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Ernst Pöppel is Chairman of the Human Science Center and former Director of the Institute of Medical Psychology, Ludwig-Maximilians-University Munich (Germany). He has been Board Member of the National Research Center Jülich in Germany being responsible for the Life Sciences and Environmental Research. He is Guest Professor of Peking University, being also associated with the Institute of Psychology of the Chinese Academy of Sciences. He is a member of the National Academy of Sciences Leopoldina (ML), the Russian Academy of Education (Moscow), the European Academy of Sciences and Arts (Salzburg), and the Academia Europaea (London).

Previously he has worked at the Department of Brain Science and Psychology of MIT, Cambridge/USA, and at the Max-Planck-Institutes of Behavioral Physiology and Psychiatry, Germany. His academic education (doctoral degree and habilitations) he obtained in the universities of Freiburg, Munich and Innsbruck (Austria). His research in brain science and psychology is characterized by an interdisciplinary approach focusing on temporal and visual processing. Besides scientific articles he has written some ten books for the general public. A particular challenge he sees in the connection between basic research and applications, making scientific results accessible for better education, technological developments, new diagnostics and therapies in medicine, or the appreciation of the arts. Perhaps because of personal experiences from the second world war (being born in 1940) he promotes intercultural understanding; the task is to better understand anthropological universals and cultural specifics. His political motto is: "Scientists are Natural Ambassadors".

The power of single case studies: Examples from the early visual pathway

Several single case studies are presented which disclose organizational principles along the early visual pathway, and indicate challenges for imaging technologies. The basic premise is, that to make statements about "higher cognition", the "lower levels" of visual processing have to be understood.

First case: A paradoxical phenomenon in brightness perception is described; in spite of the inhomogeneity of sensitivity, the visual field on the subjective level appears to be homogeneous providing the perceptual platform for object perception and attentional control.

Second case: With a brain-injured patient having suffered a partial visual field loss an important mechanism in color perception using color induction as a retinal phenomenon presumably at the level of amacrine cells can be demonstrated.

Third case: In a patient having suffered a bilateral occipital lobe infarction, restoration of function can be demonstrated; divergence and convergence of projection in the geniculo-cortical pathway are suggested as structural basis for such functional recovery. Slowed down binocular rivalry in this case provides a “functional microscope” which discloses a specific temporal mechanism in visual perception.

Fourth case: In another patient it can be shown that the pre-wired projection of the retina to the visual cortex remains globally unchanged, although paradoxically some local neuroplasticity is observed.

Fifth case: Using as an experimental paradigm habituation of local sensitivity in the visual field and its resetting by interhemispheric interactions, it can be shown that spatial attention is controlled at the level of the superior colliculus.

Sixth case: Observations on residual vision or “blindsight” support the hypothesis that the visual cortex is the one and only structure responsible for visual perception on a conscious level.

Seventh case: Behavioral and fMRI observations with a patient with conscious vision across an extended area of blindness disclose some structural and functional mechanisms of the human visual system and the participation of the “wrong side of the brain”.