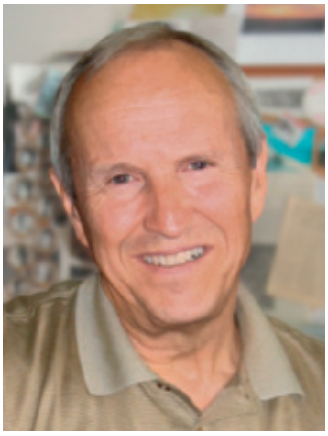

Photo: Private

Dear Readers,

In the preface to his book *Analysis of Sensations*, which was published in 1886, physicist Ernst Mach made the following "antimetaphysical remarks":

"The great results achieved by physical science in modern times – results not restricted to its own sphere but embracing that of other sciences which employ its help – have brought it about that physical ways of thinking and physical modes of procedure enjoy on all hands unwonted prominence, and that the greatest expectations are associated with their application. In keeping with this drift of modern inquiry, the physiology of the senses, gradually abandoning the method of investigating sensations in themselves followed by men like Goethe, Schopenhauer, and others, but with greatest success by Johannes Muller, has also assumed an almost exclusively physical character."

When Ernst Mach penned these lines, he had no idea of the extent to which his thoughts would be confirmed in the 20th century. Bats rely on echolocation ("sonar") to hunt their prey, birds use the Earth's magnetic field to navigate ("compass") and fish are able to orient themselves even in murky waters thanks to a self-generated electric field ("radar"). These are examples of physical phenomena that animals make use of. Three topics in this issue describe the interplay of such disparate sensory faculties for navigation.

Ernst Mach continued:

"This tendency must appear to us as not altogether appropriate, when we reflect that physics, despite its considerable development, nevertheless constitutes but a portion of a larger collective body of knowledge, and that it is unable, with its limited intellectual implements, created for limited and special purposes, to exhaust all the subject matter in question."

Modern brain research shows how right Ernst Mach was in this observation, too. Indeed, we have now gathered an enormous amount of knowledge about where the different sensory perception areas are located in the brain and how sensory stimuli are processed. However, the manner in which this puzzle forms a complete sensation is still unknown to us. Korbinian Brodmann, one of the first colleagues of Oskar Vogt, the founder of the then future Max Planck Institute for Brain Research, described, on the one hand, this unsolved problem of localization, and, on the other, integral perception, with a nice comparison:

"In this sense, the mosaic of the cerebrum could perhaps be compared with the keys of a piano. One key does not produce a chord; it is the interplay of several keys that produce a melody and music. In the same way, no top performance or consciousness phenomenon can be expected from one single area of the brain. Mental events are created only through the interaction of multiplicity – maybe even through the entirety of the cerebral areas."

Heinz Wäßle
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for Brain Research