

Einblicke ins menschliche Hirn

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Universität Bremen

Einblicke ins menschliche Hirn

Wieso eigentlich das Gehirn ??

(und nicht das Herz ?)

Gehirn = Sitz des „Ich“

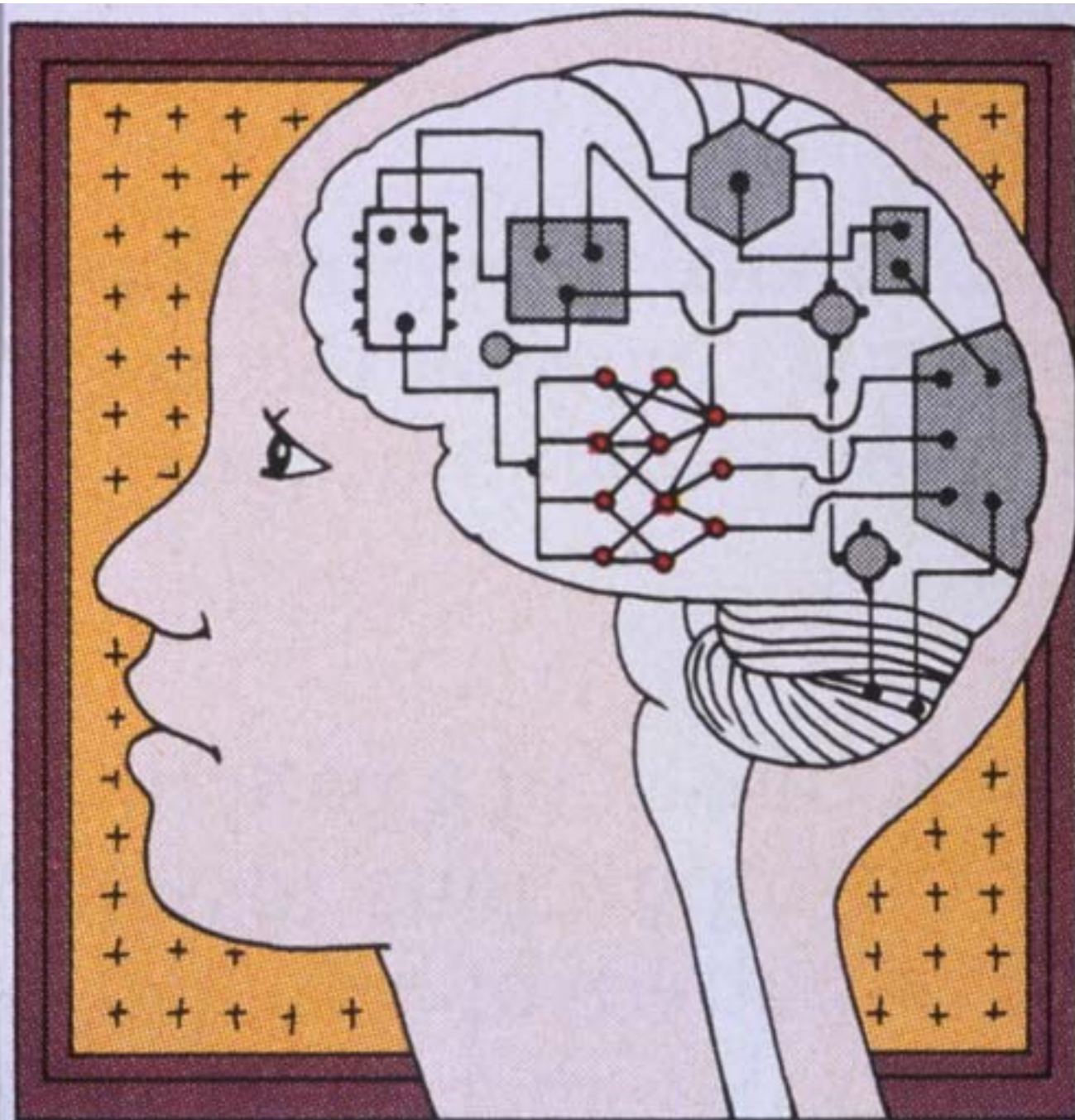
- Hirnverletzungen/ Schlaganfall

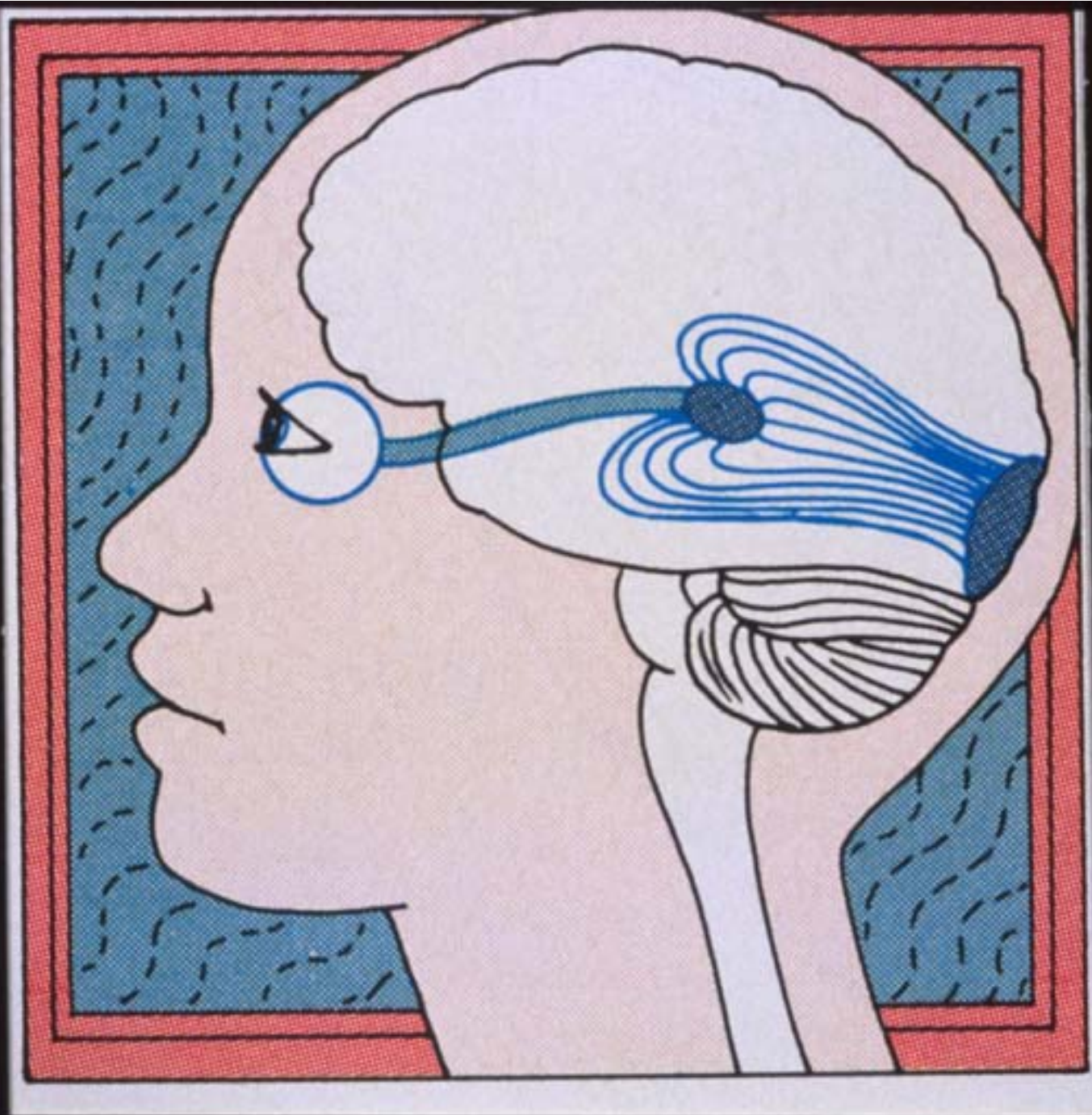
Gehirn = Sitz des „Ich“

- Hirnverletzungen/ Schlaganfall (-Symptome)
- Elektromagnetische Stimulation (+/- Sympt.)

Gehirn = Sitz des „Ich“

- Hirnverletzungen/ Schlaganfall (-Symptome)
- Elektromagnetische Stimulation (+/- Sympt.)
- Bildgebende Verfahren (fMRI, Vielkanal-EEG)

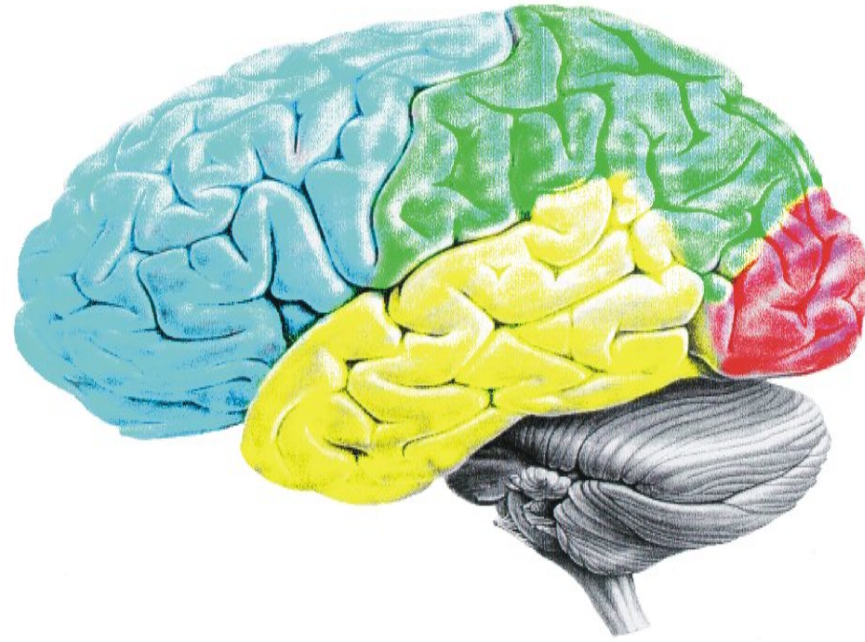


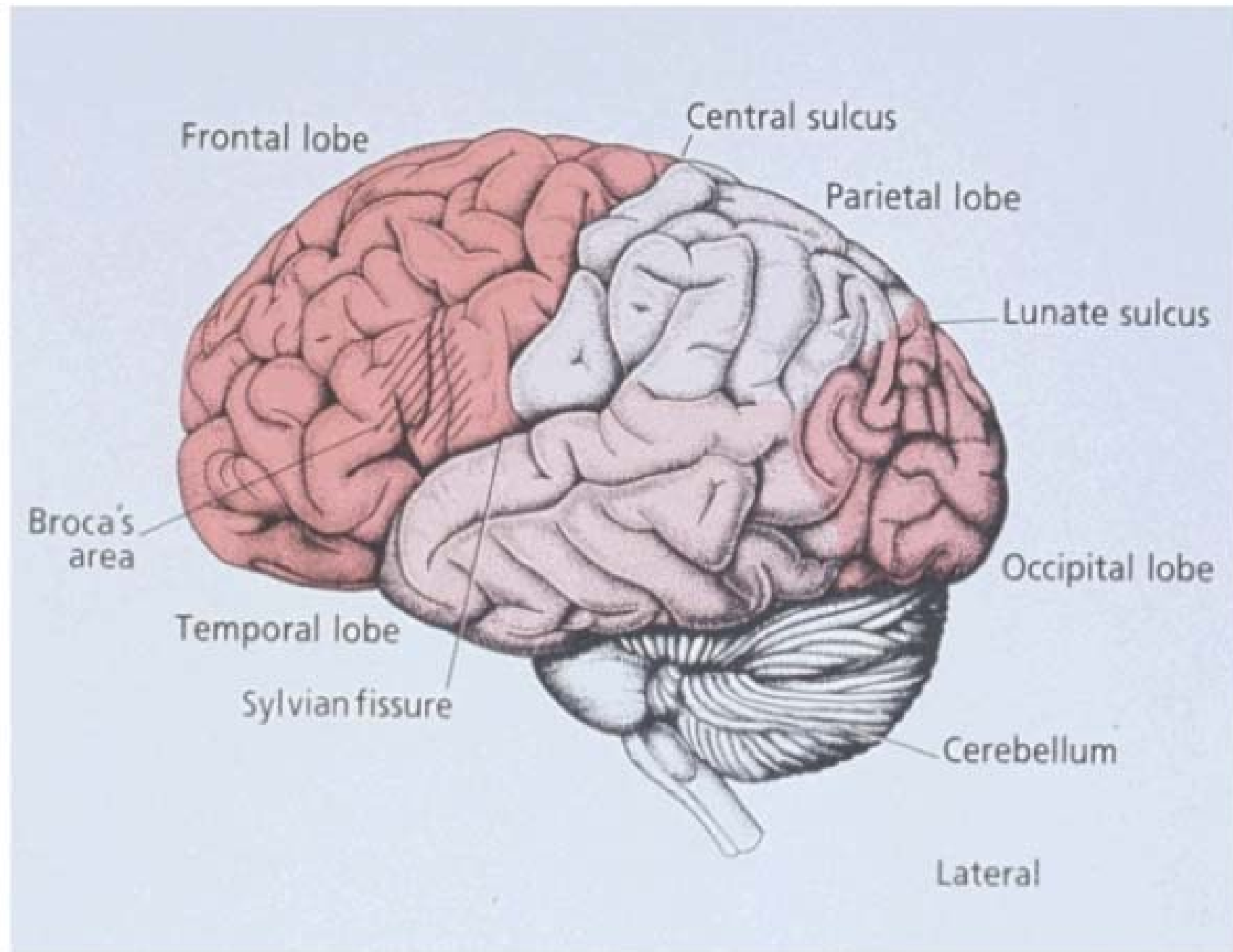


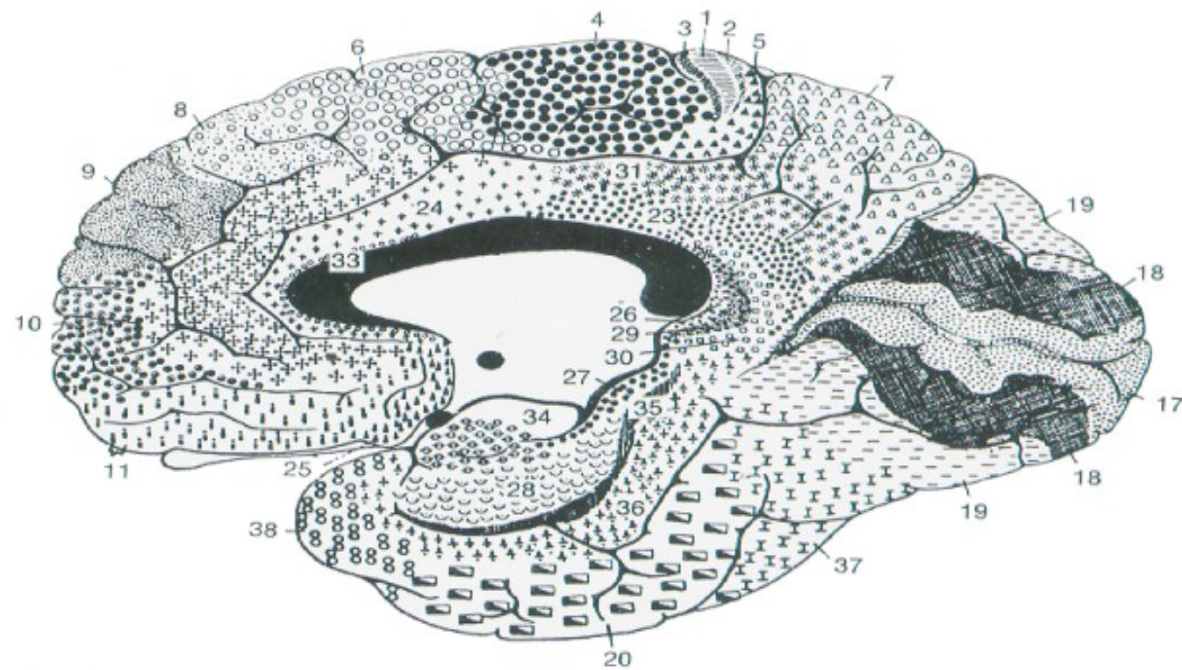
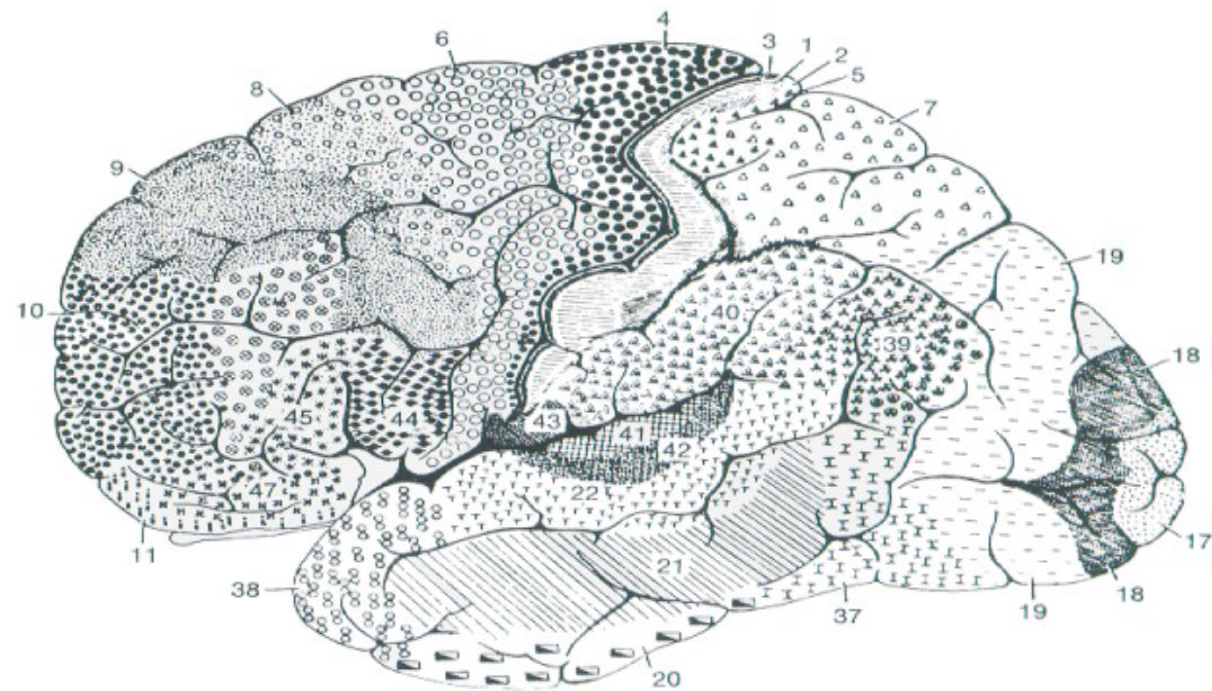
Einblicke ins menschliche Hirn

1. Patientenstudien

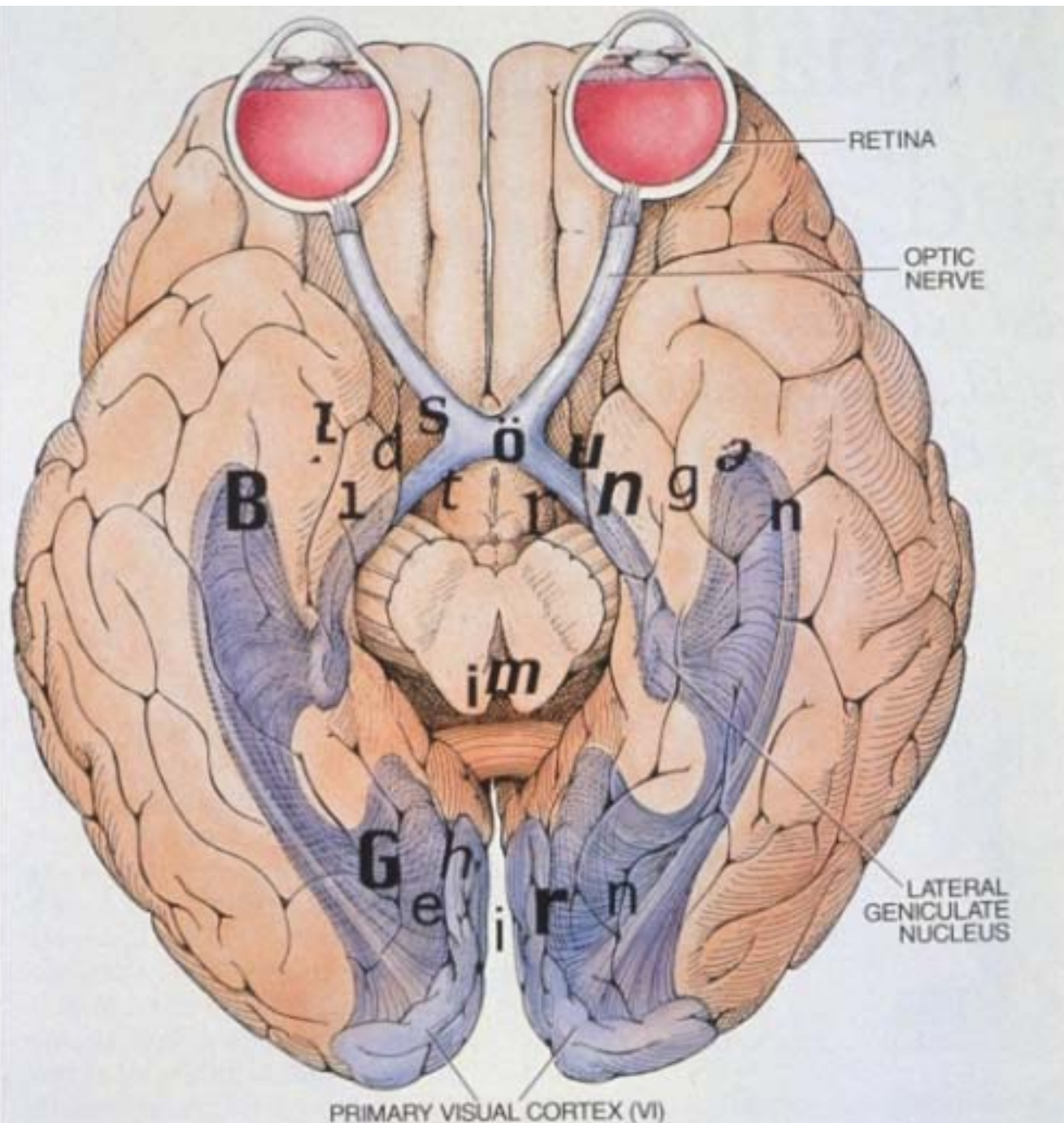
A

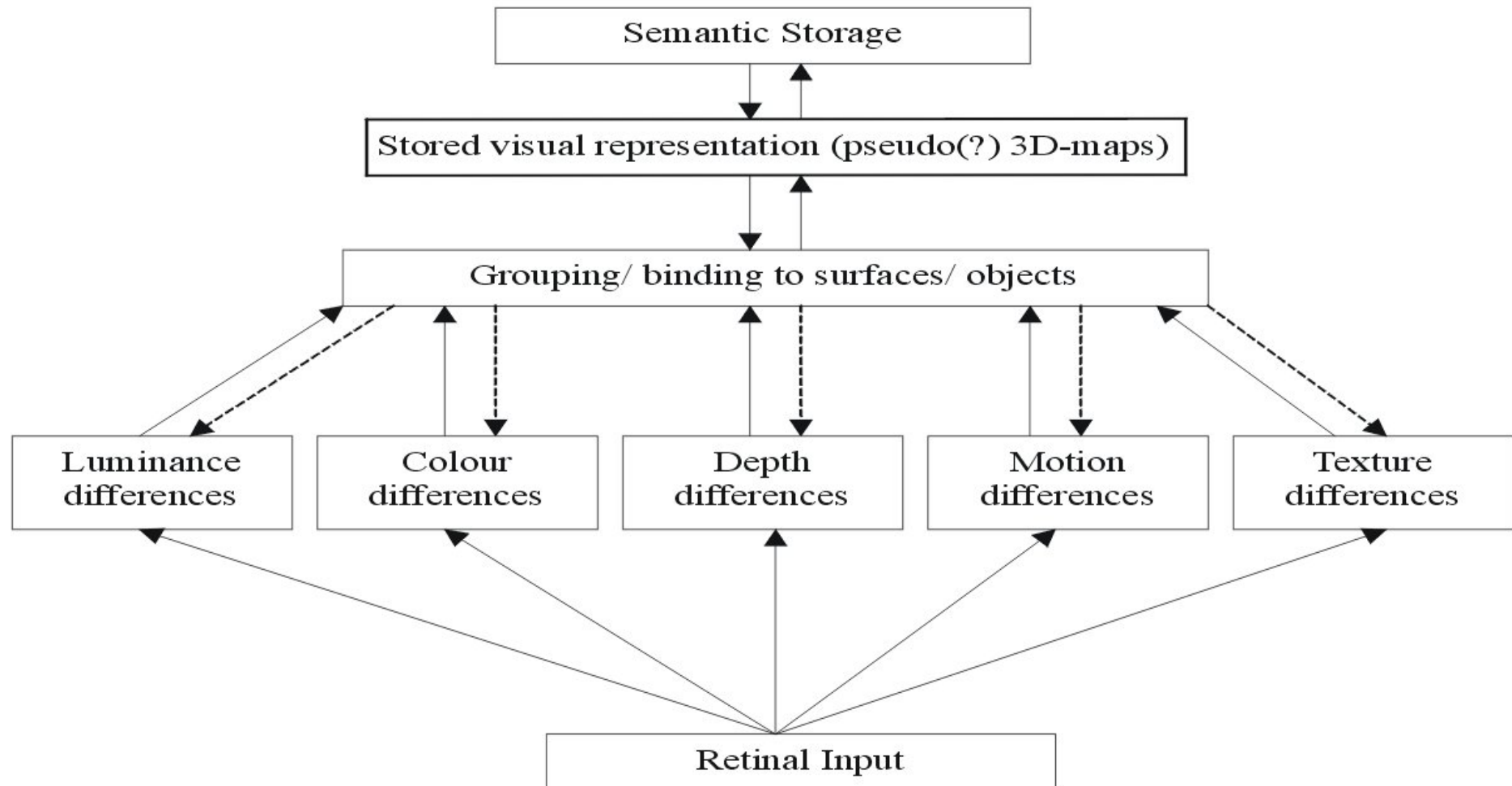












Visual field of patient DF

conventional perimetry

relative defect in

■	both eyes
■	one eye



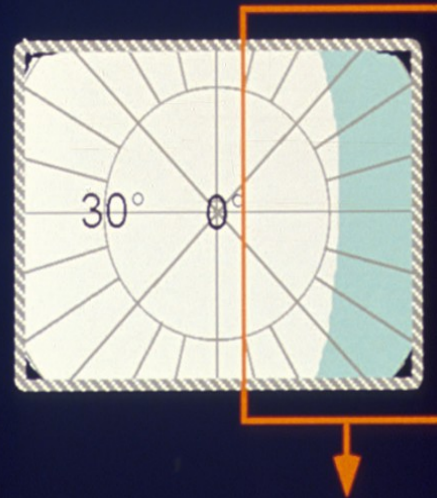
relative defects particular
in the right hemifield

lesion:

lateral fronto-temporal cortex

component perimetry

■ deviating visual perception



degraded or not perceived:



- motion •
- flicker •
- depth •
- checkerboard •

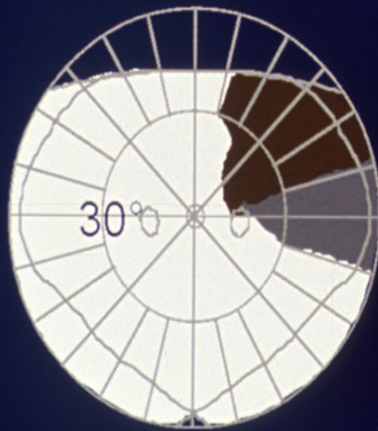
unchanged:

- colors
- acuity
- all noise field pattern

Visual field of patient SF

conventional perimetry


absolute defect in  both eyes
 one eye

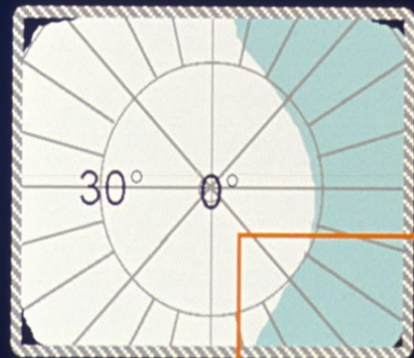


homonymous hemianopia
upper right quadrant

lesion:
medial occipito-temporal cortex
and parts of the optic radiation

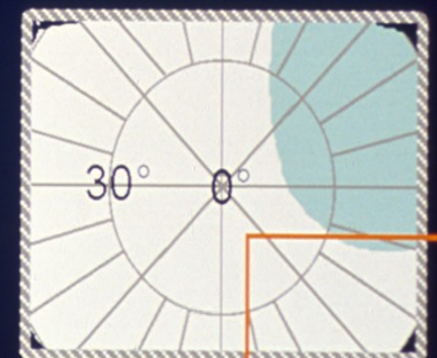
component perimetry

 deviating visual perception



degraded or not perceived:

- color •
- depth •
- checkerboard •





unchanged:

- motion •
- flicker •
- acuity •
- black / white noise field •

Visual field of patient PG

conventional perimetry

absolute defect in  both eyes
  one eye

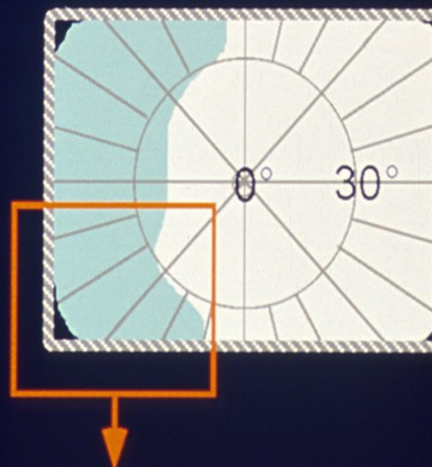


homonymous hemianopia
upper left quadrant

lesion:
medial occipito-temporal cortex
and parts of the optic radiation

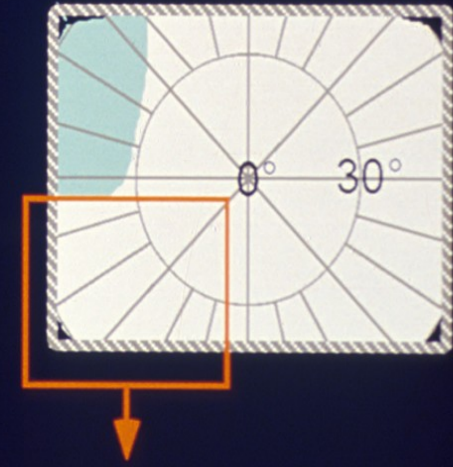
component perimetry

 deviating visual perception



degraded or not perceived:

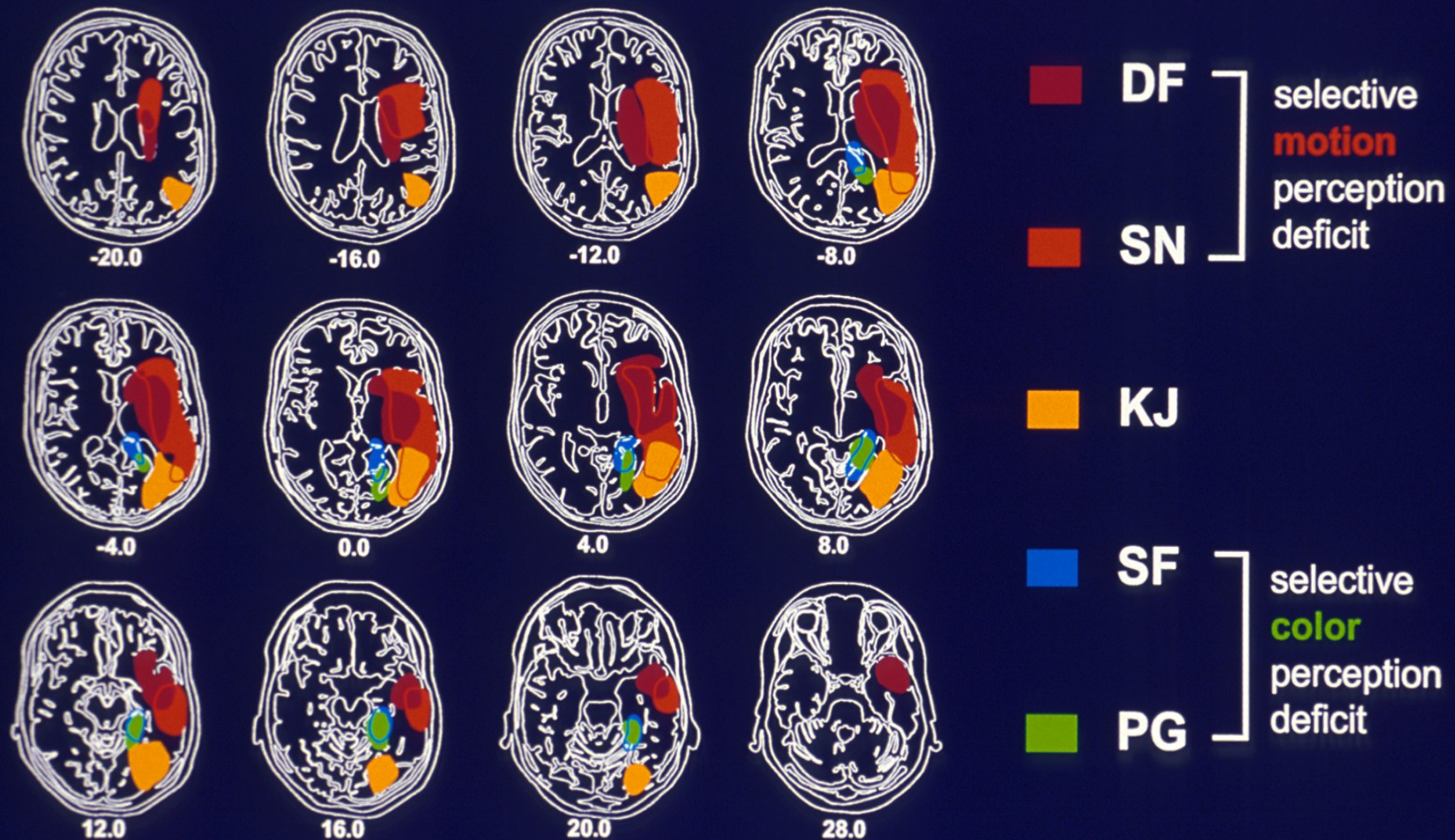
- color
- depth
- checkerboard



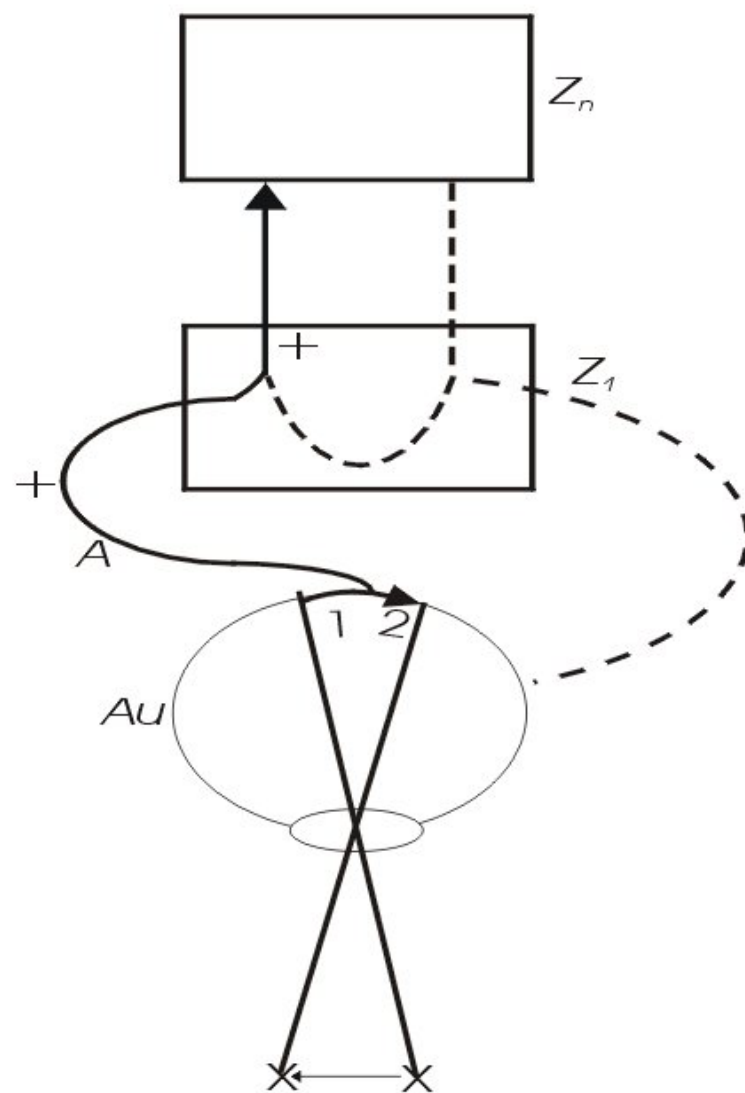
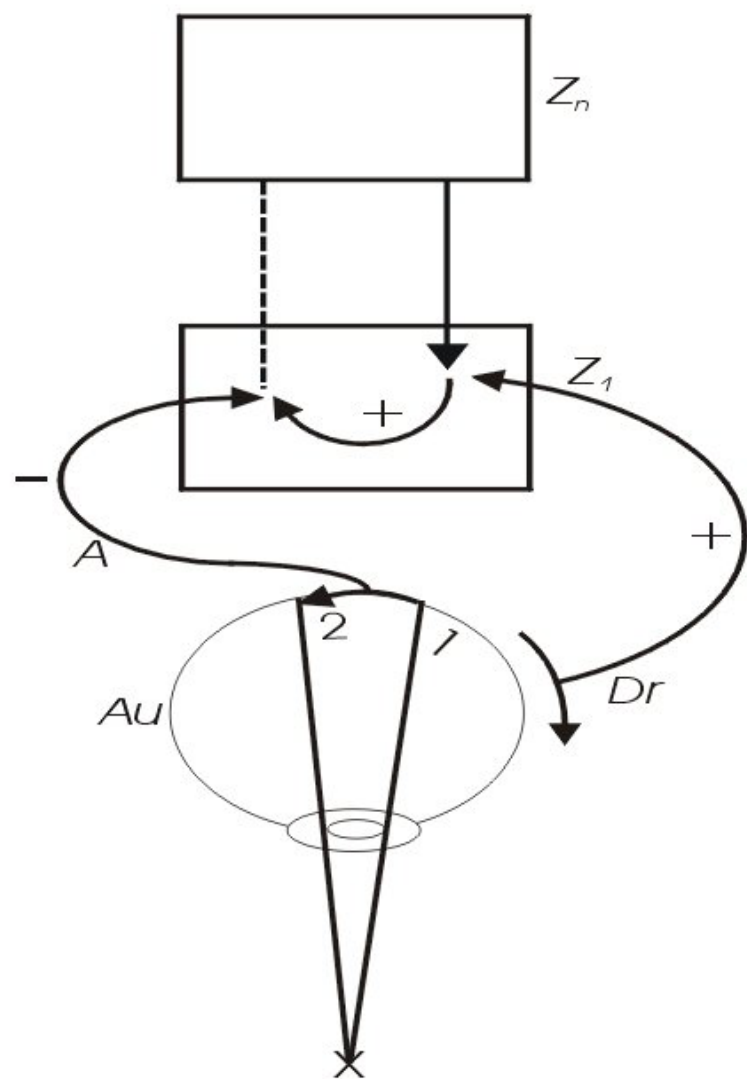
unchanged:

- motion
- flicker
- acuity
- black / white noise field

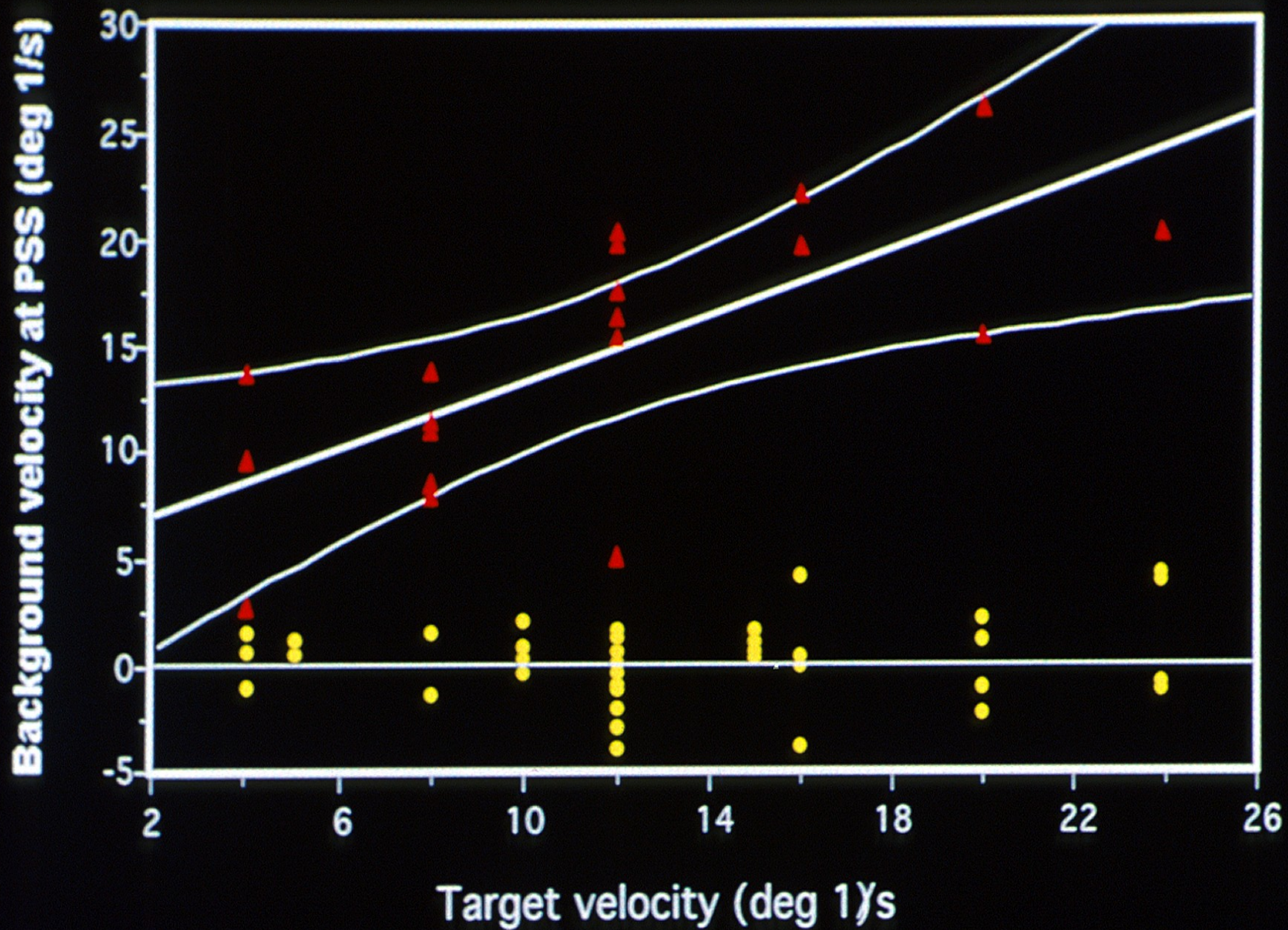
Patients with selective visual field defects



Lesions are projected into the same hemisphere

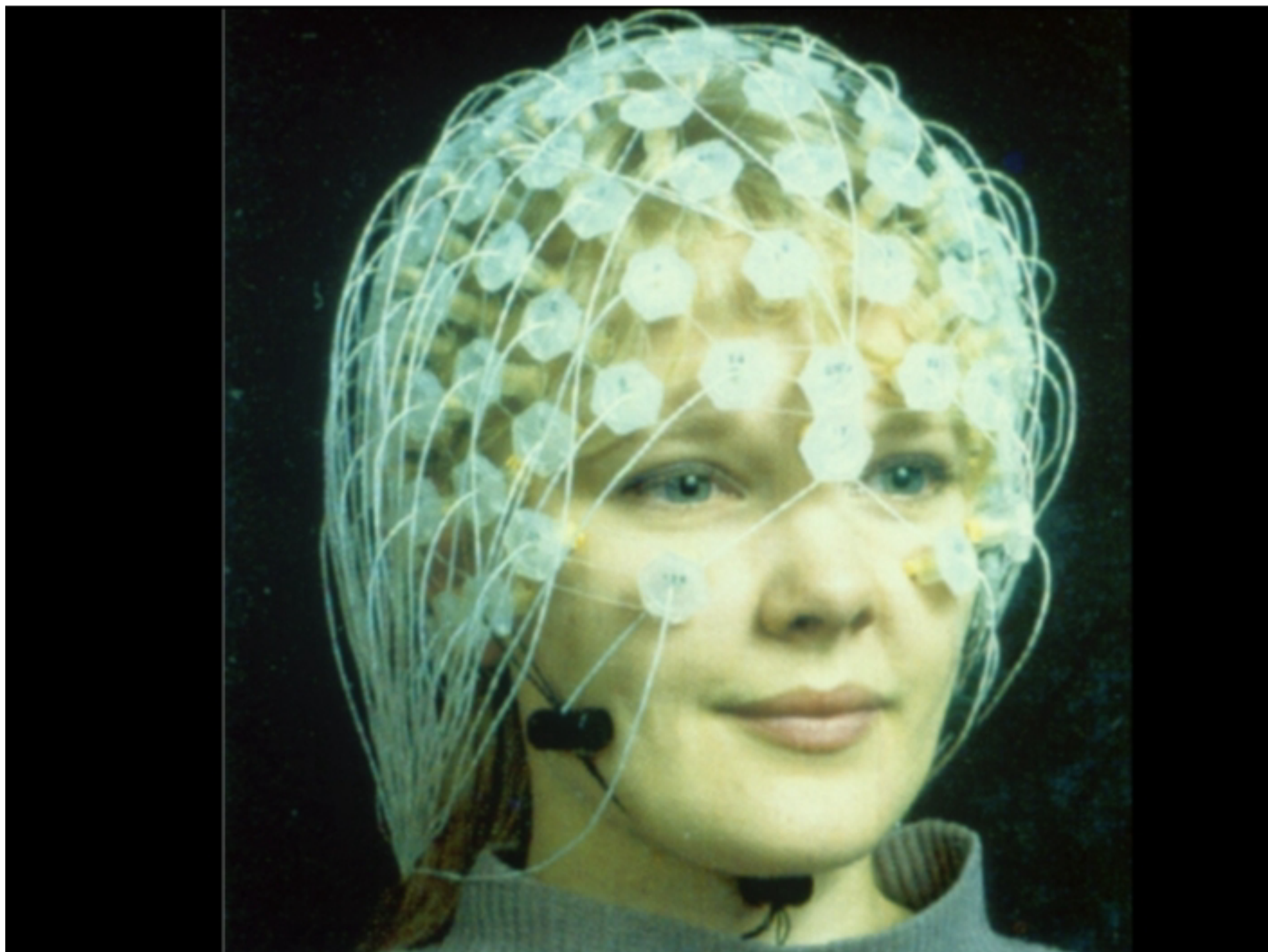


B



Einblicke ins menschliche Hirn

1. Patientenstudien
2. Summenpotentiale (EEG)



COLOUR



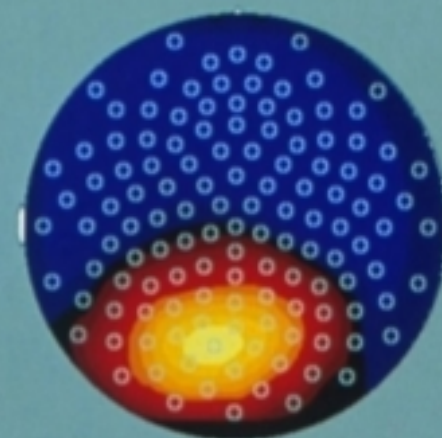
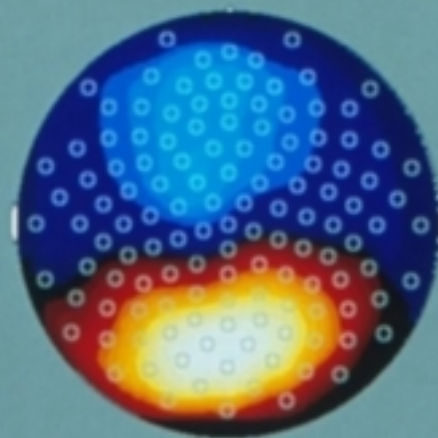
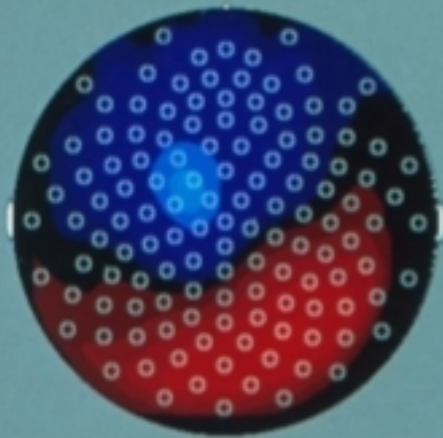
MOTION

homogeneous

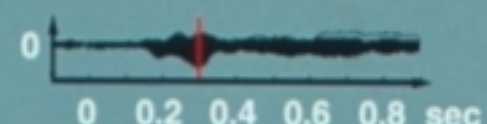
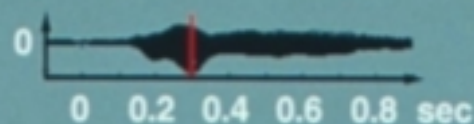
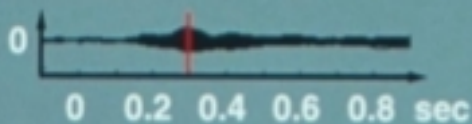
checkerboard

texture
segmentation

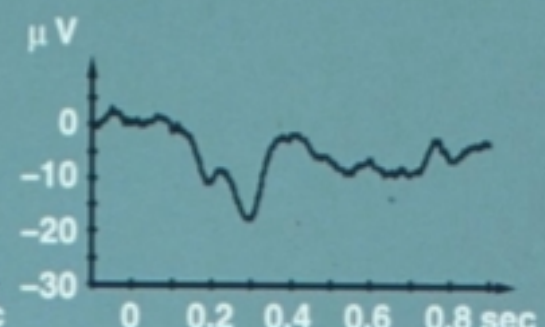
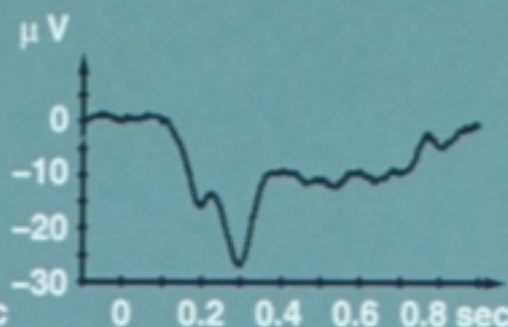
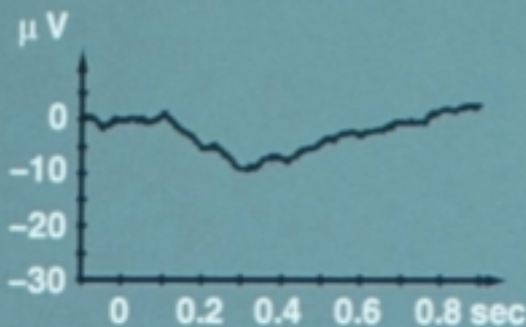
contour plot
128 channels
at $t = 0.296$ sec



128 channels



channel
at Oz



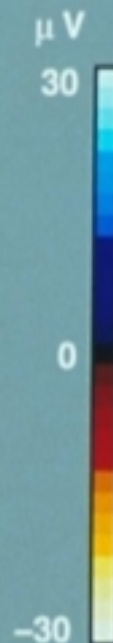
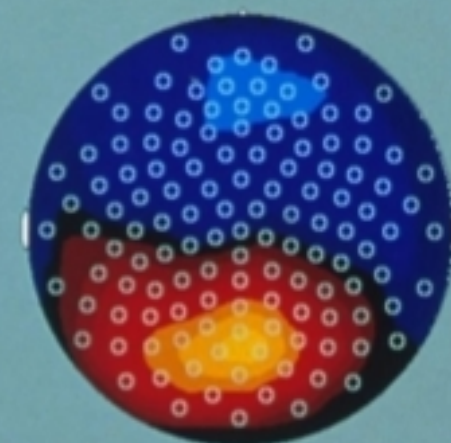
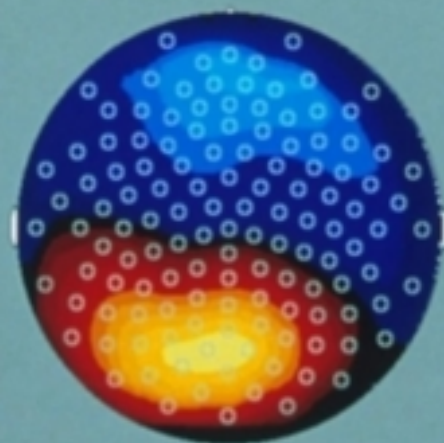
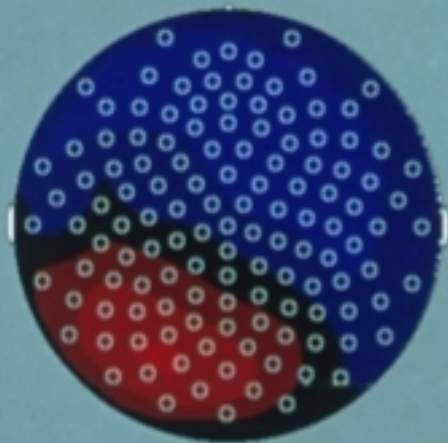
STEREO

homogeneous

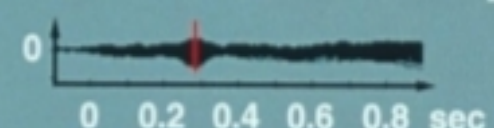
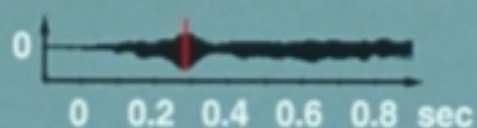
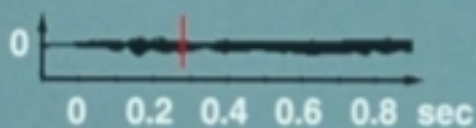
checkerboard

texture
segmentation

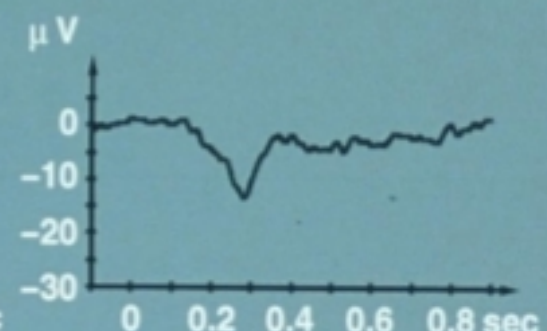
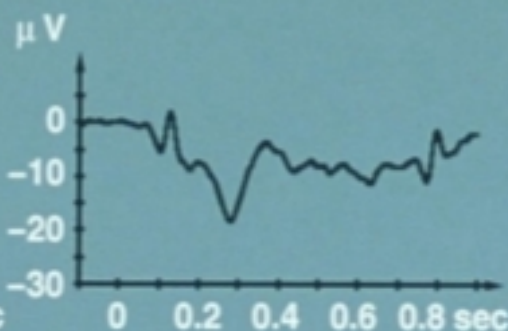
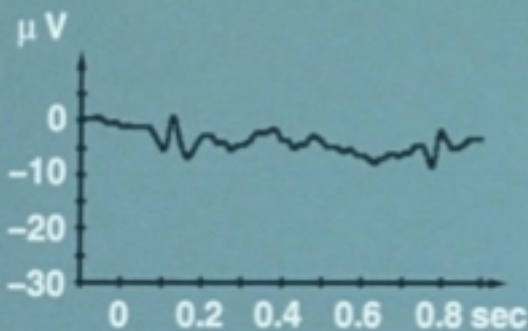
contour plot
128 channels
at $t = 0.28$ sec



128 channels

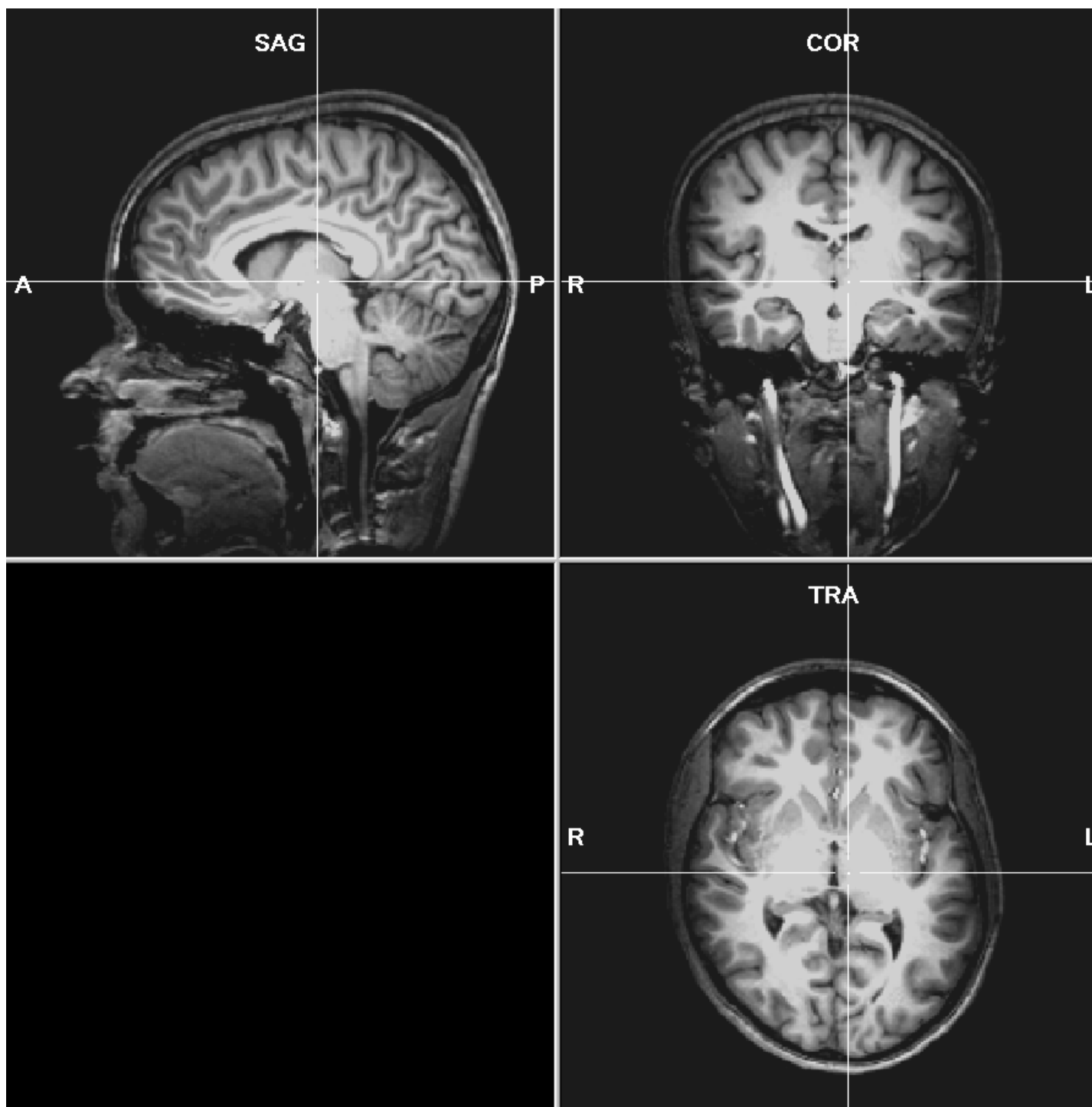


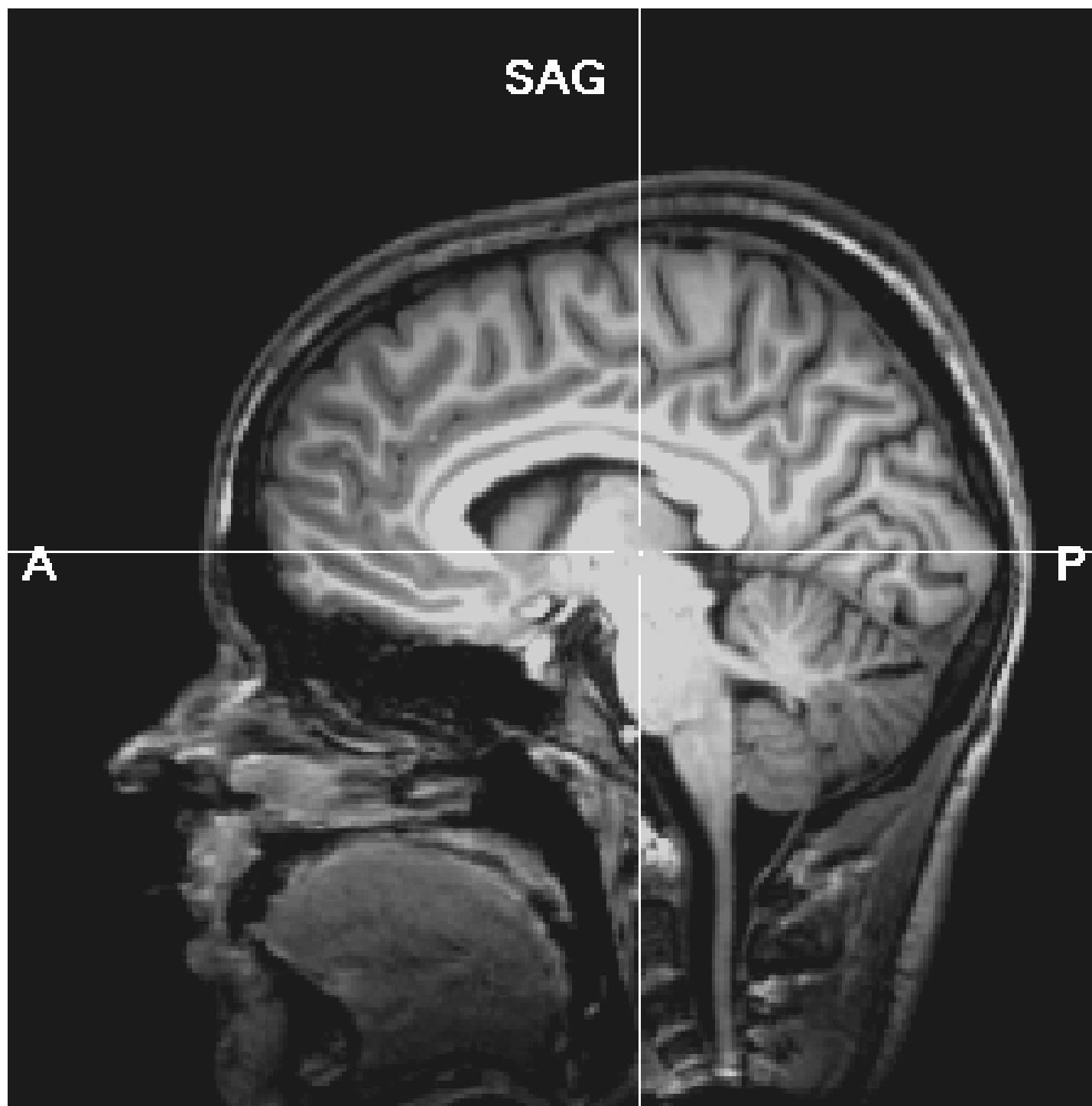
channel
at Oz

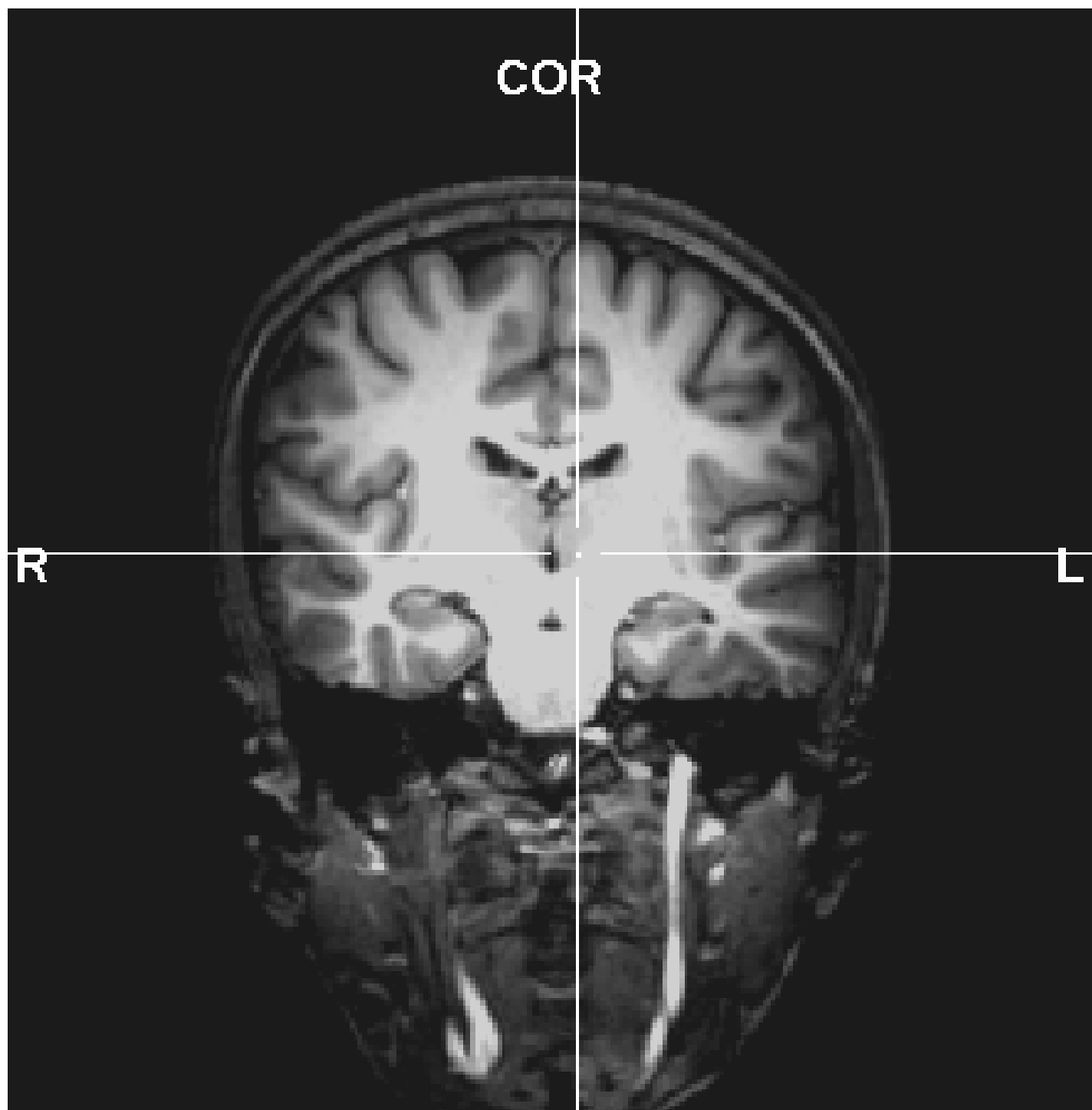


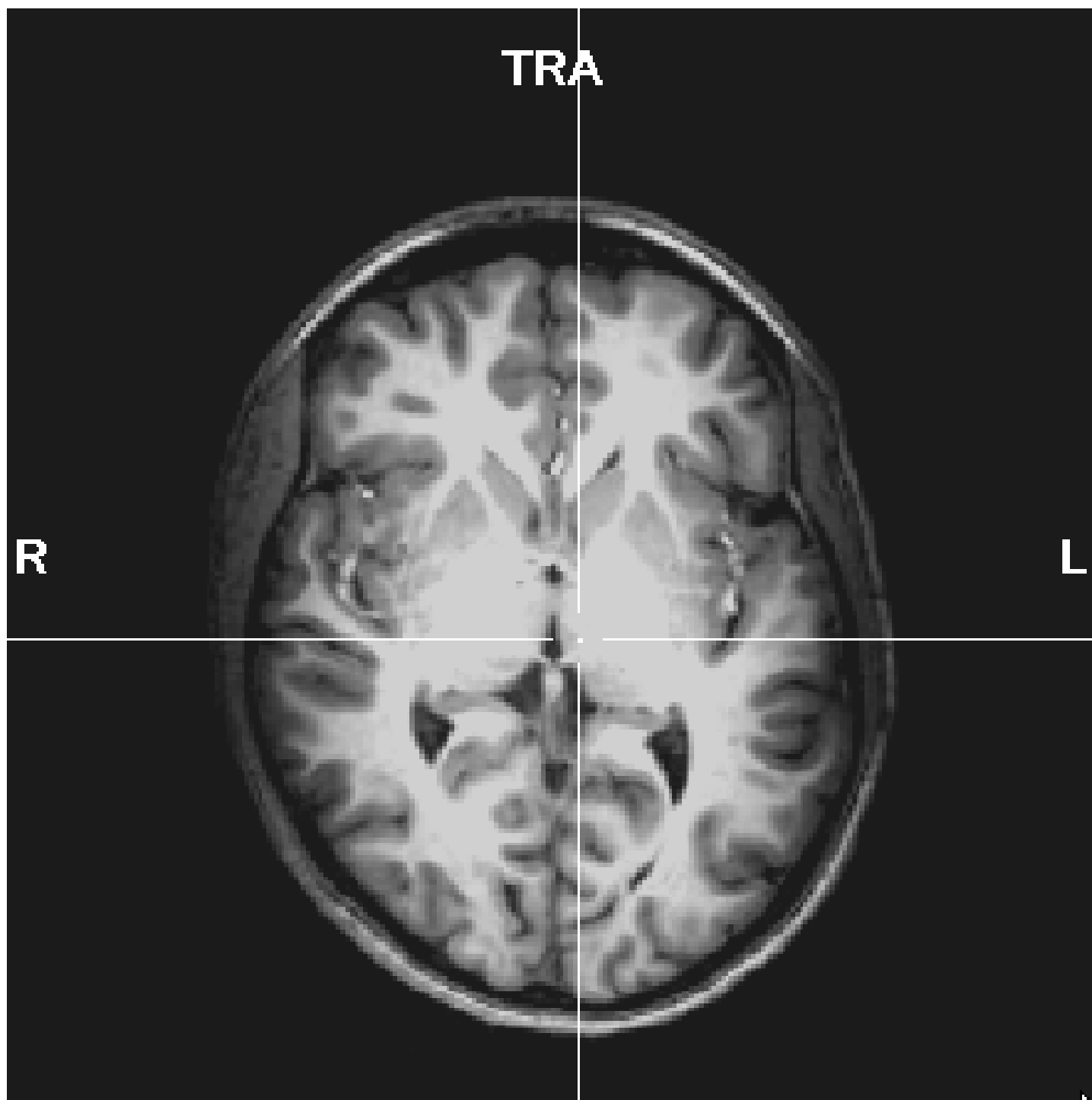
Einblicke ins menschliche Hirn

1. Patientenstudien
2. Summenpotentiale (EEG)
3. Funktionelle Kernspintomographie (fMRI)

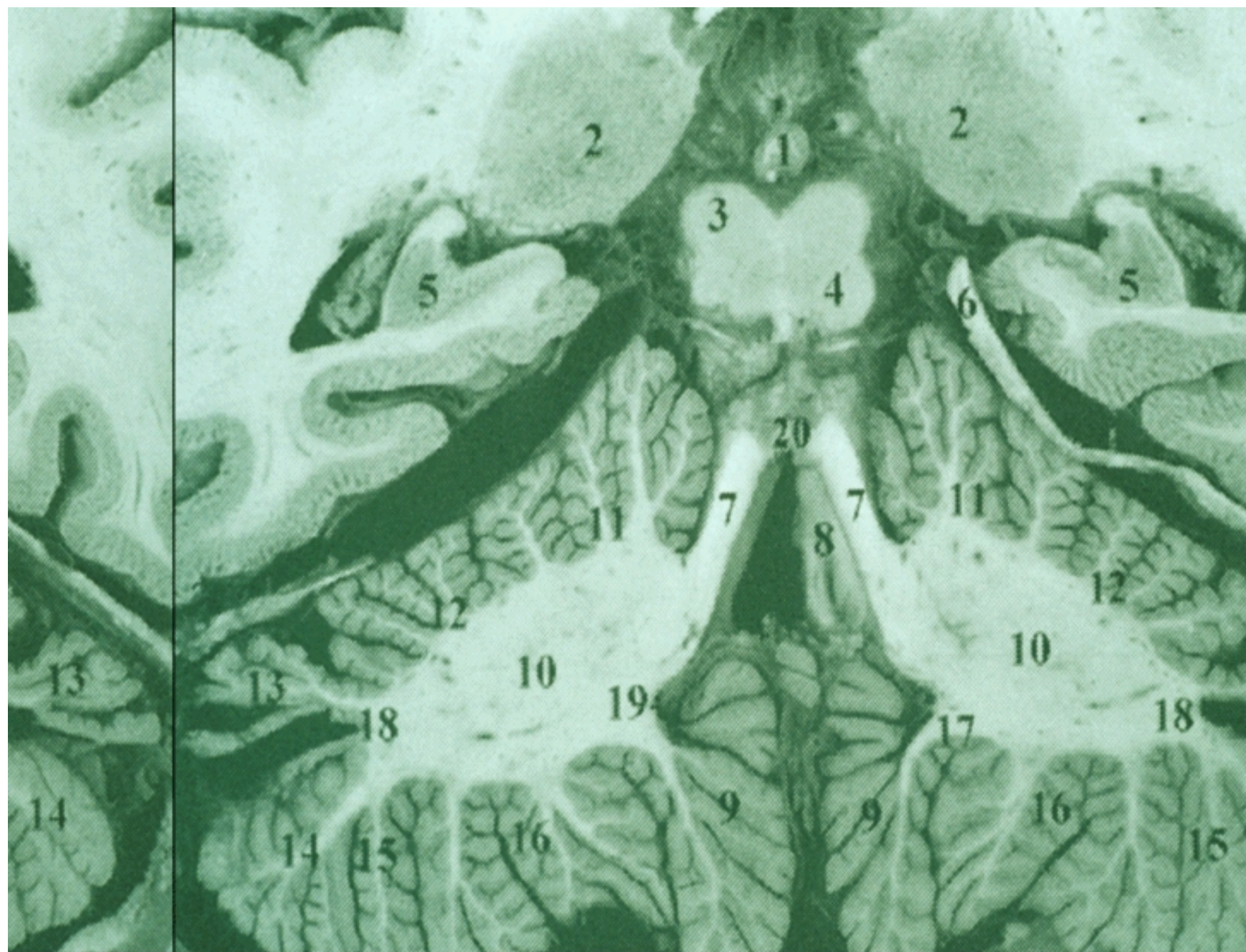


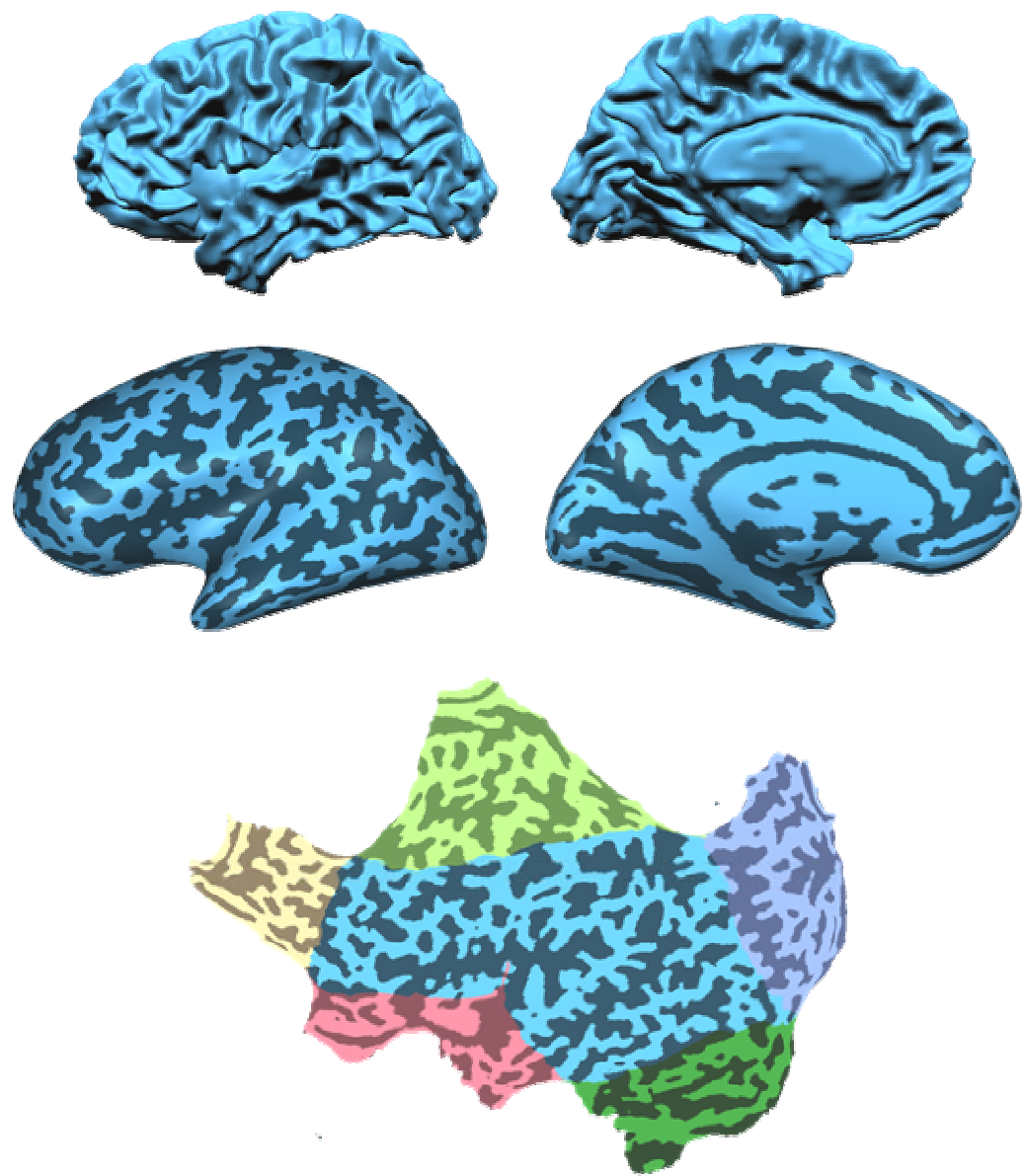
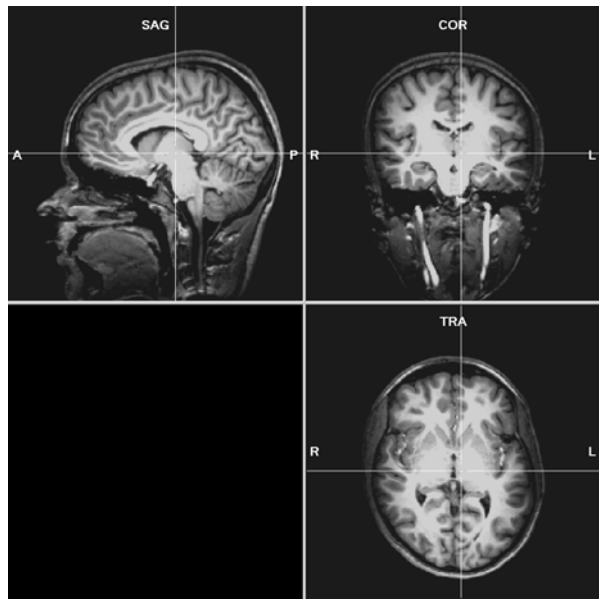




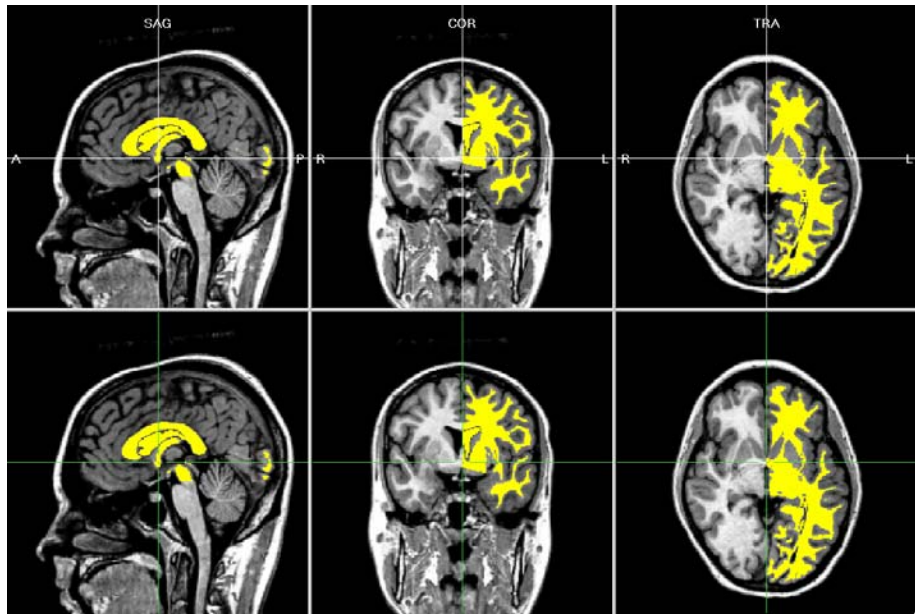




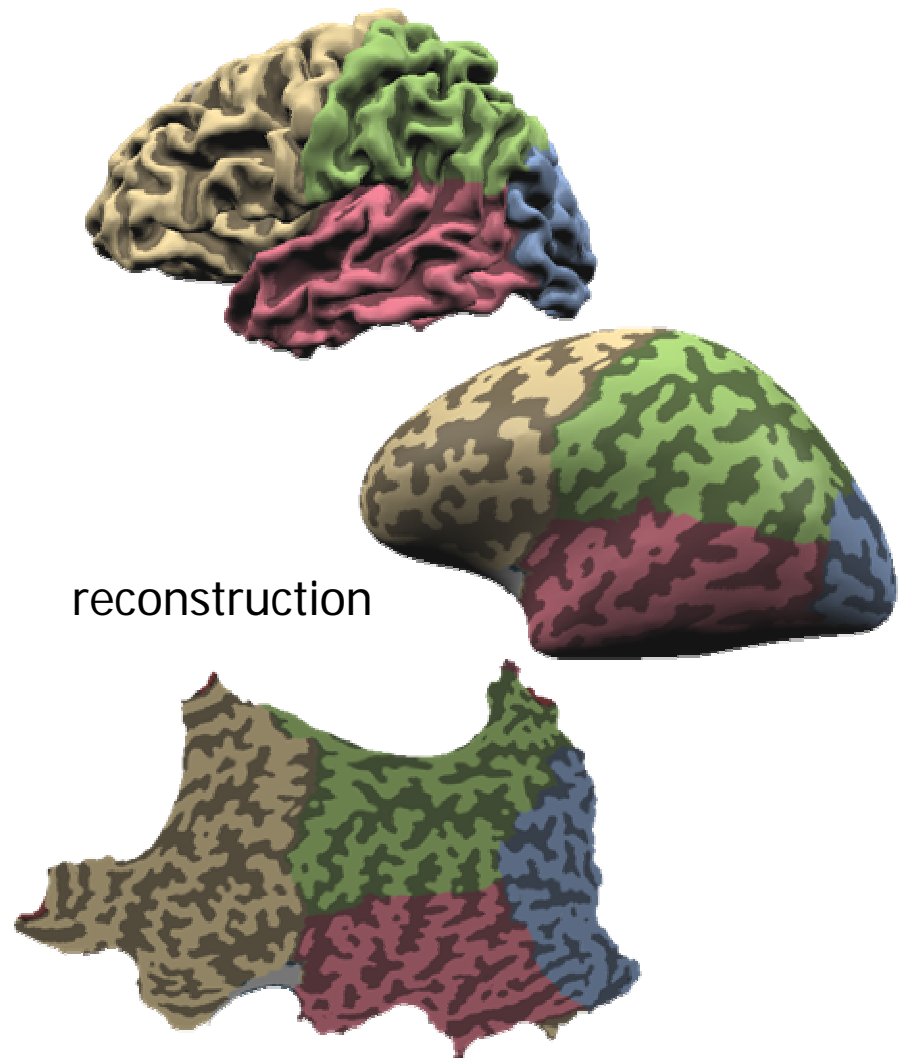




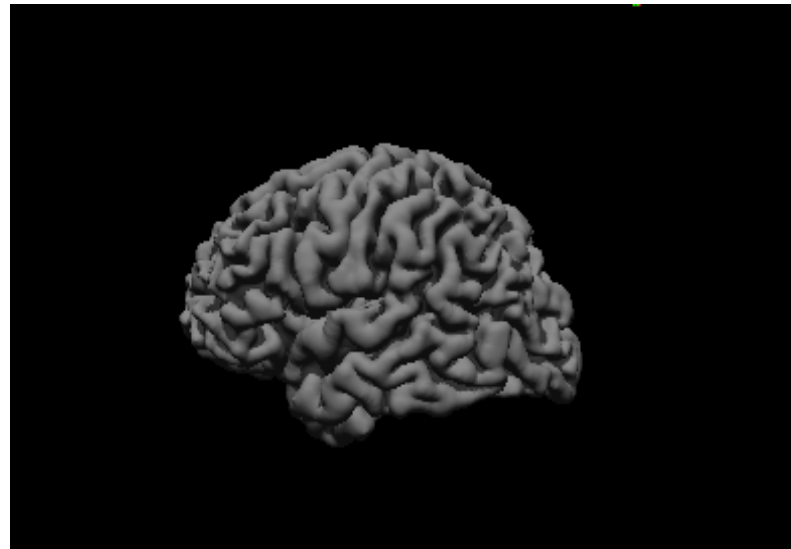
Segmentation and surface reconstruction of the cortex



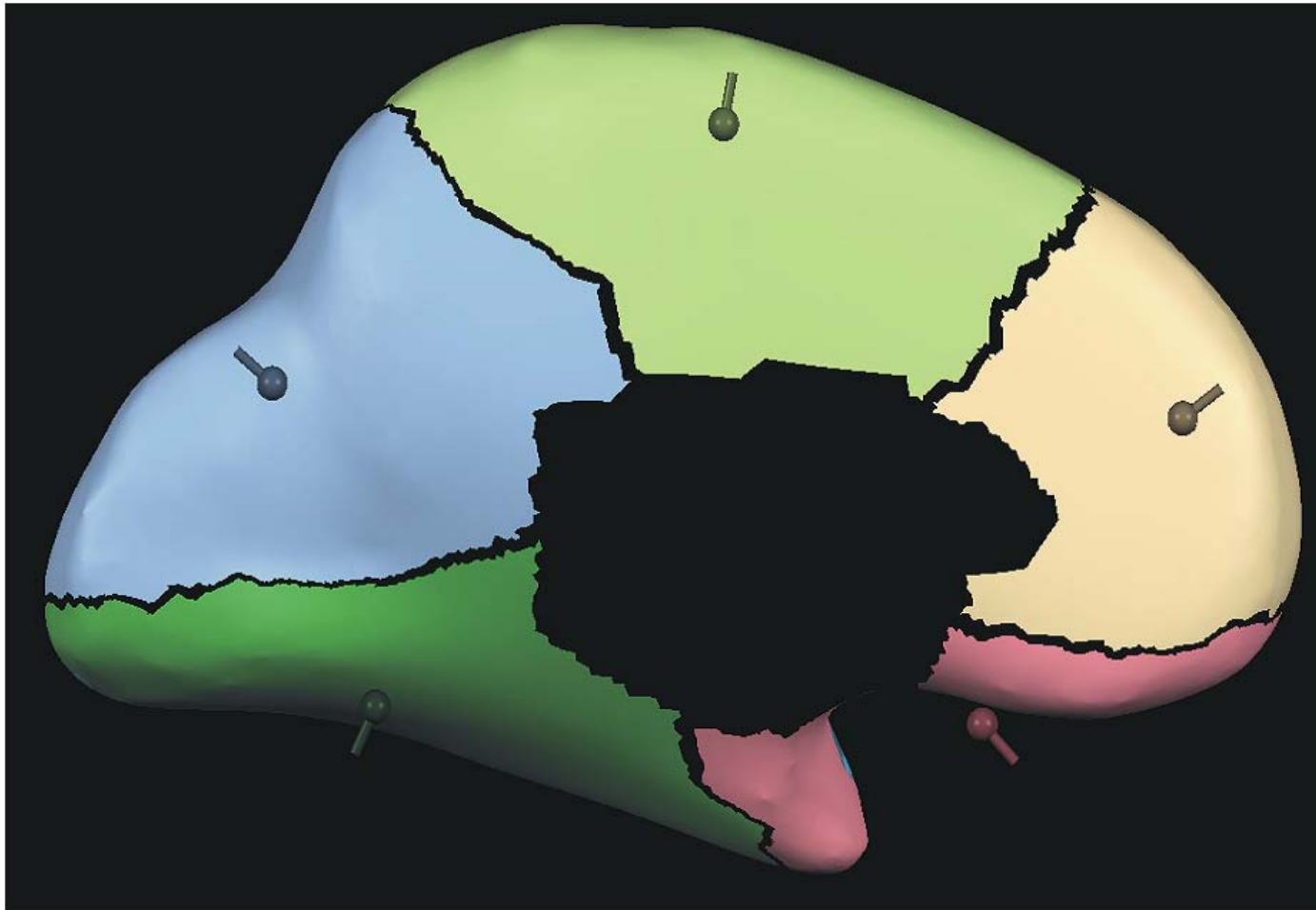
segmentation



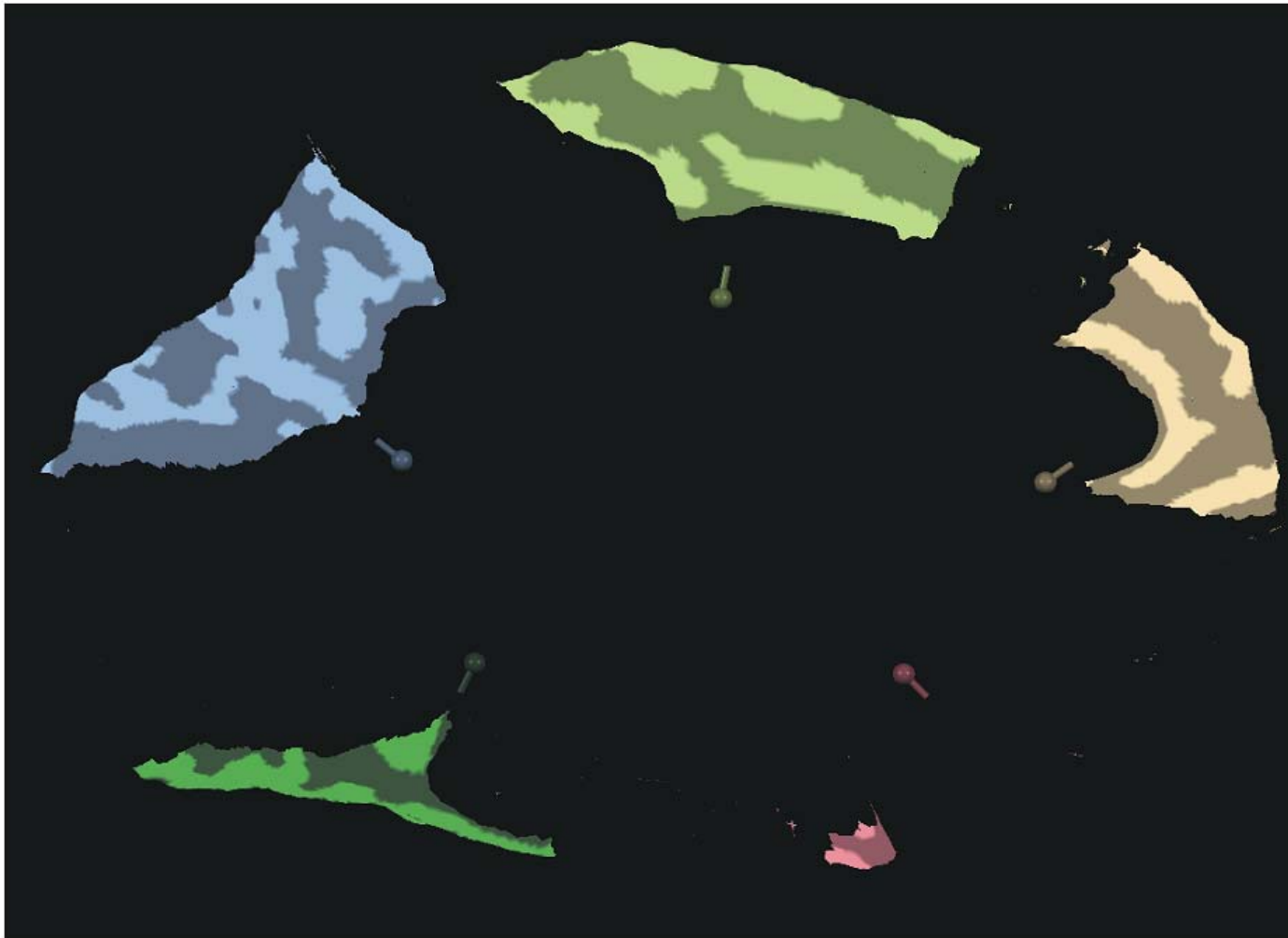
Segmentation and surface reconstruction of the cortex



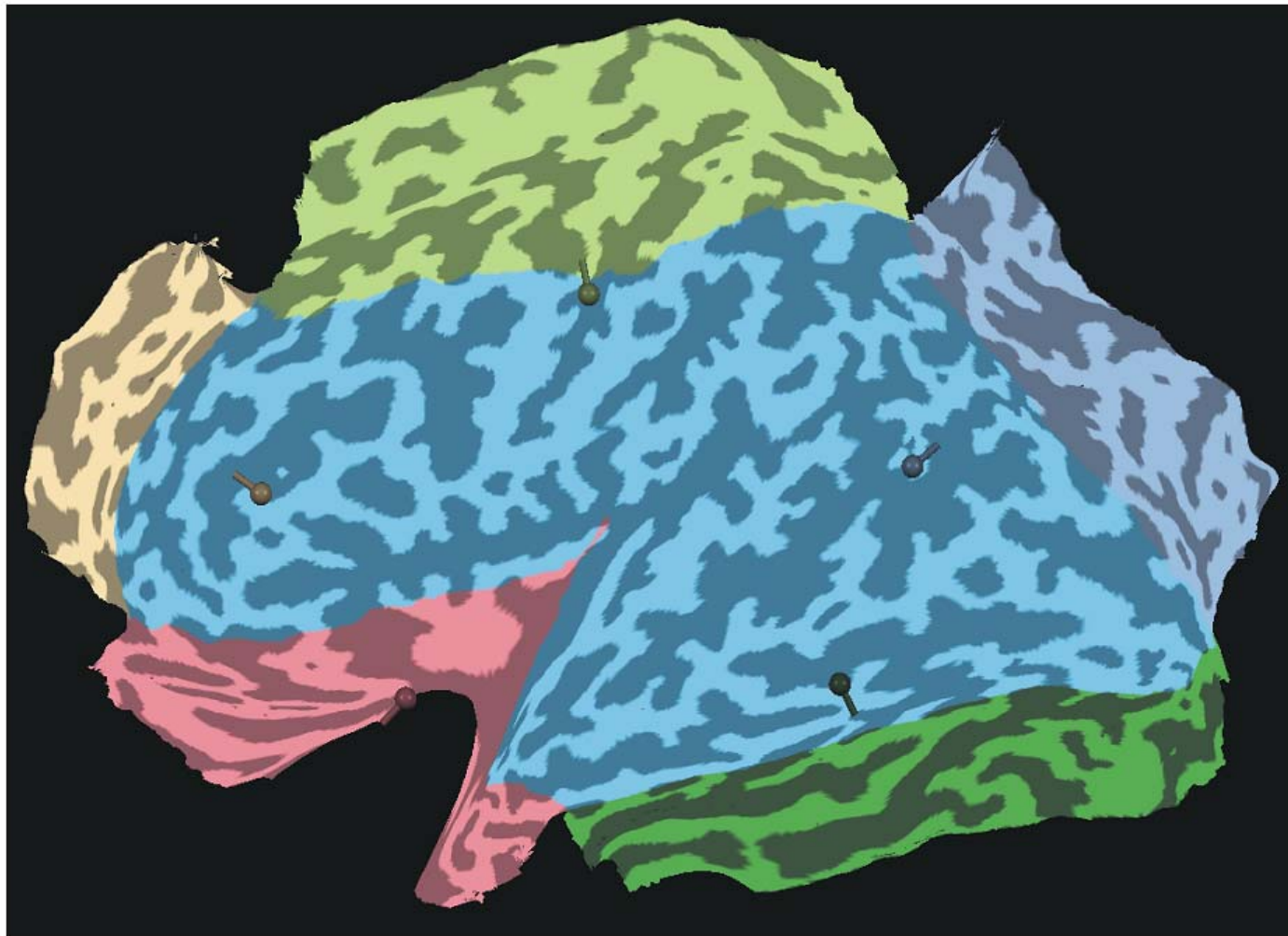
Segmentation and surface reconstruction of the cortex



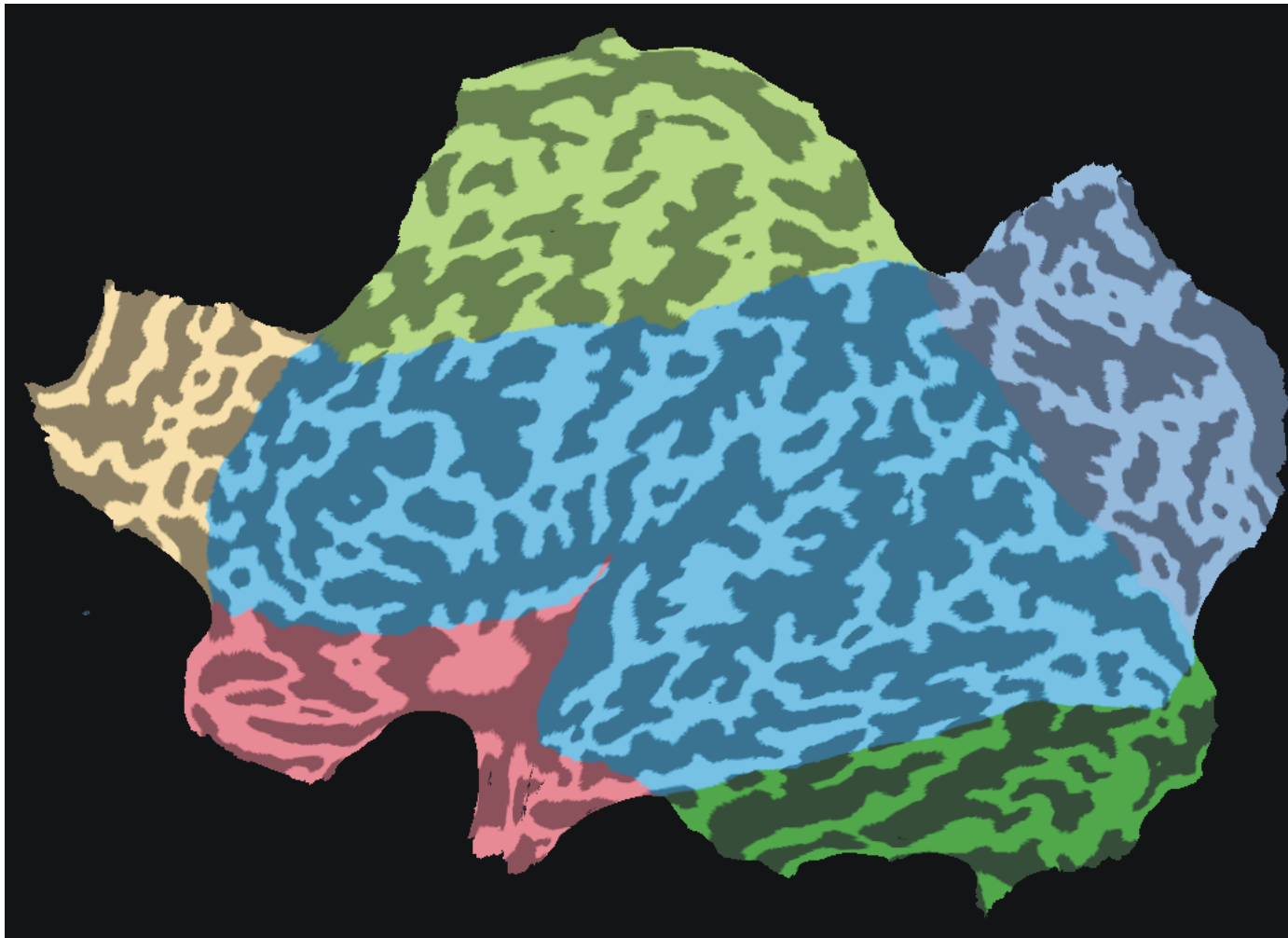
Segmentation and surface reconstruction of the cortex



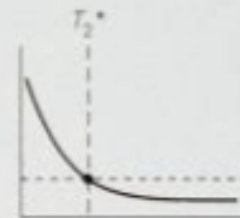
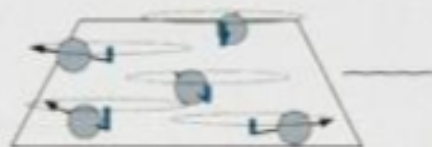
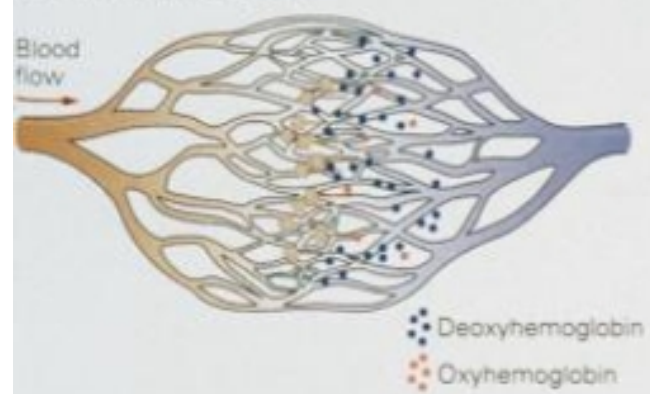
Segmentation and surface reconstruction of the cortex



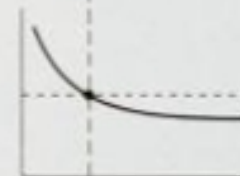
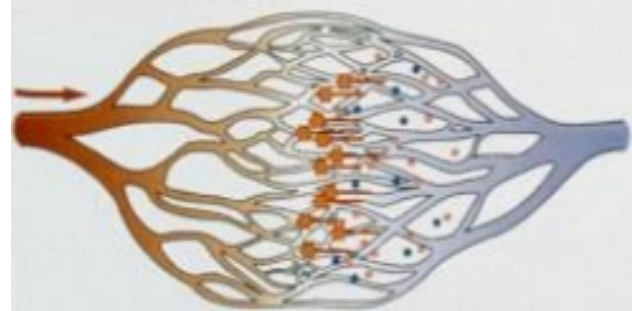
Segmentation and surface reconstruction of the cortex



A Unstimulated tissue

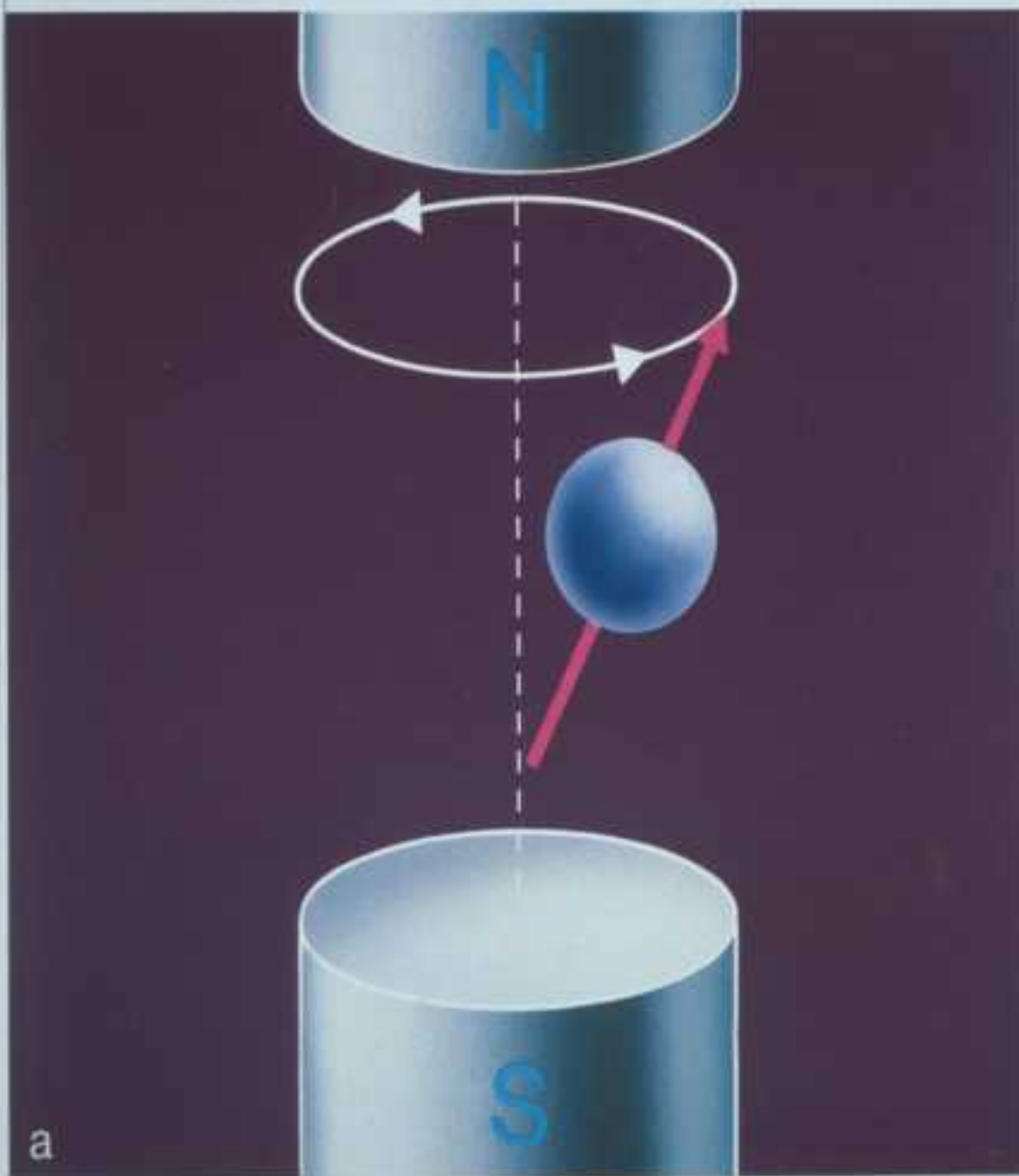


B Stimulated tissue



C

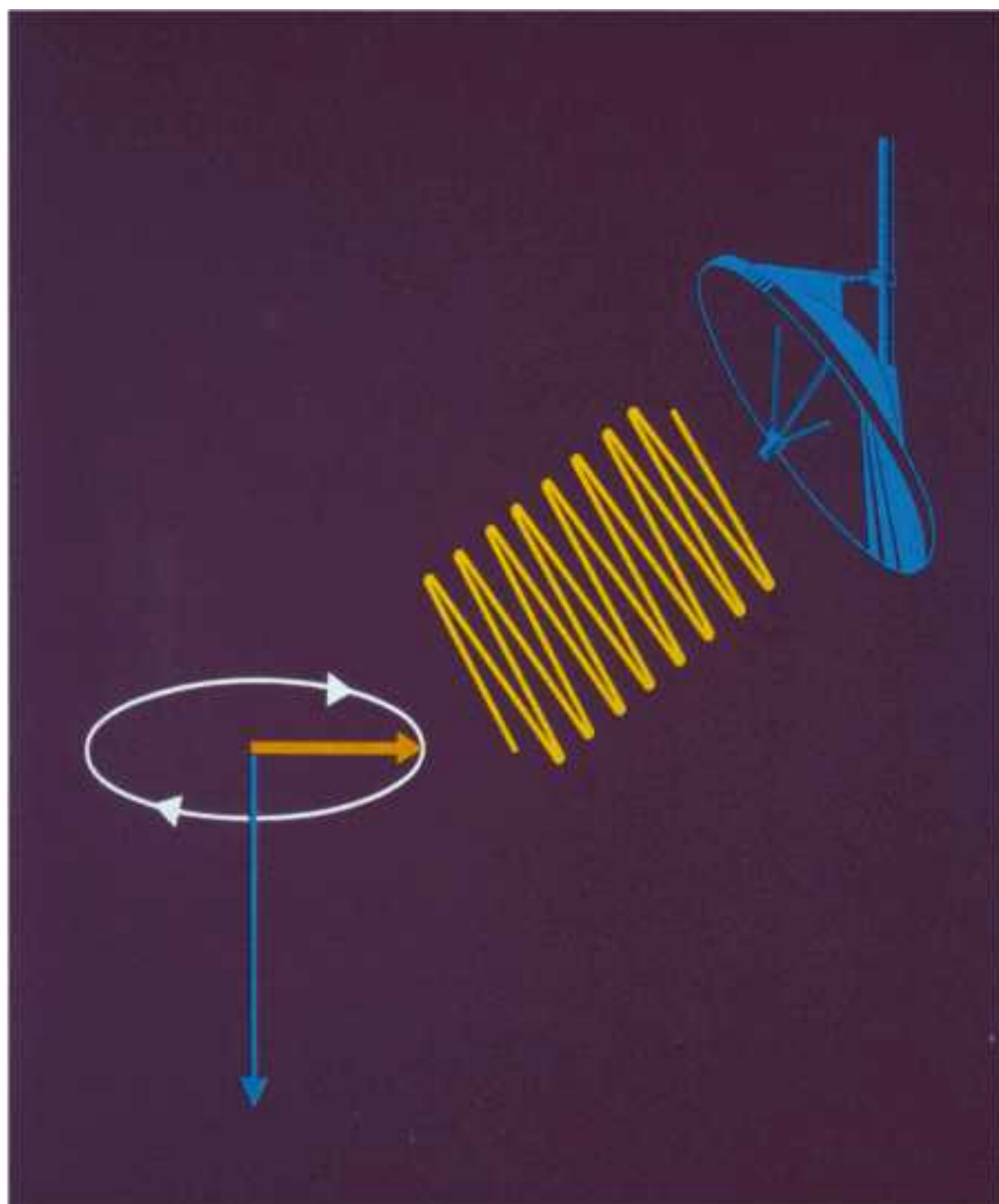




a

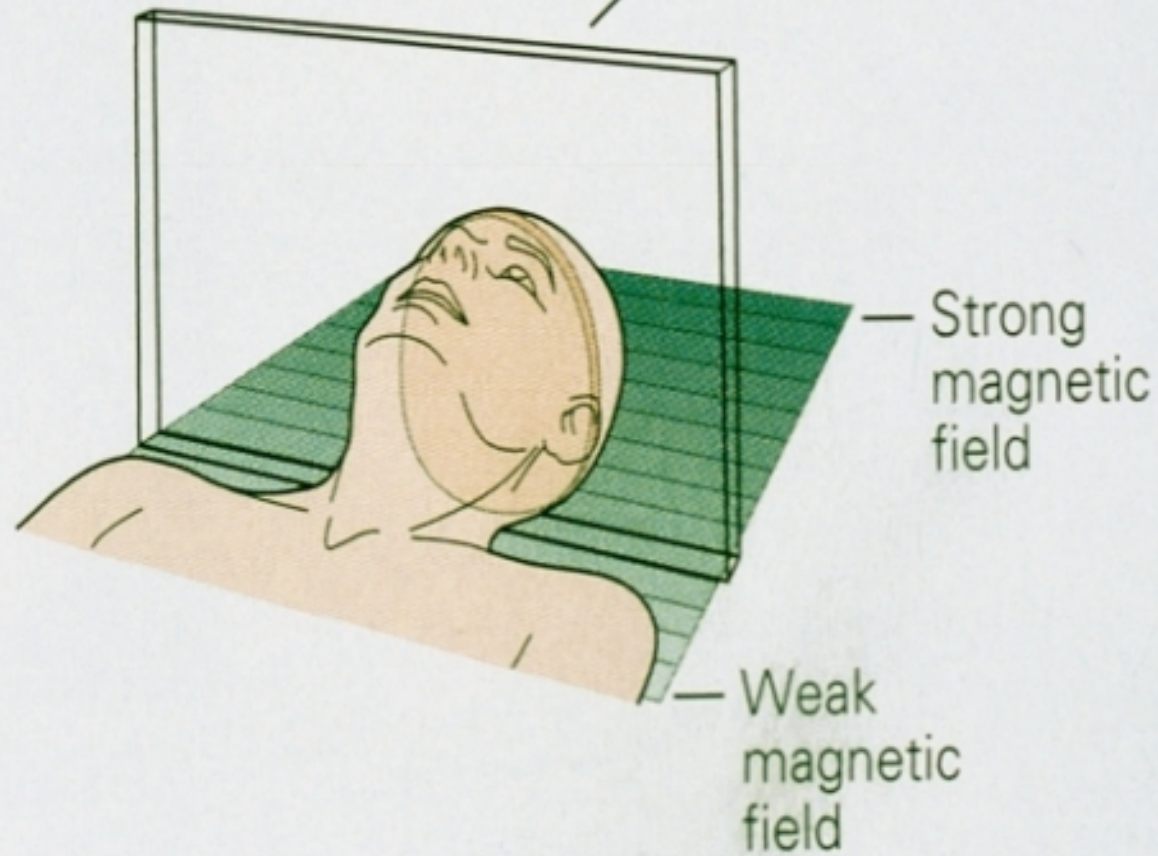


b



A Slice selection

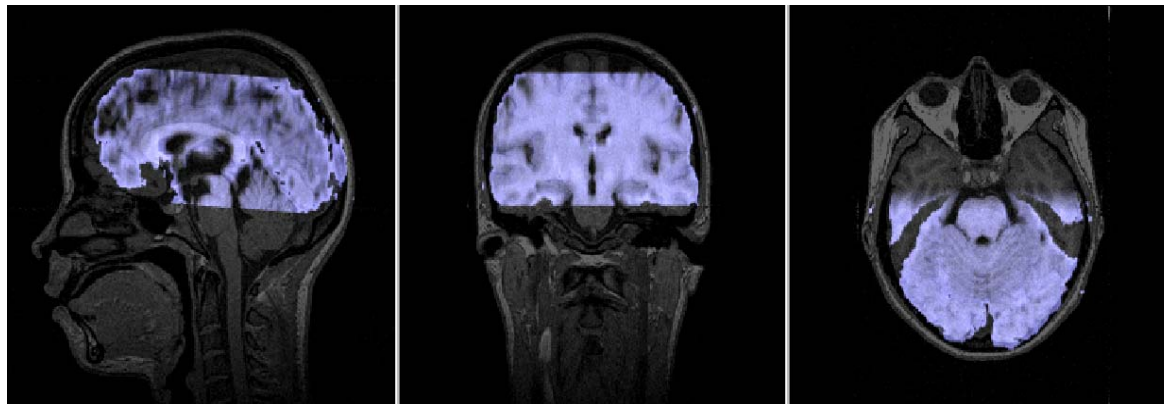
Radio frequency pulse
resonates with protons in
this strength magnetic field



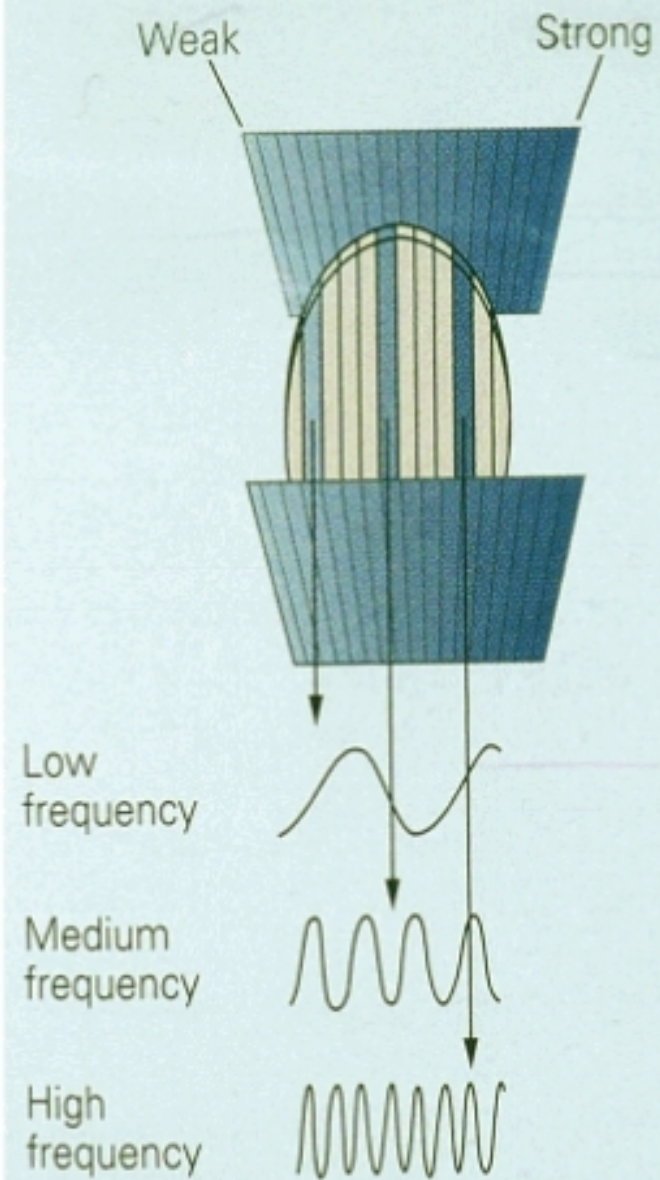
Terminologie

Für die Erzielung eines **MRT**-Bildes werden die Wasserstoffatome einer Gewebeschicht mehrmals hintereinander durch eine Hochfrequenzpulsfolge angeregt.

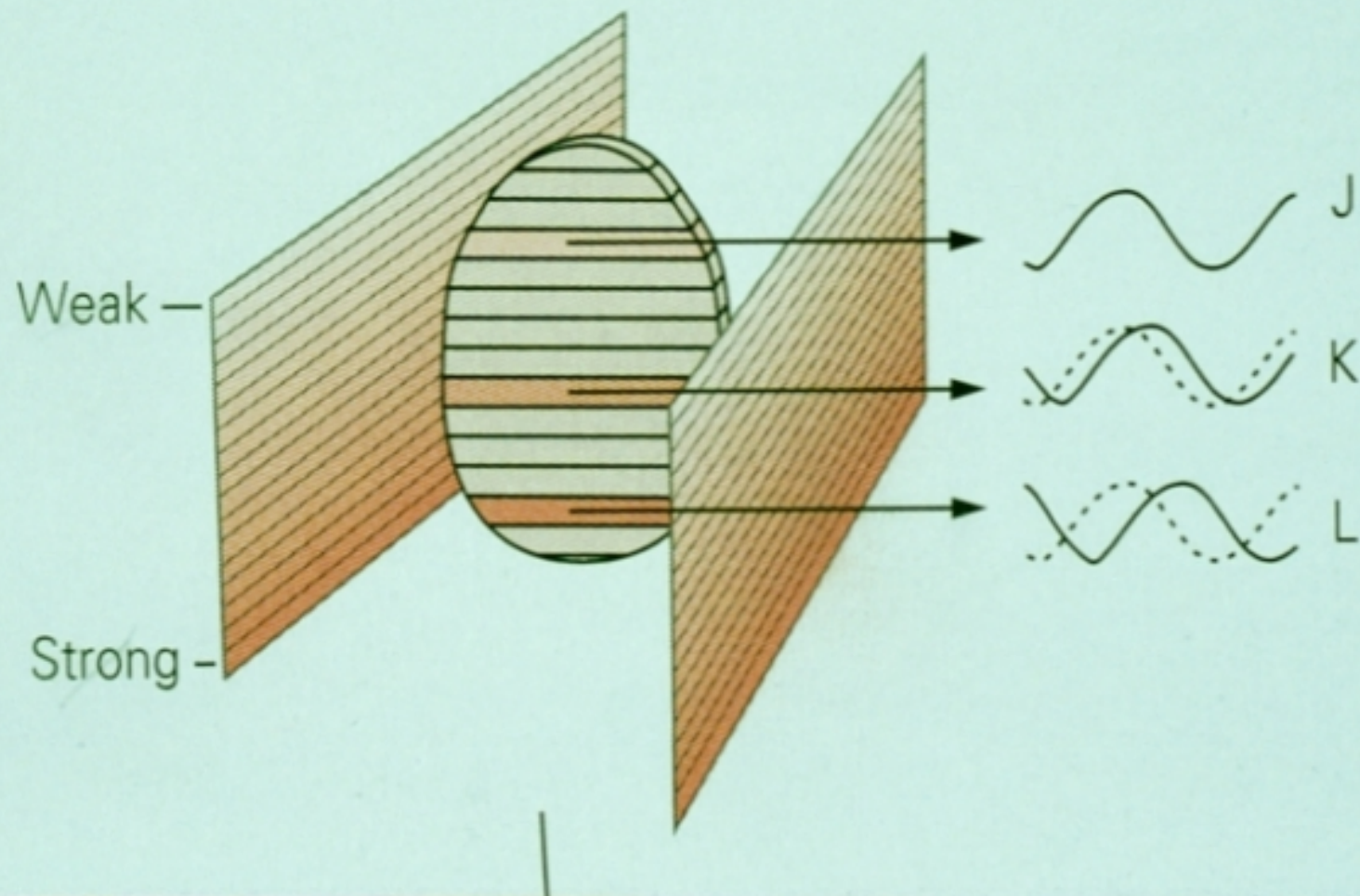
TR Repetitionszeit (time to repetition), Zeit zwischen zwei Anregungen



C Frequency encoding



B Phase encoding



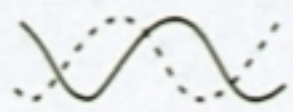
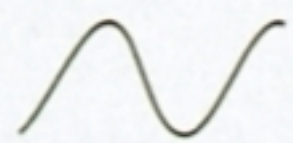
D

High frequency

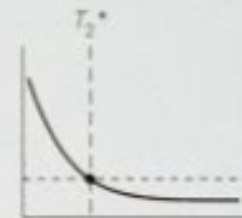
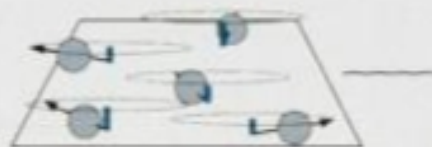
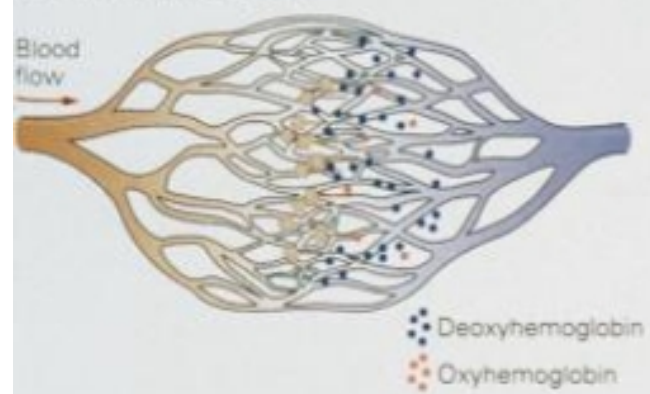
Phase J

Low frequency

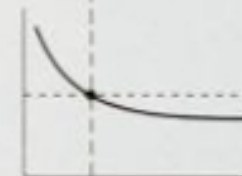
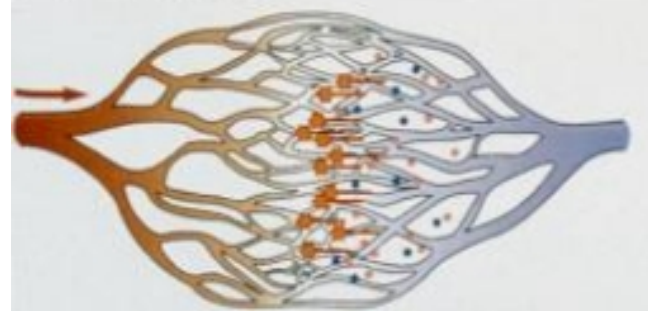
Phase L



A Unstimulated tissue

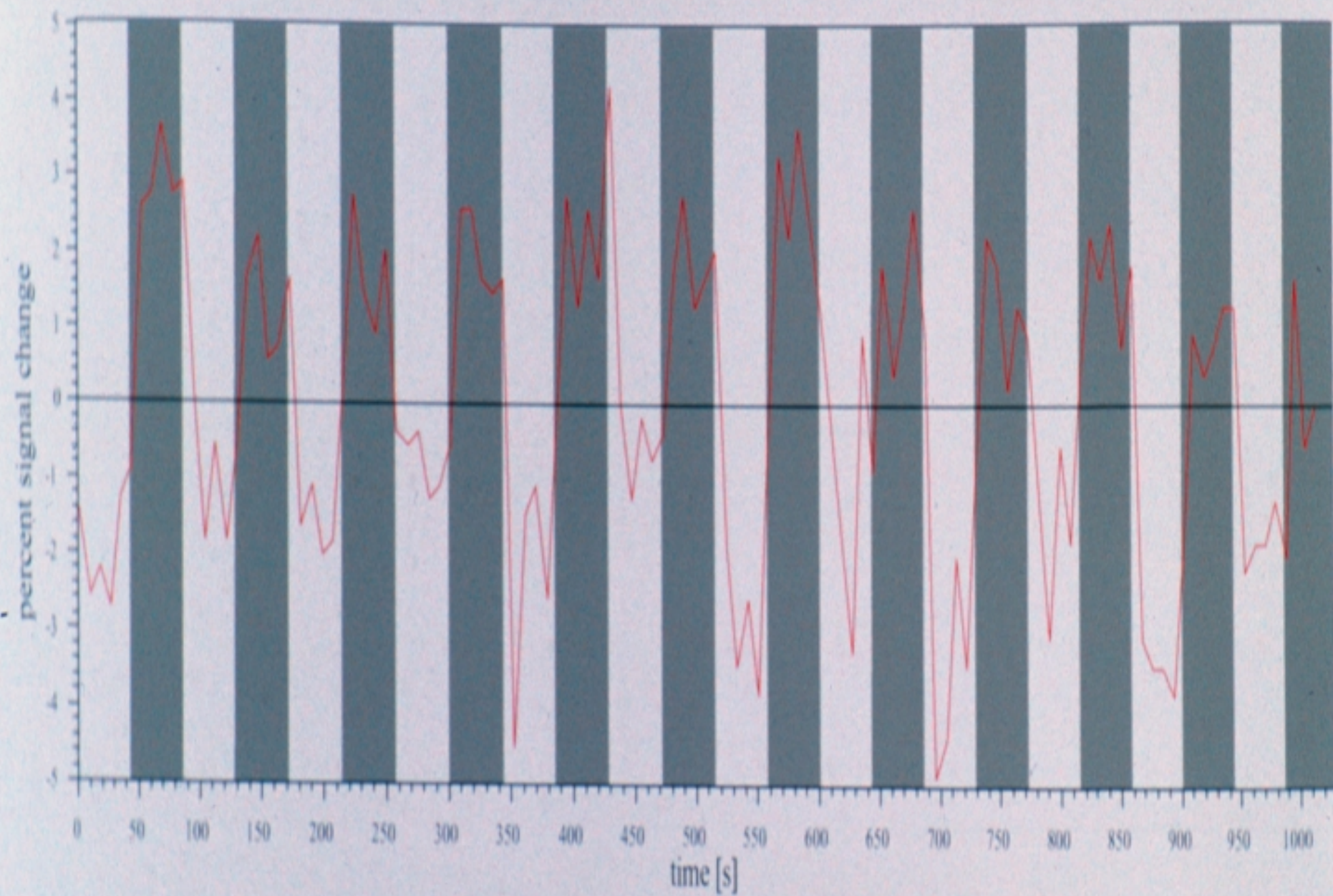


B Stimulated tissue



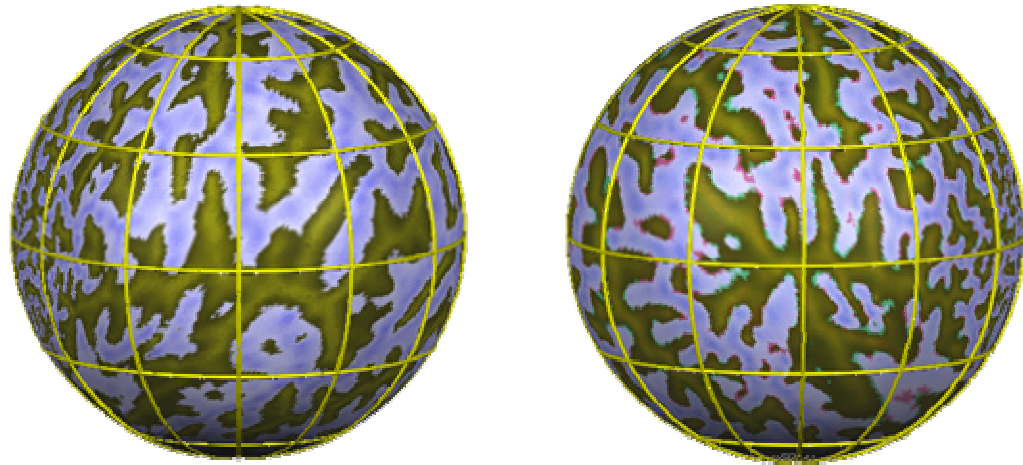
C





Cortex-based intersubject alignment

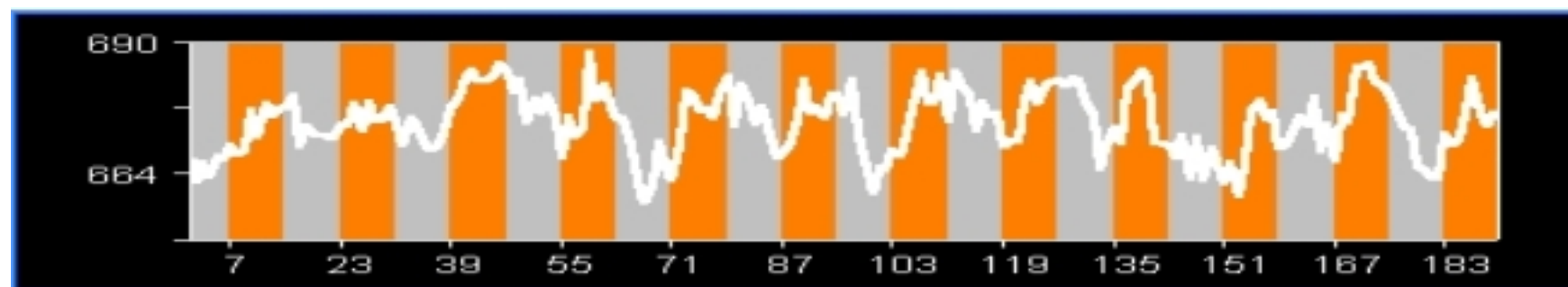
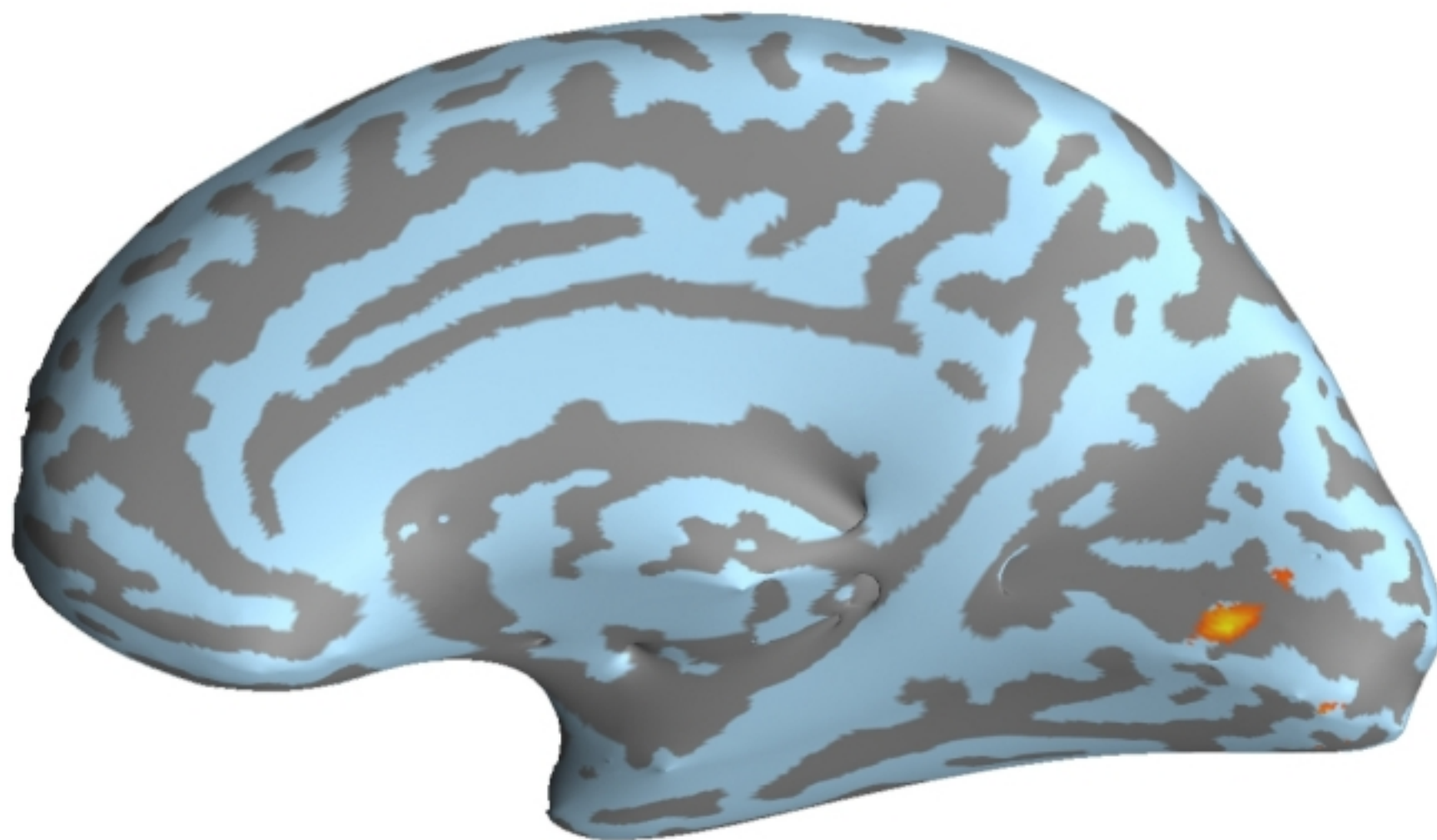
- objective procedure
- more specific

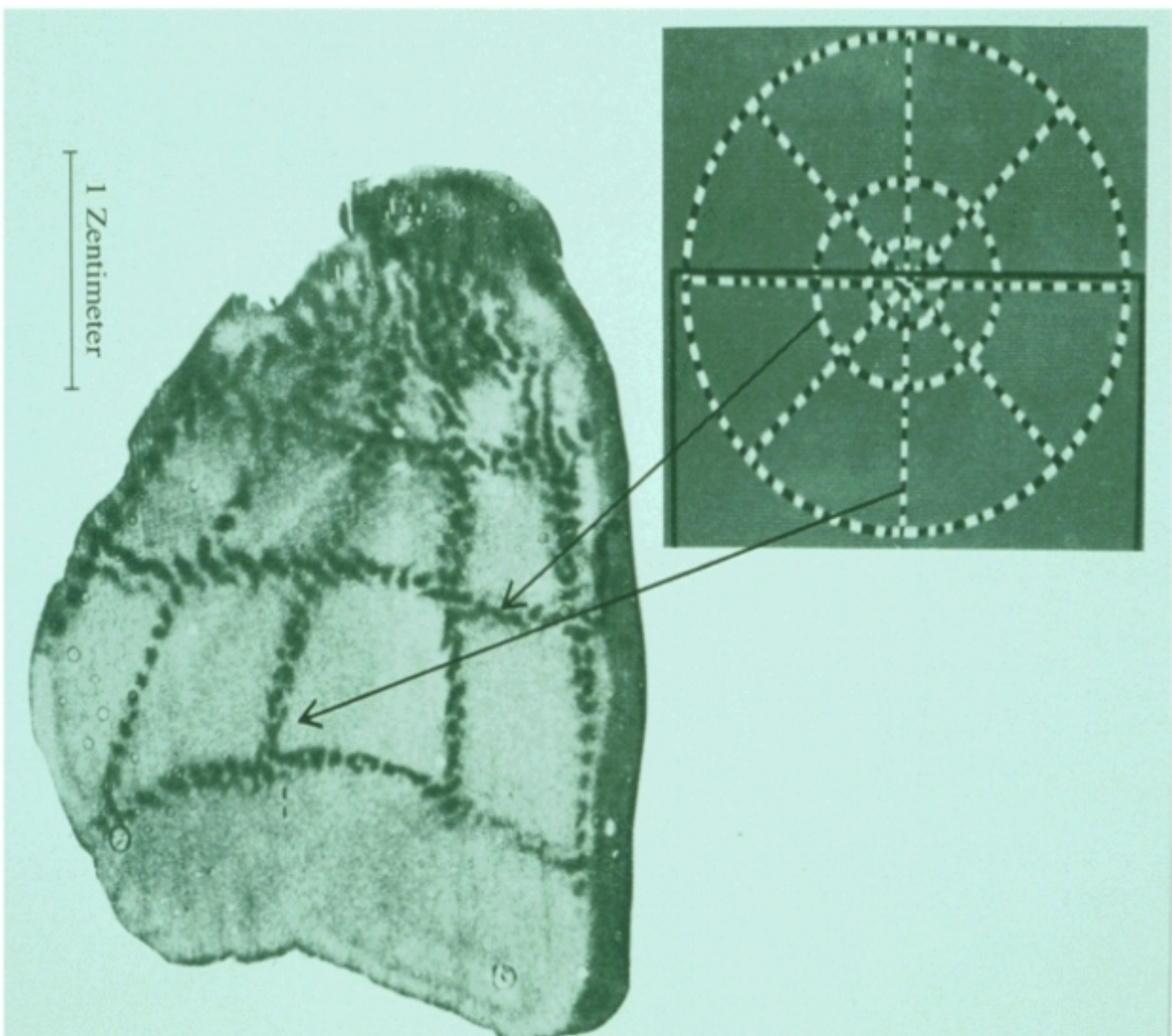


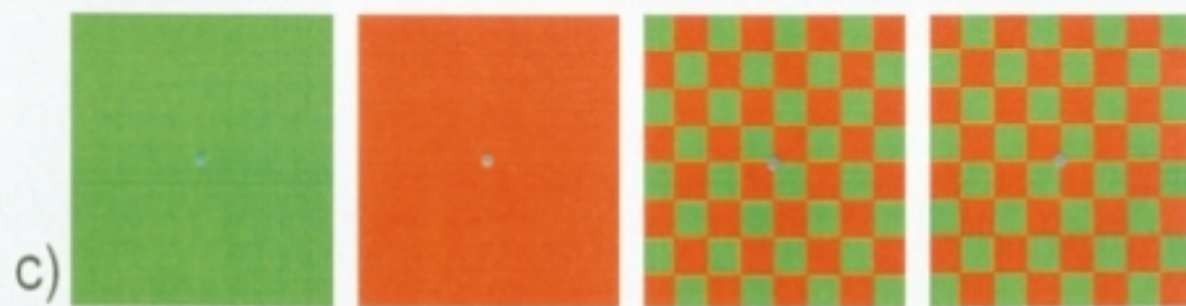
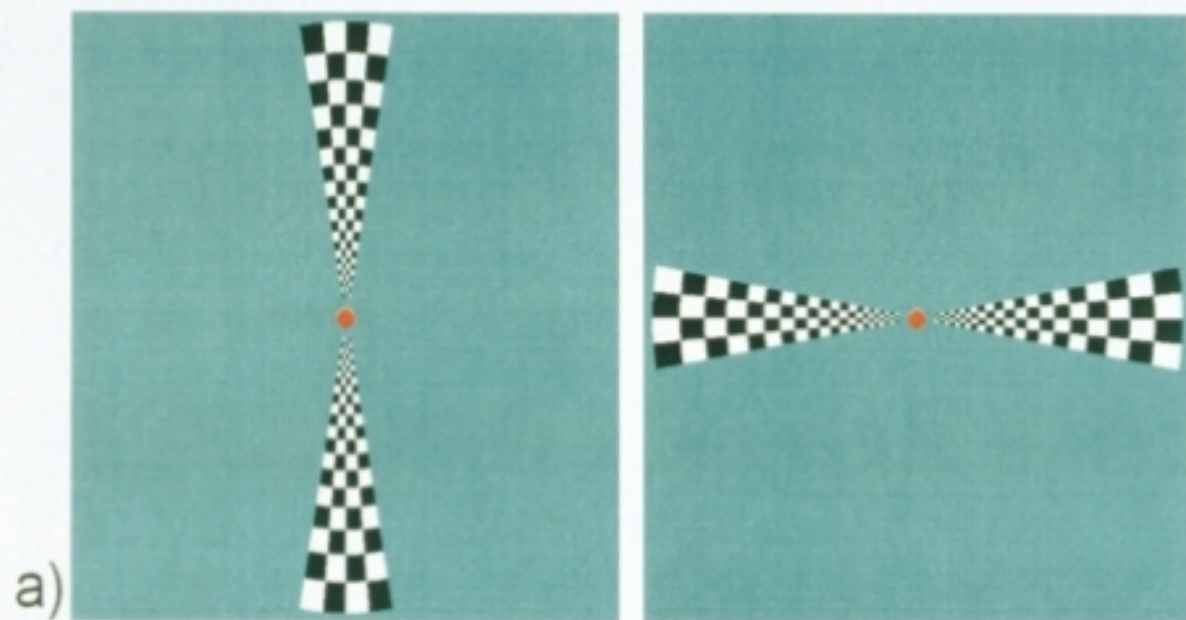
Problem of talairach-based alignment: squeezed brain but problems within it.

Spherical coordinate system keeps information of gyri and sulci \Rightarrow increase the overlap of different brains.

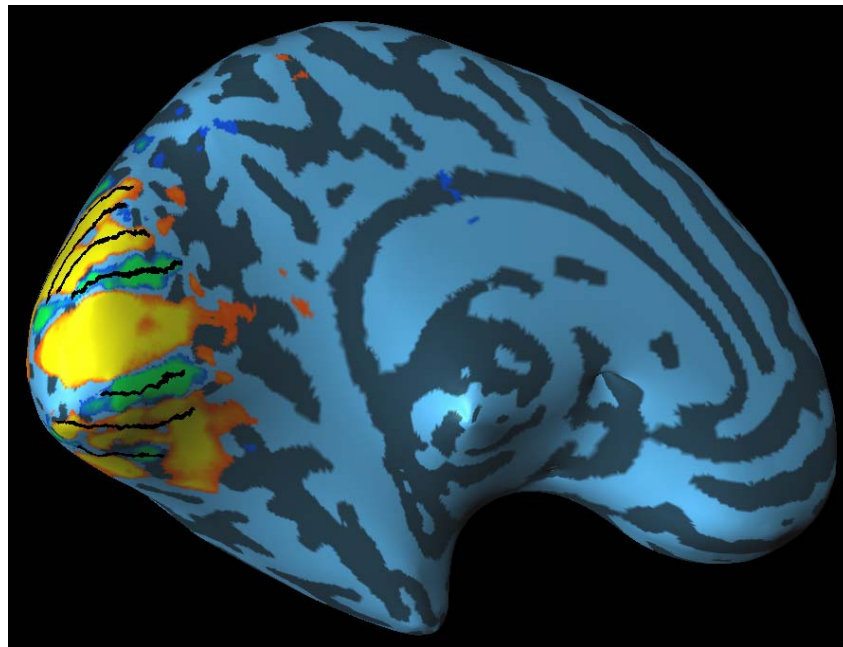
reference brain?



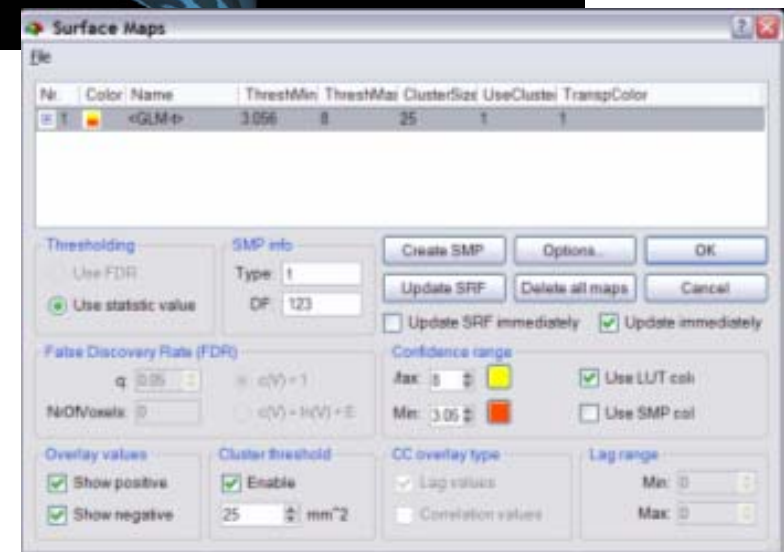
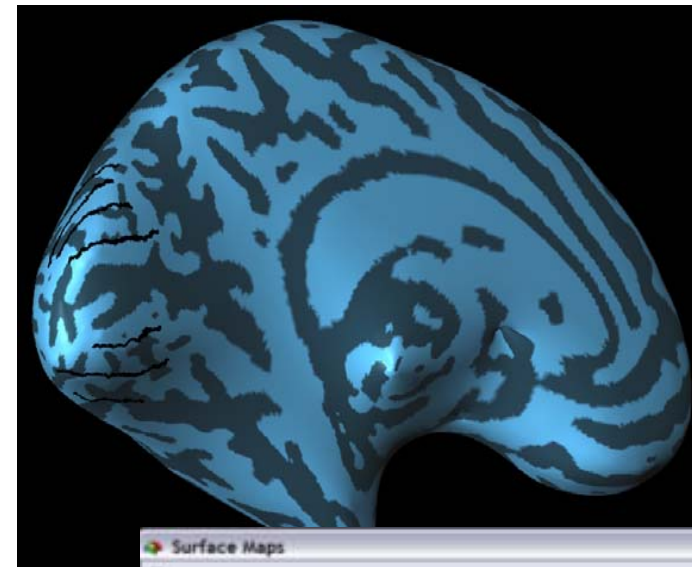




Statistical surface maps (SMPs)



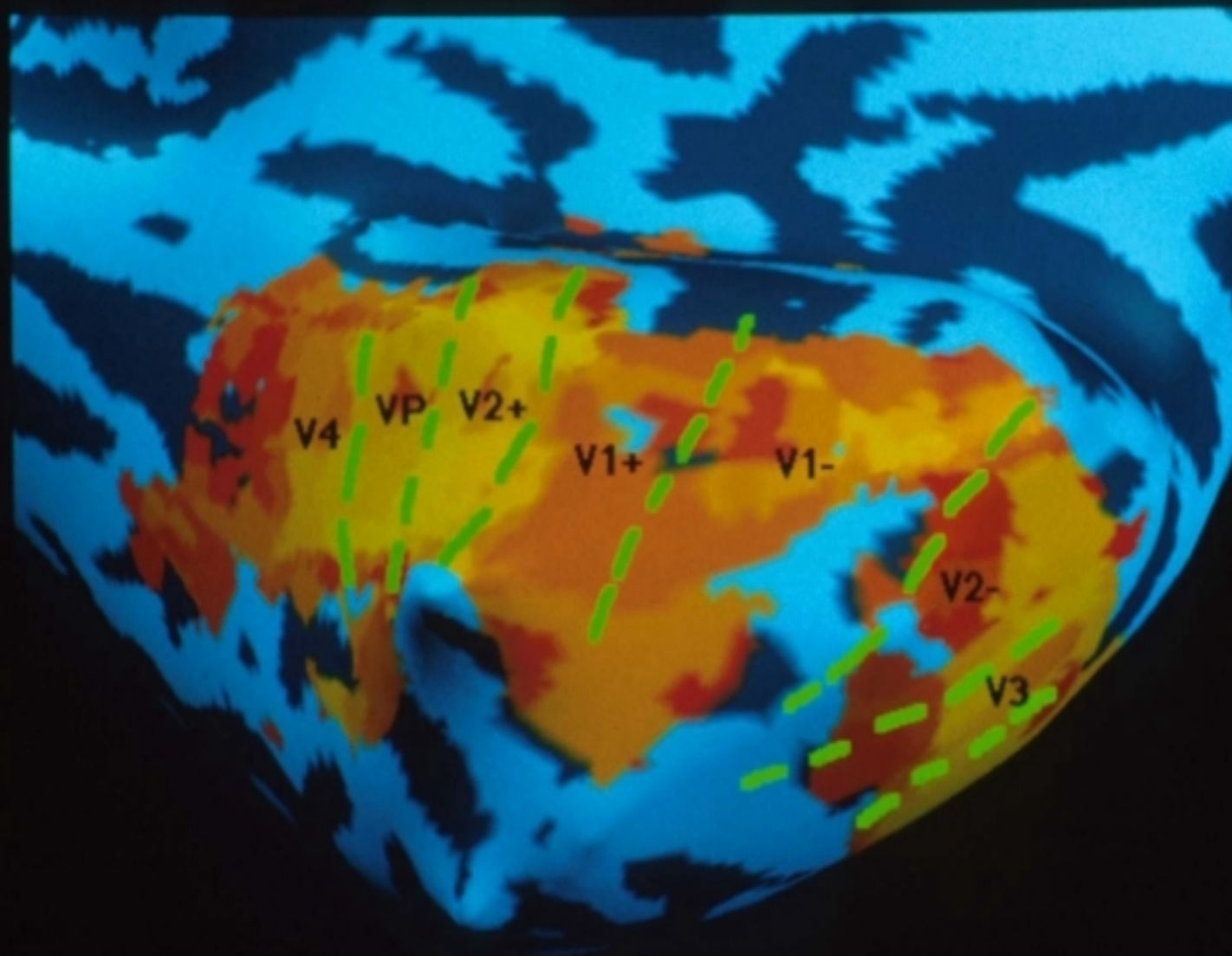
mapping.infl.srf LH mit retina-video1-6

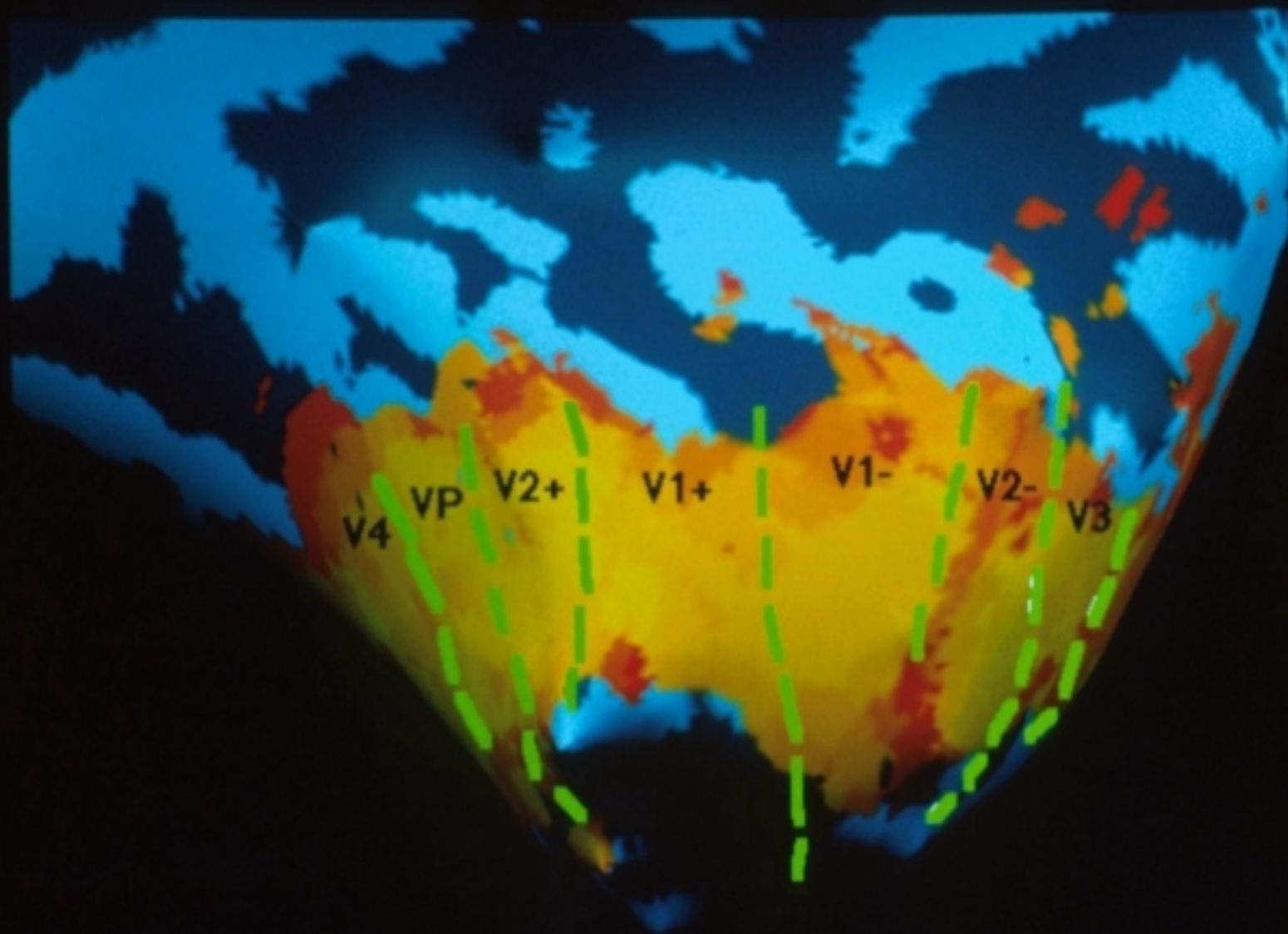


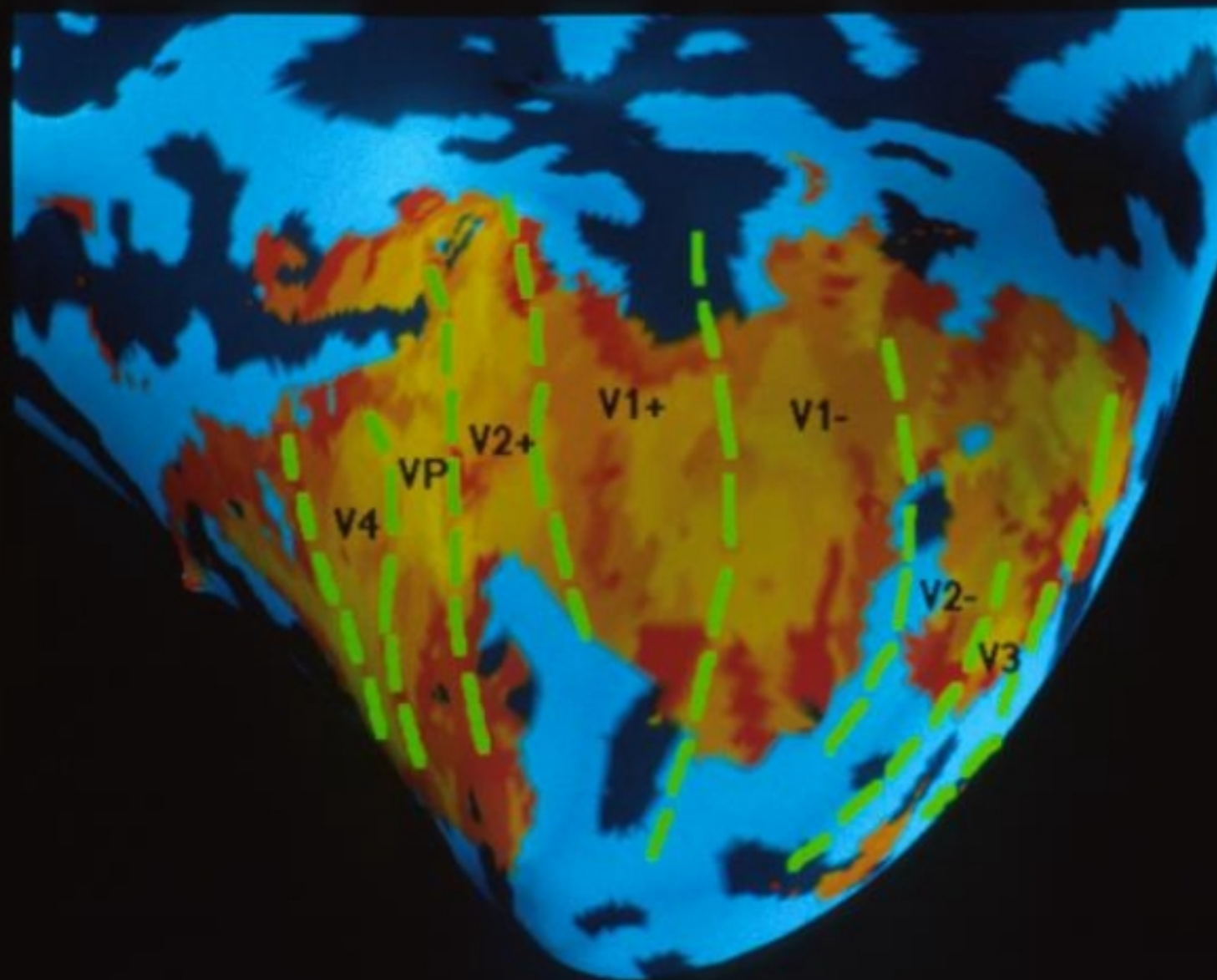


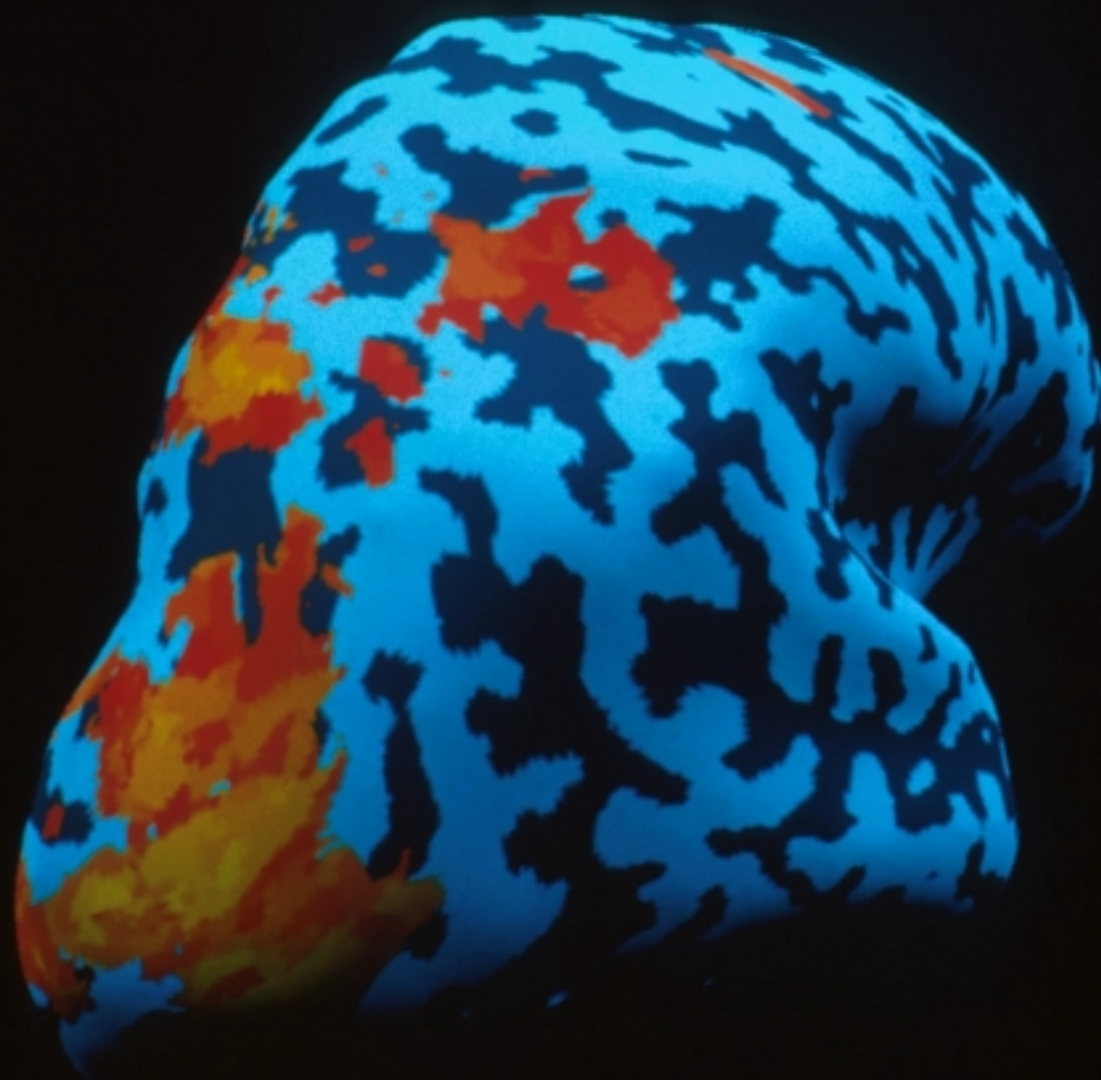
p-value :6.05e-04
cctresh :0.35 natresh :0.25
N : 96 timecourse : 120











Zusammenfassung

- Das menschliche Gehirn ist der Sitz des „Ich“
- Es kann mittels verschiedener Methoden untersucht werden
 - Verhaltensebene: Wahrnehmungsexperimente (z.T. Patienten)
 - Elektromagnetische Stimulation (z.T. Ableitung)
 - EEG: Vielkanal-Ableitungen mit Dipol-Analyse
 - Kernspintomografie: Anatomie
 - funktionelle Kernspintomografie: Funktion
- Es zeigt sich eine hohe Spezialisierung und Parallelverarbeitung