

German pioneers of research into human haptic perception

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Introduction

The science of the human sense of touch, also known as 'haptic', had a long and rich tradition in Germany before World War II. Philosophers and physiologists, medical doctors and psychologists approached the subject of touch from different points of view and each of them developed an unmistakable, and sometimes enduring, part of the knowledge we have today. Among these scientists are some whose works about research into the sense of touch were internationally known and influential while others, though, were only received in the German speaking world. Regardless of this criteria, several of the most important representatives of German touch research before World War II and their scientific contributions are outlined below. The accounts are ordered chronologically according to the respective year of birth (E.H. Weber, M. von Frey, M. Dessoir, G. Révész, D. Katz, and E. von Skramlik). In creating this list, an exemplary selection was made which can only include a part of the range of German scientists who have researched the human sense of touch in the last 150 years. A comprehensive presentation is impossible in a work such as this and must be left for a historical-psychological study. The fact, however, that such a work does not exist (even in a most basic form) shows that the history of this research is not exactly the focal point of today's scientific interest. Several authors are neglected in this 'sketch' – partially, because their effects are sufficiently known and acknowledged and partially because, to date, too little information is to be found about them. In any case, other researchers have delivered works to us about

the human sense of touch and deserve, at least, to be mentioned here: G. T. Fechner, W.M. Wundt, J.N. Czermak, L. A. H. von Strümpell, E. Mach, O. Funke, H. Lotze, E. Hering, G. Meissner, T. Hausmann, P. Mahner, A. Goldscheider, G.A. Brecher, O.F. Scheuer, R. Hippus.

E. H. Weber

The scientific and systematic examination of the human sense of touch began with an anatomist and physiologist from Leipzig, Germany, Ernst Heinrich Weber (1795–1878). He studied in Wittenberg and Leipzig and became professor of comparative anatomy in 1818 in Leipzig and, in 1840, professor of physiology. In 1840, he laid out first findings about the systematic and experimental testing of sensory thresholds in the human sense of touch in his dissertation paper, '*De pulsu, resortione, auditu et tactu annotatines anatomicae et physiologicae*' [1]. As early as this paper, his findings about two-point discrimination were developed and he could prove that the ability to discriminate between two tactile stimuli, applied at the same time on two points of the body, was different in different places on the skin. To show this, E.H. Weber used a compass with dulled points. The sensibility thresholds valid here are used still today as a diagnostic tool in, e.g., neurology. E.H. Weber continued to explore the subject of the research of the human sense of touch even after his dissertation. The central results of his work regarding the sense of touch were published in a short, German-language abstract in 1835 [2]. In 1851 [3], a larger, more comprehensive work with the title '*Die*

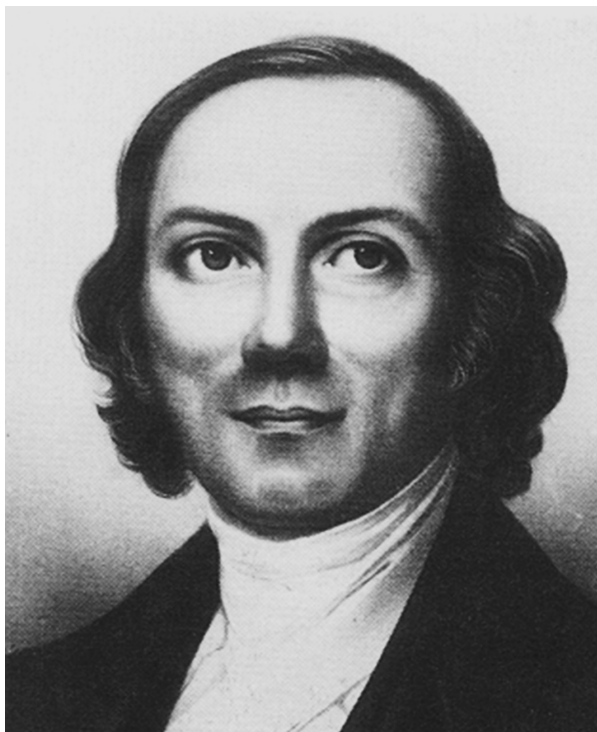


FIGURE 1. ERNST HEINRICH WEBER (1795–1878)

Lehre vom Tastsinn und Gemeingefühl ('The Science of the Sense of Touch and General Sensation') followed. Within, he presented several newer and older studies as well as a discussion about the few national and international publications about anatomy and the physiology of the sense of touch that had been published at the time (e.g., C. Bell, J. Müller).

E.H. Weber did not pursue his research into the human sense of touch because of philosophical considerations but, rather, as he briefly stated in his publications from 1835 and 1851, this 'sensory organ' offered him the practical possibility to "conduct the most varied of experiments and to collect data from various points of view" without damaging the human body while doing so. In addition, Weber was hoping to collect information which he could "later use [with respect to] the visual and other senses".

As a result, practical considerations and the hope of discovering basic principles of other perceptual modalities were the main aim of his experimental studies. He didn't use only experimental findings for the foundations of his studies of the sense of touch but, as was usual in his times, phenomenological and generally formulated arguments found their way into his presentations and analyses. In this way, he confronted the basic dimensions of human perception while, at the same time assuming that, for "*inexplicable reasons, the soul*" is forced to process all sensations in relation to the categories of space, time and quantity. With these categories E.H. Weber laid the foundation for the interpretation of his own findings about spatial two point stimuli discrimination. The time-space structure of our perception is, for Weber, a natural axiom although Kant's philosophy may have contributed to this line of thought. At the same time, however, he postulated a 'sense of locality' (or 'feel for locality') which appears to be all the more differentiated the more numerous nerve fibres are present in the various sensory organs. In order for the sense of locality to come into existence, E.H. Weber hypothesises that the sensory organs are separated into "*small, departments located next to each other*" and that they are connected to the brain with individual nerves. E.H. Weber depicted these areas of the skin as 'feeling circles' [3] or 'sensation circles' [3]. The ability to differentiate between two spatially different stimuli is, according to him, based upon the fact that the two stimuli lie within two different sensation circles. He also suspected that the nerve fibres running from each 'department' were connected to a topographically-ordered, corresponding area in the brain. As support for his hypothesis he presents results from observations made during tests conducted on patients paralysed on one side of the body (hemiplegia) [3]. At the same time he points out that his hypotheses are based on founded, yet non-proven assumptions as the basic relationships between the paths of the nerves related to the sense of touch and the brain had only been insufficiently examined thus far. E.H. Weber also remained uncertain about