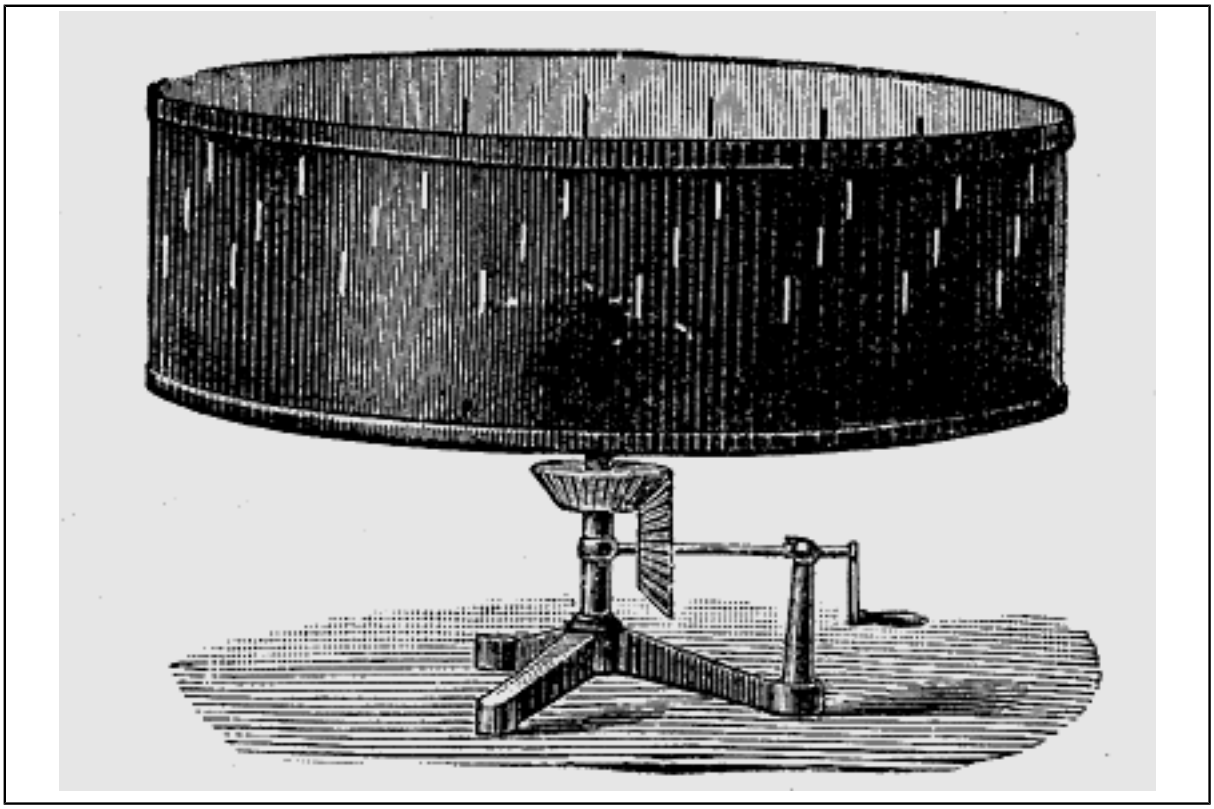
As early as 1747, Albrecht von Haller (1708-1777) defined physiology as "animated anatomy". It is hardly surprising, then, that nineteenth-century physiologists did not want to rely exclusively on the static forms of texts and figures when distributing their experimental knowledge.



from: Weber and Weber, 1894

Instead, they began to produce "movement-images" (Deleuze), adopting elements from the very system that, according to Deleuze, is also at the basis of cinematography: images of moments in equal intervals, a transfer of these images and intervals on to a support, and a driving mechanism for transporting the images.

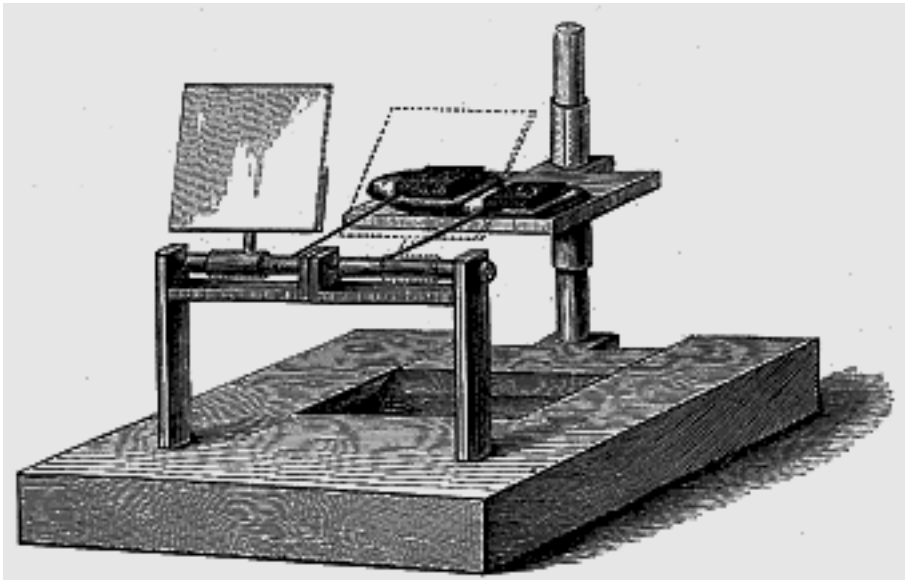
In 1836, Wilhelm Weber (1804-1891) and Eduard Weber (1806-1871) published a study of the "Mechanics of the Walking Apparatus". To convince their readers of their mechanical theory of walking, they used a stroboscopic apparatus. If there was no "total numerical identity" between their theory and the results of their experiments, then there should be at least some visual evidence for it.



Helmholtz, 1916 (Zootrope)

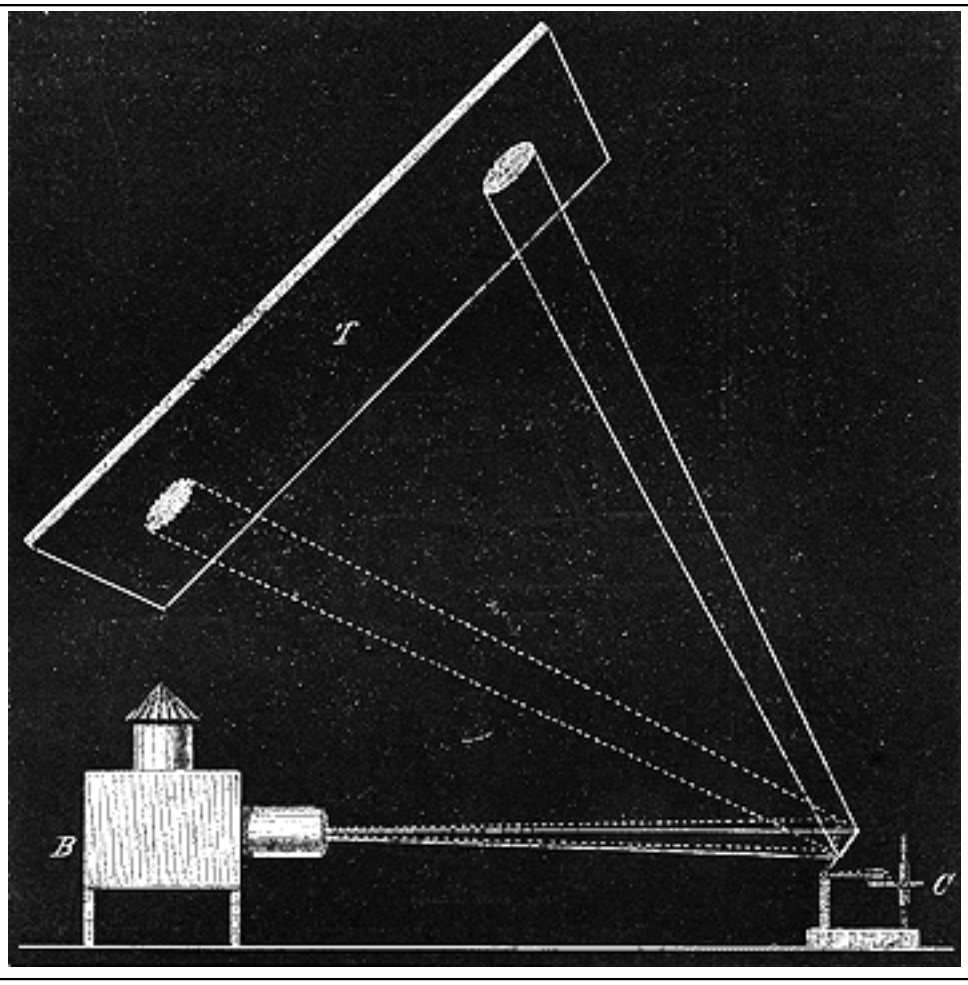
For this purpose, the readers were asked to use a "Daedalon" (or "Zootrope", as it was later called). First, they were asked to draw images of the different phases of the walking process according to the theory put forth in the book. Then they were to place these images inside a rotating drum. While it was rotating and readers were looking in through the slots from outside they could see a perfect walking movement.

Johann Nepomuk Czermak, a student of Purkyne, was especially eager to distribute the knowledge of experimental physiology by means of movement-images. In 1867, this later director of the physiological "spectatorium" at Leipzig (1871) gave popular lectures on physiological topics at the University of Jena. In a lecture on the heart, Czermak tried to demonstrate its rhythmic movement by using a cardioscope specifically designed for this purpose.



Czermak, 1879 (Stativ)

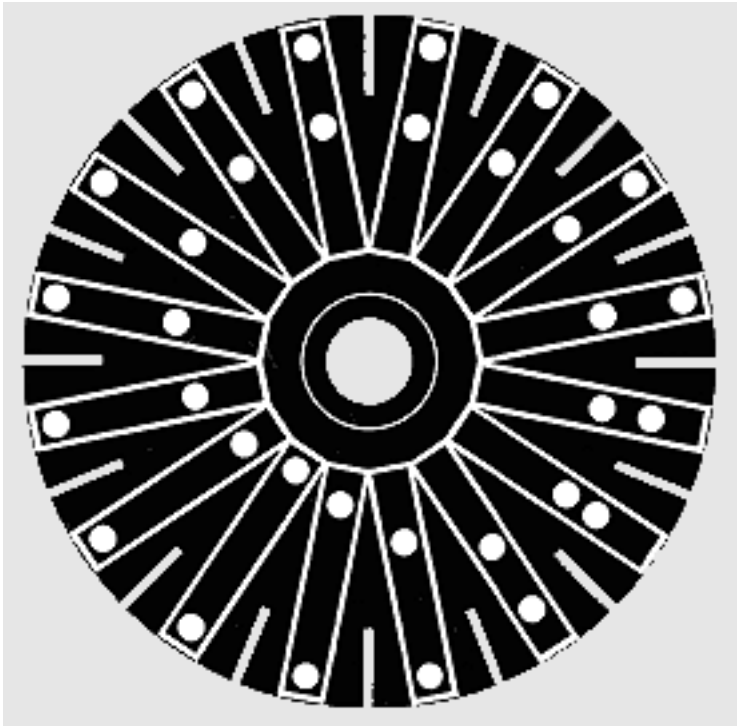
A still-contracting heart cut out of a frog was posed on a small tripod. Small pieces of cork were placed on the two heart chambers. The cork pieces were connected with angled steel sticks. At the end of each stick was a light mirror plate that moved forward or backward when the corresponding heart chamber was contracting.

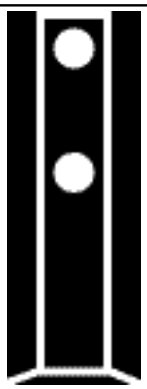


Czermak, 1879 (Projector)

By means of a device "similar to a laterna magica" (Czermak), a ray of light was directed onto both mirror plates. The plates reflected the light onto a screen. In the darkened lecture hall, the auditorium could see an enlarged image of heart movement.

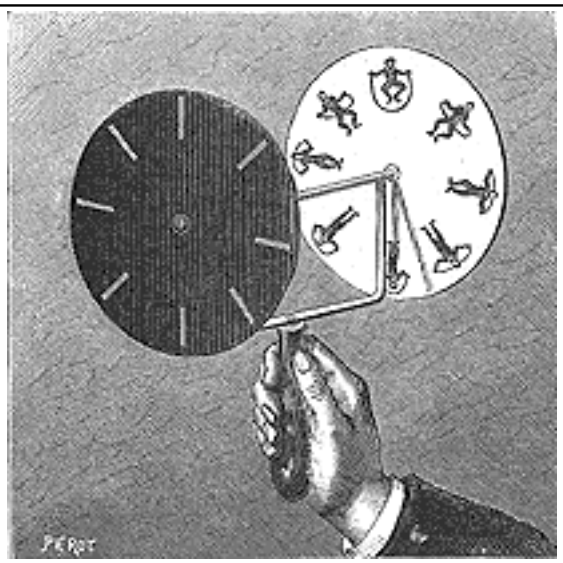
But Czermak not only wanted his audience to see these movement-images, he wanted readers of the published lecture to see them as well. For this purpose, he designed a black disk with white points and lines.





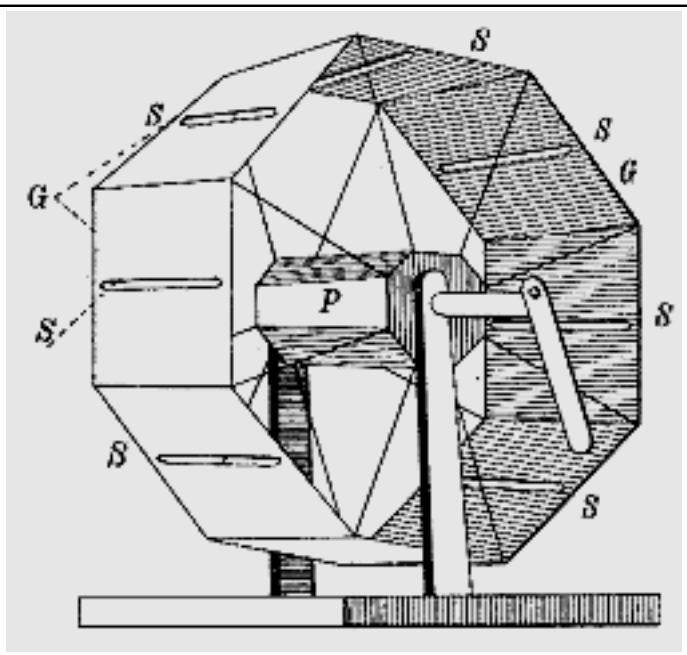
When mounted on an axis, the cut-out disk (provided with slots at its periphery) allowed the reader to reproduce the movement of the light ray in the lecture hall. In front of a mirror, in a living room, for example, the view from the back side of the rotating disk through the slots depicted the up-and-down of the light spots induced by the movement of the beating frog heart.

The model for this latter device was an optical tool known since the 1830s as the "phenakisticope" (Plateau) or as "stroboscopic discs" (Stampfer).



As early as in the 1840s, Czermak's teacher Purkyne had used a similar device in order to display physiological knowledge in motion. In Purkyne's eyes, the "phorolyt" was an "apparatus for the graphical representation of movement" allowing to display "most of the movements in the natural and the artificial world (in der Natur- und Kunstwelt)"

Czermak, however, wanted to take this technology one step further. In 1855 he presented a device that combined the properties of the phenakistiscope and the stereoscope. The "stereophoroscope" was meant to depict the movements "that seem to take place in the dimension of depth" (see Czermak, Johann Nepomuk: Das Sterophoroskop [1855] (1879)). In this context, Czermak also suggested making use of stereoscopic photographs.



The three-dimensional view of the depth of organic movements thus figures as the vanishing point of an experimental life science that would approach this point only much later, in the twentieth century, within different scientific and technological configurations.

This essay is part of a lecture held at the Free University, Berlin, within the framework of a series on the "stages of knowledge" (winter semester 2000/2001). An edited volume with this lecture and the other contributions will be published by Dahlem University Press in 2002.

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