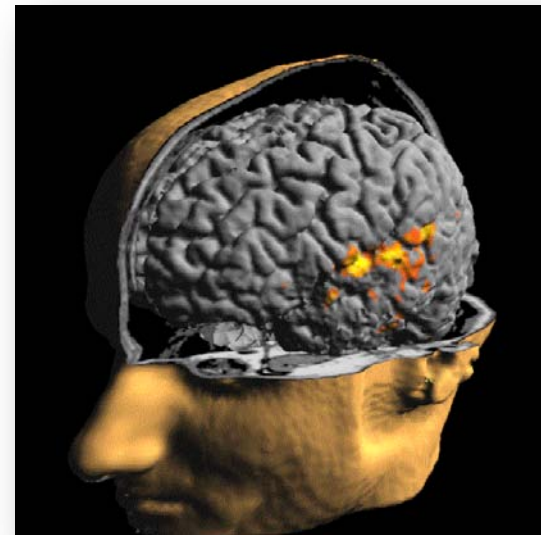




Neurobildgebung als Fenster zu Hirnfunktion und Verhalten?

Prof. Dr. Lutz Jäncke

lutz.jaencke@uzh.ch





Gliederung

Prolog

Psychologie & Kognitive Neurowissenschaften

Bildgebung – ein Triumph?

Fortschritte ...

Grenzen der Bildgebung

Herausforderungen

Konklusion



University of
Zurich^{UZH}

Neuropsychology

Prolog



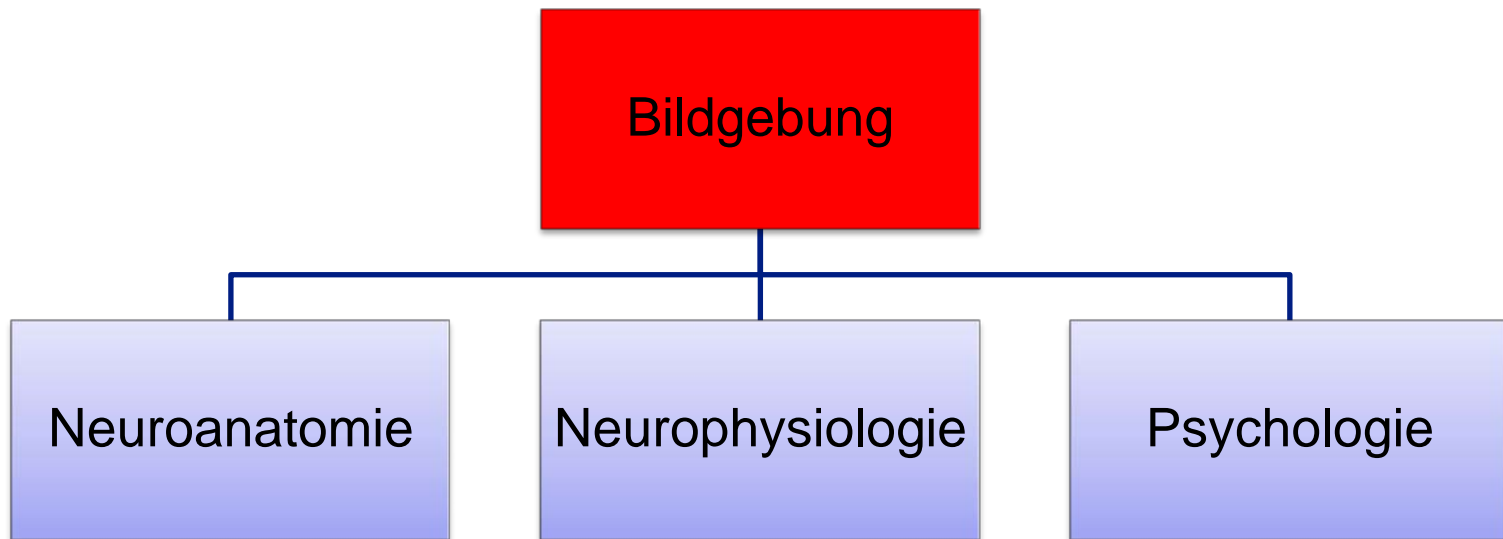


„If brain imaging is the answer what is the question ?“

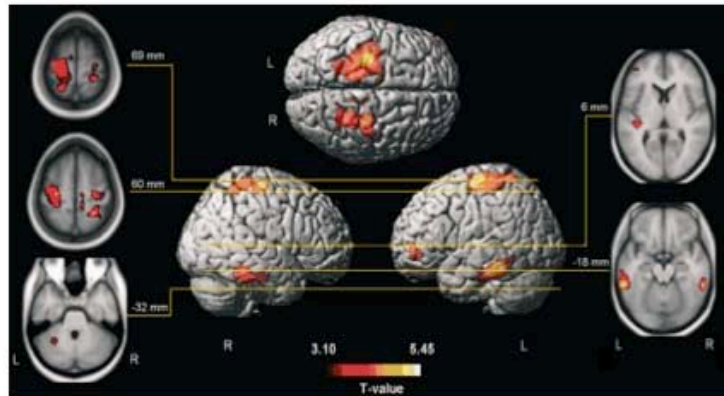
Stephen Kosslyn
Professor for Cognitive Neuroscience
(Harvard University; now at Stanford University)



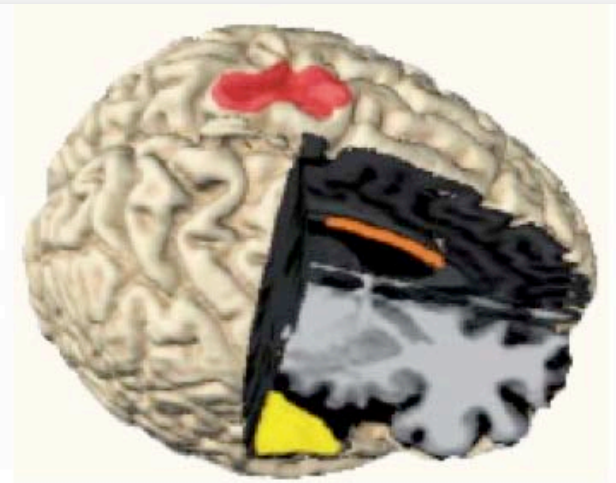
Die Beziehung der Bildgebung zu anderen Disziplinen



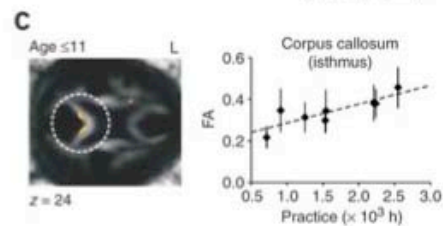
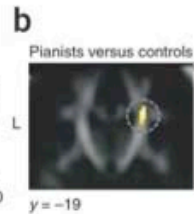
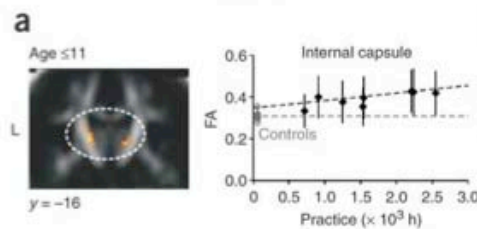
Das plastische Hirn



Gaser und Schlaug 2003



Münste, Altenmüller & Jäncke 2002



Bengtson et al., 2006





University of
Zurich^{UZH}

Neuropsychology

Psychologie und Kognitive Neurowissenschaften





Psychologie – Wissenschaft vom Verhalten





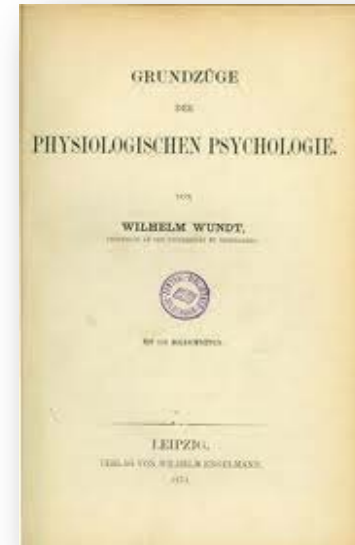
Wilhelm Wundts Psychologie

1PP



subjective
experience

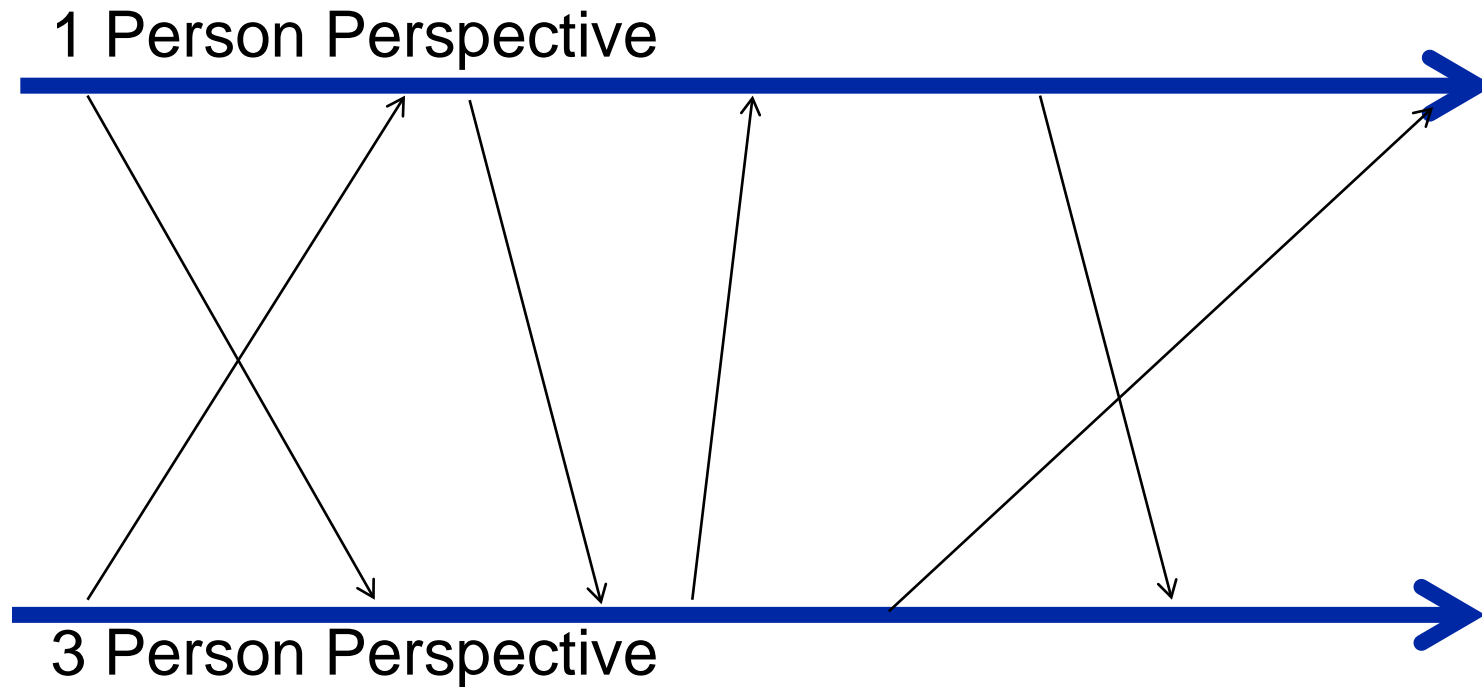
3PP



objective
behaviour
physiology



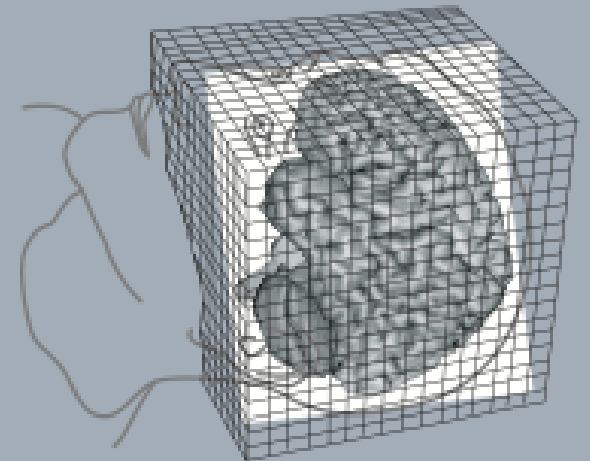
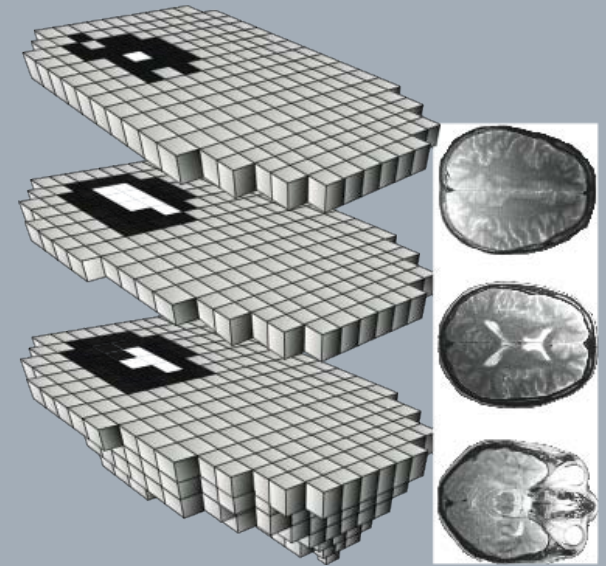
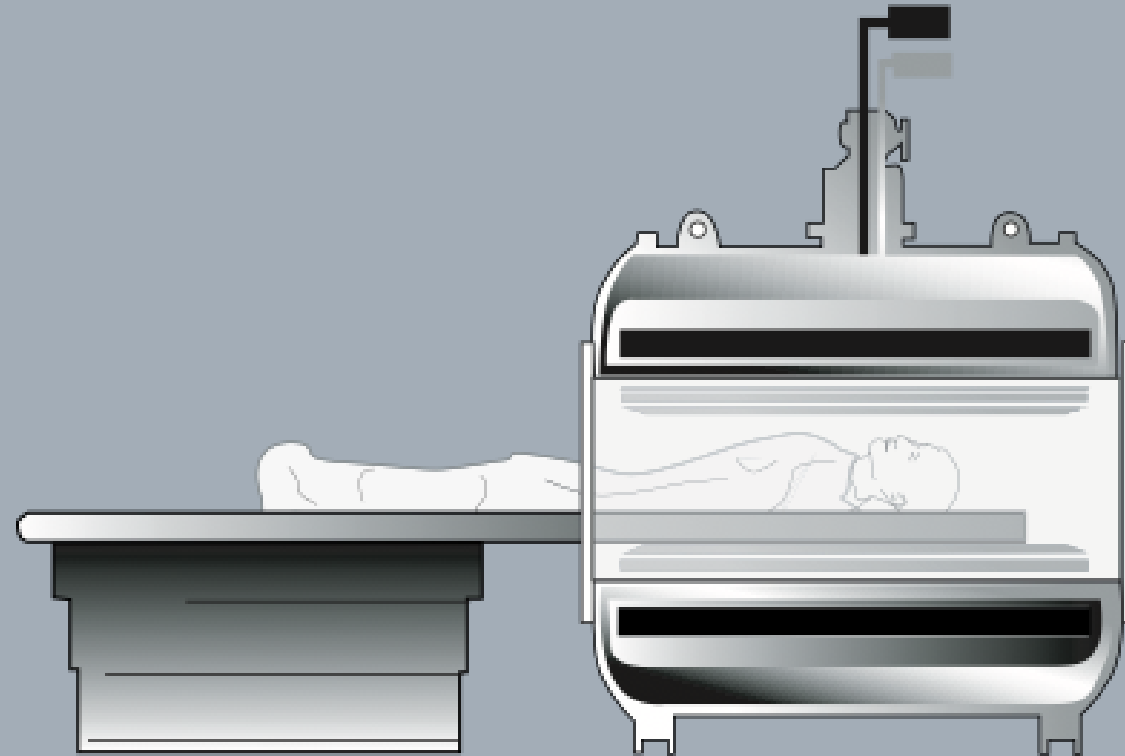
Complimentarity



Niels Bohr 1920, Fahrenberg 1970



Bildgebung – ein Triumph?





The Beginning

Magn Reson Med. 1990 Apr;14(1):68-78.

Oxygenation-sensitive contrast in magnetic resonance image of rodent brain at high magnetic fields.

Ogawa S, Lee TM, Nayak AS, Glynn P.

AT&T Bell Laboratories, Murray Hill, New Jersey 07974.

Abstract

At high magnetic fields (7 and 8.4 T), water proton magnetic resonance images of brains of live mice and rats under pentobarbital anesthetization have been measured by a gradient echo pulse sequence with a spatial resolution of 65 x 65-microns pixel size and 700-microns slice thickness. The contrast in these images depicts anatomical details of the brain by numerous dark lines of various sizes. These lines are absent in the image taken by the usual spin echo sequence. They represent the blood vessels in the image slice and appear when the deoxyhemoglobin content in the red cells increases. This contrast is most pronounced in an anoxy brain but not present in a brain with diamagnetic oxy or carbon monoxide hemoglobin. The local field induced by the magnetic susceptibility change in the blood due to the paramagnetic deoxyhemoglobin causes the intra voxel dephasing of the water signals of the blood and the surrounding tissue. This oxygenation-dependent contrast is appreciable in high field images with high spatial resolution.

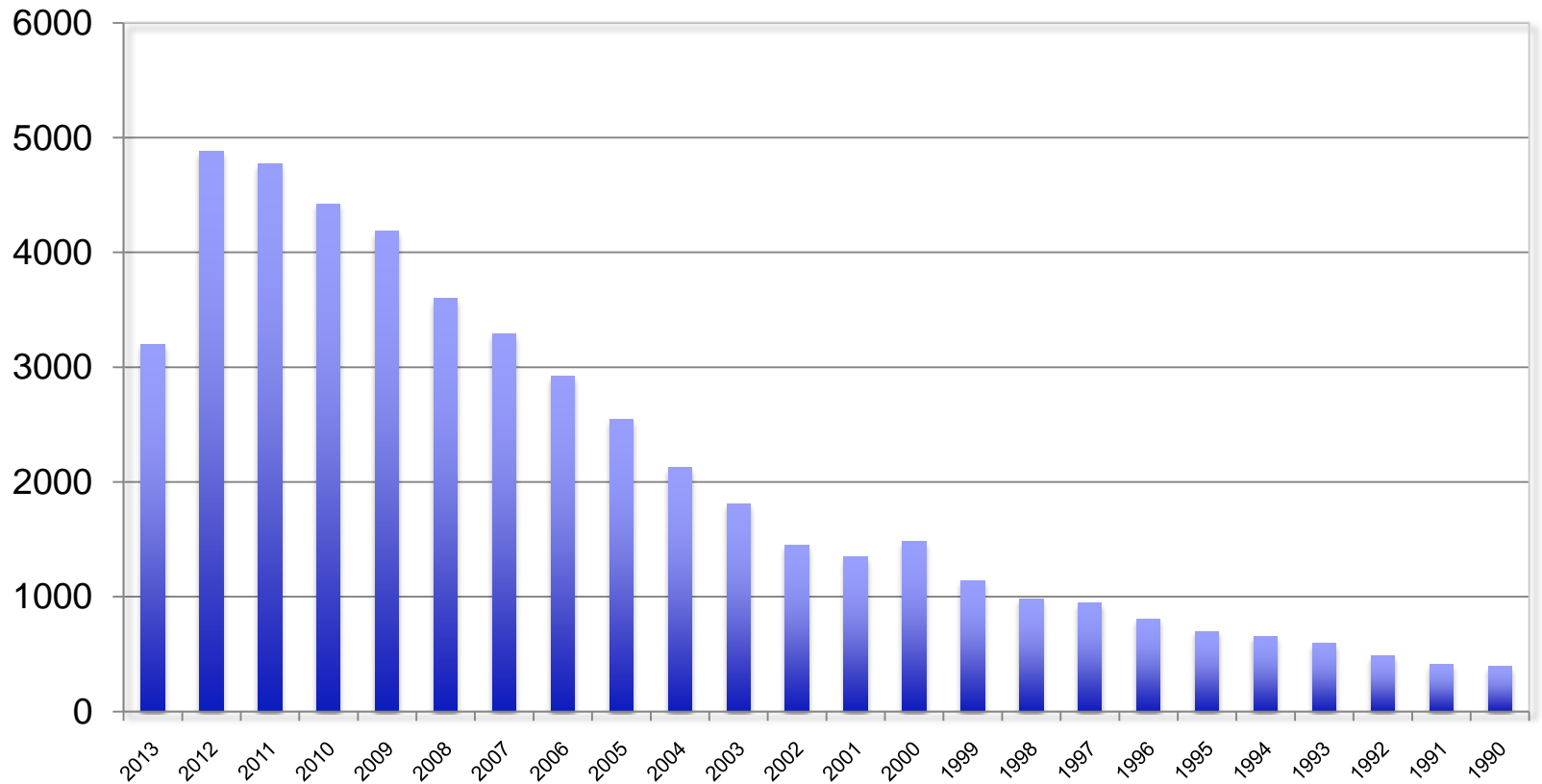
PMID: 2161986 [PubMed - indexed for MEDLINE]





Anzahl Publikationen in PubMed

(brain imaging OR neuroimaging) AND (cognition OR emotion OR motor OR personality)

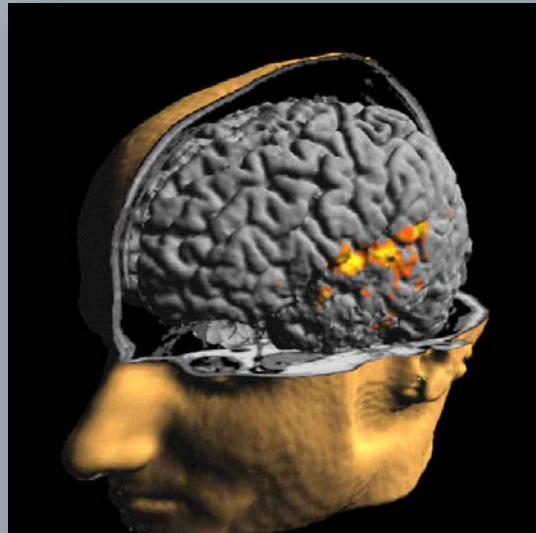




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Neuropsychology

The brain is back !





Theoretical lines of Psychology

Introspection

Associationism

Behaviourism

Gestalt-Psychology

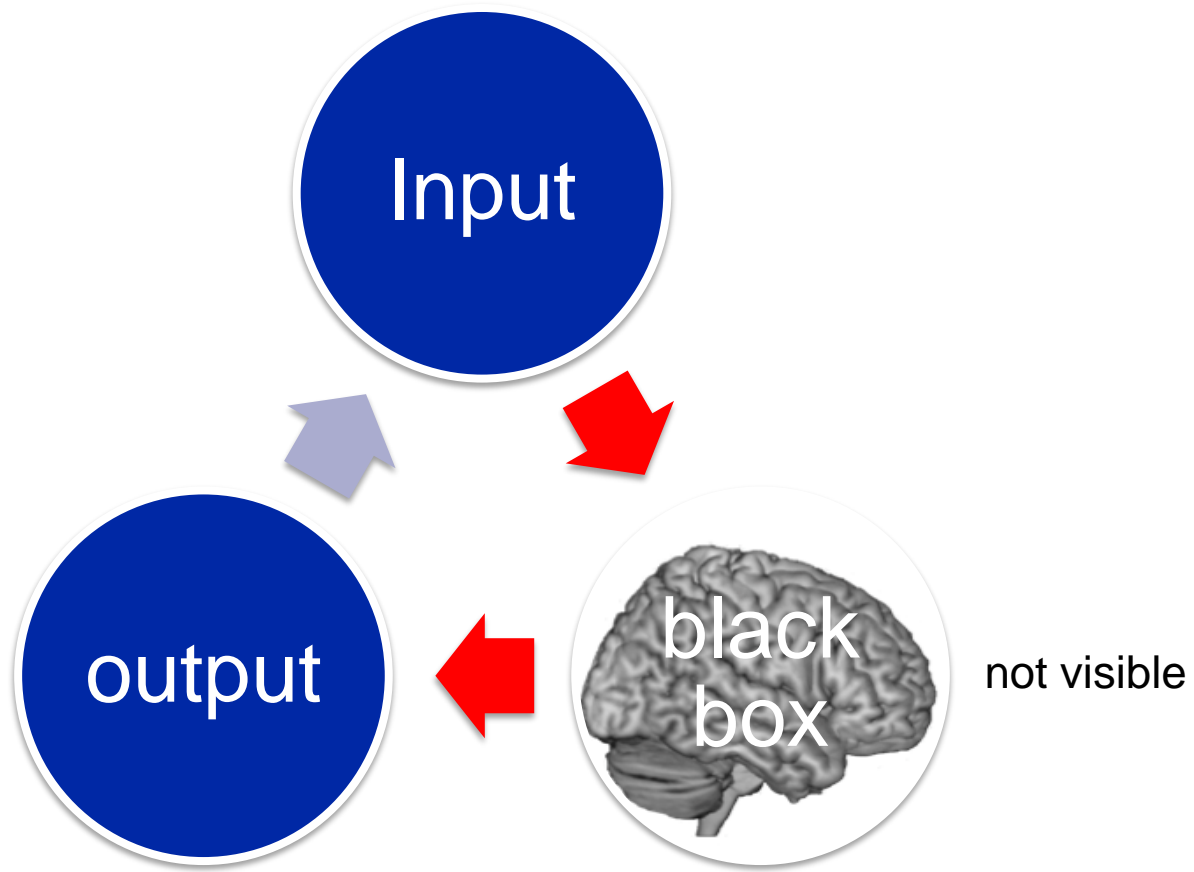
Information processing

Cognitive Psychology



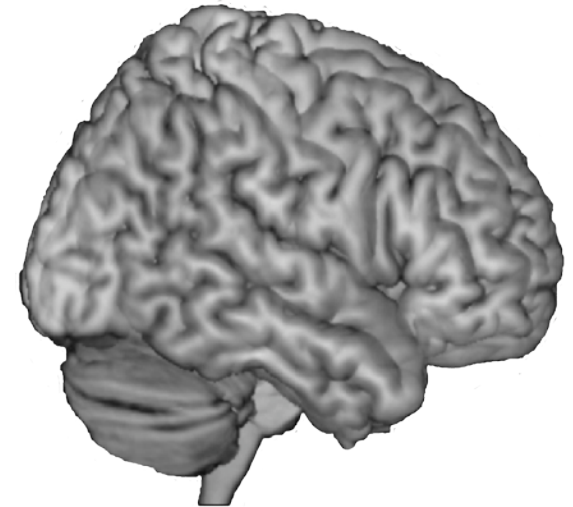
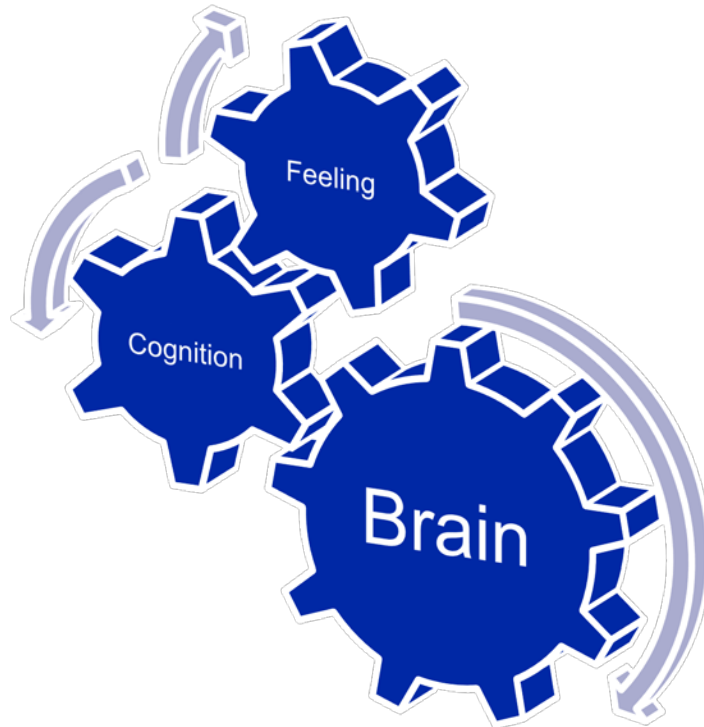


The black box model



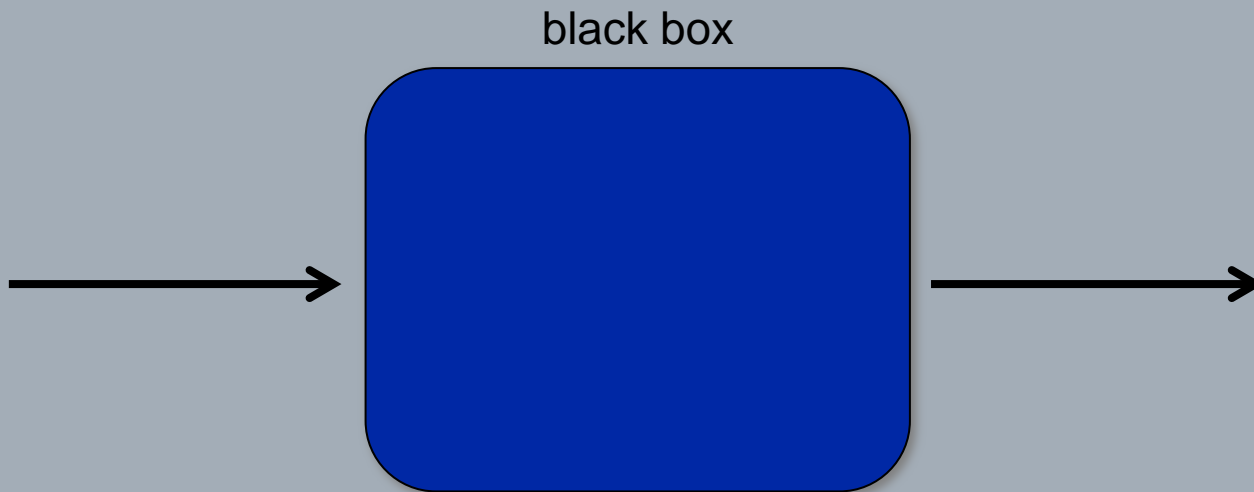


Psychologie und Neuroscience

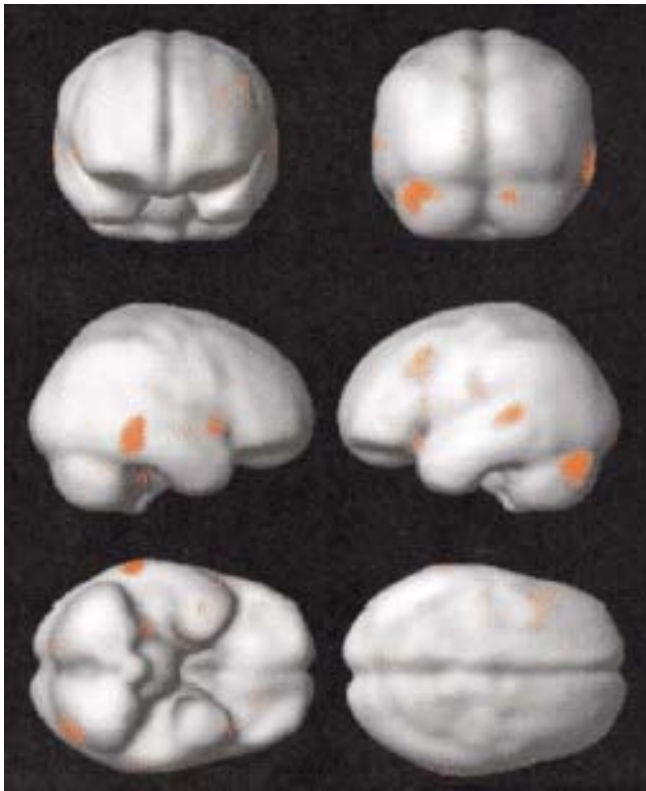




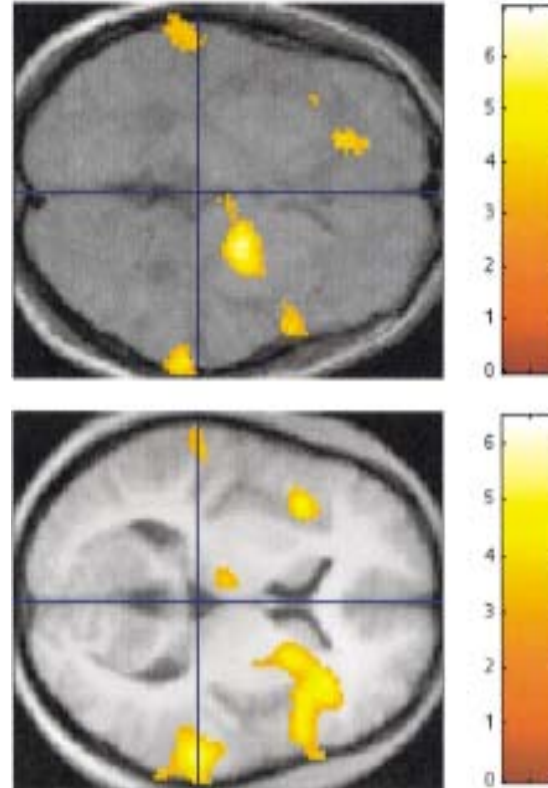
Internal events !



Music hallucinations

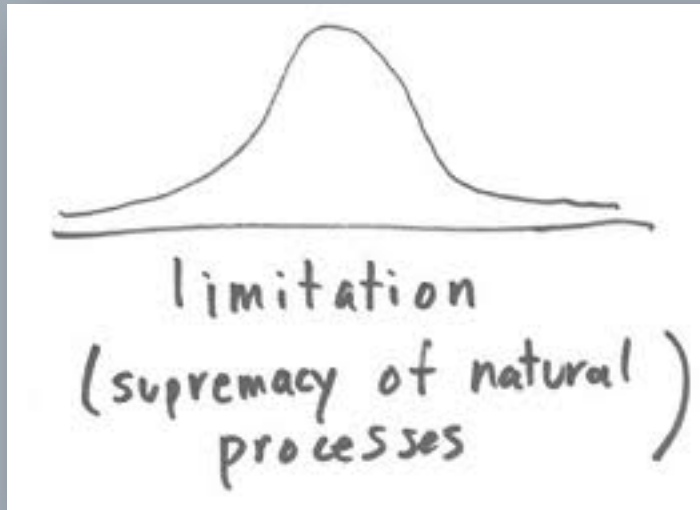


Griffiths 2002





Grenzen der Bildgebung





Plurality of analysis

frontiers in
NEUROSCIENCE

ORIGINAL RESEARCH ARTICLE

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On the plurality of (methodological) worlds: estimating the analytic flexibility of fMRI experiments

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How likely are published findings in the functional neuroimaging literature to be false? According to a recent mathematical model, the potential for false positives increases with the flexibility of analysis methods. Functional MRI (fMRI) experiments can be analyzed using a large number of commonly used tools, with little consensus on how, when, or whether to apply each one. This situation may lead to substantial variability in analysis outcomes. Thus, the present study sought to estimate the flexibility of neuroimaging analysis by submitting a single event-related fMRI experiment to a large number of unique analysis procedures. Ten analysis steps for which multiple strategies appear in the literature were identified, and two to four strategies were enumerated for each step. Considering all possible combinations of these strategies yielded 6,912 unique analysis pipelines. Activation maps from each pipeline were corrected for multiple comparisons using five thresholding approaches, yielding 34,560 significance maps. While some outcomes were relatively consistent across pipelines, others showed substantial methods-related variability in activation strength, location, and extent. Some analysis decisions contributed to this variability more than others, and different decisions were associated with distinct patterns of variability across the brain. Qualitative outcomes also varied with analysis parameters: many contrasts yielded significant activation under some pipelines but not others. Altogether, these results reveal considerable flexibility in the analysis of fMRI experiments. This observation, when combined with mathematical simulations linking analytic flexibility with elevated false positive rates, suggests that false positive results may be more prevalent than expected in the literature. This risk of inflated false positive rates may be mitigated by constraining the flexibility of analytic choices or by abstaining from selective analysis reporting.

Keywords: fMRI, data analysis, analysis flexibility, selective reporting, false positive results



New „disciplines“

Neuro-education

Neuro-didactics

Neuro-pedagogy

Neuro-economy

Neuro-marketing

Neuro-law

Neuro-theology

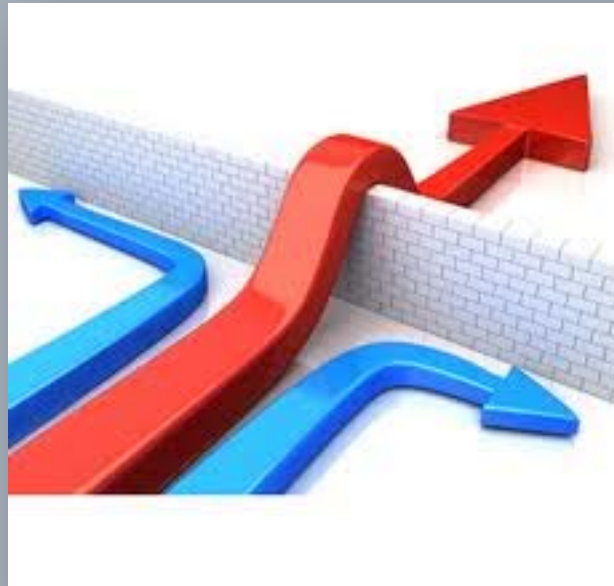
Neuro-philosophy



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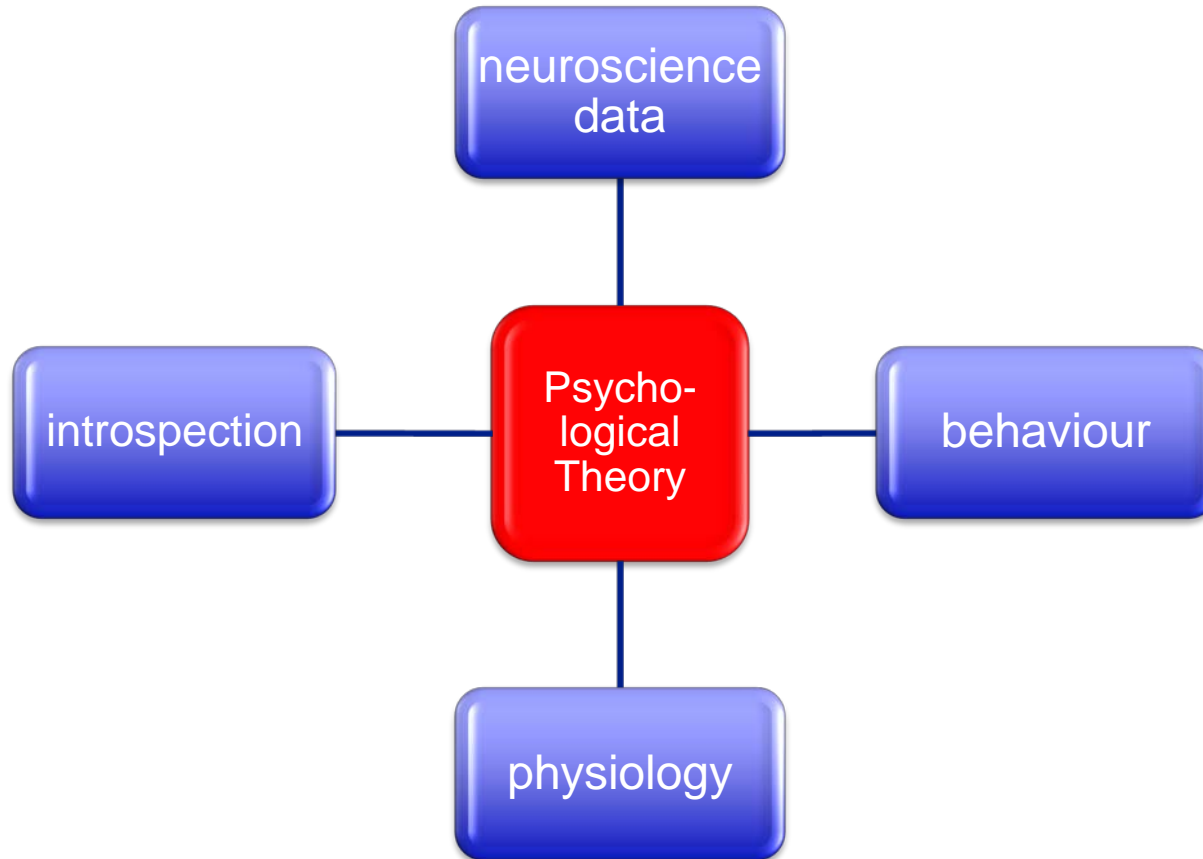
Neuropsychology

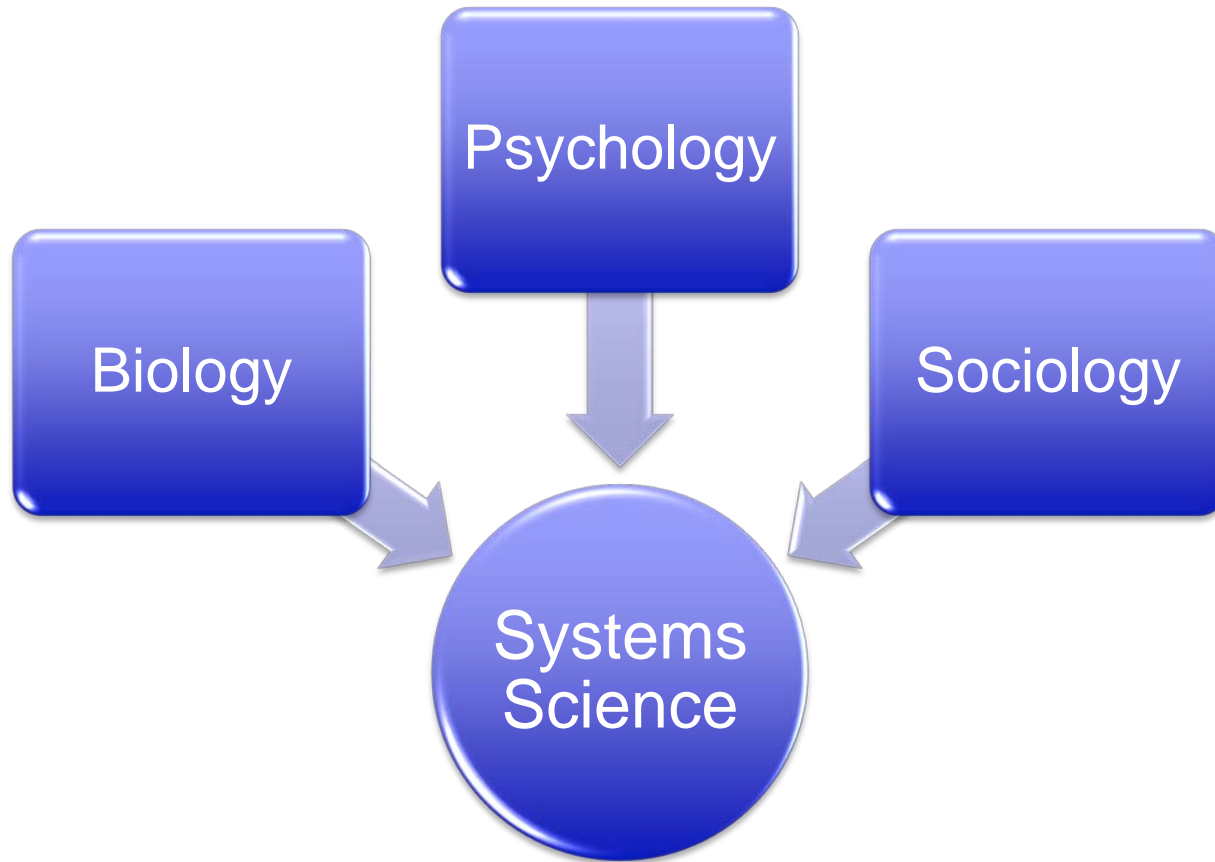
Herausforderungen für die Zukunft





Theorien sind wichtig







University of
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Neuropsychology

Konklusion

