

# **The Human EEG**

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A Data Source for Sonification of  
Spatio-temporal Dynamics

# What is the EEG “trying to tell“?



# The EEG

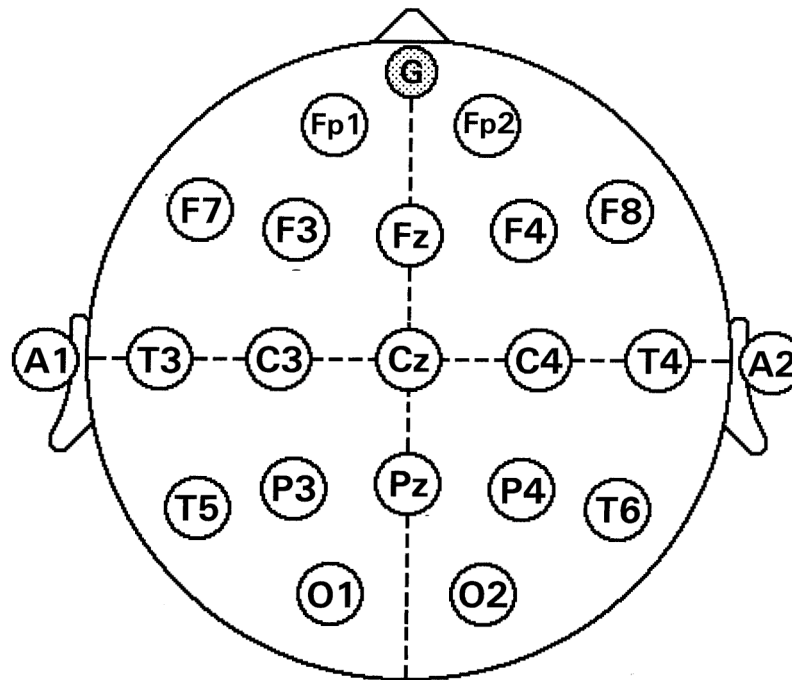
- Electrodes on the scalp pick up superimposed cortical field potentials
- These potentials stem from activity of nerve cells in the outer third of the human neocortex.
- Changes in electric potential are caused by selective ion currents across nerve cell membranes.

# Schematic Electrode Placement 10-20 system

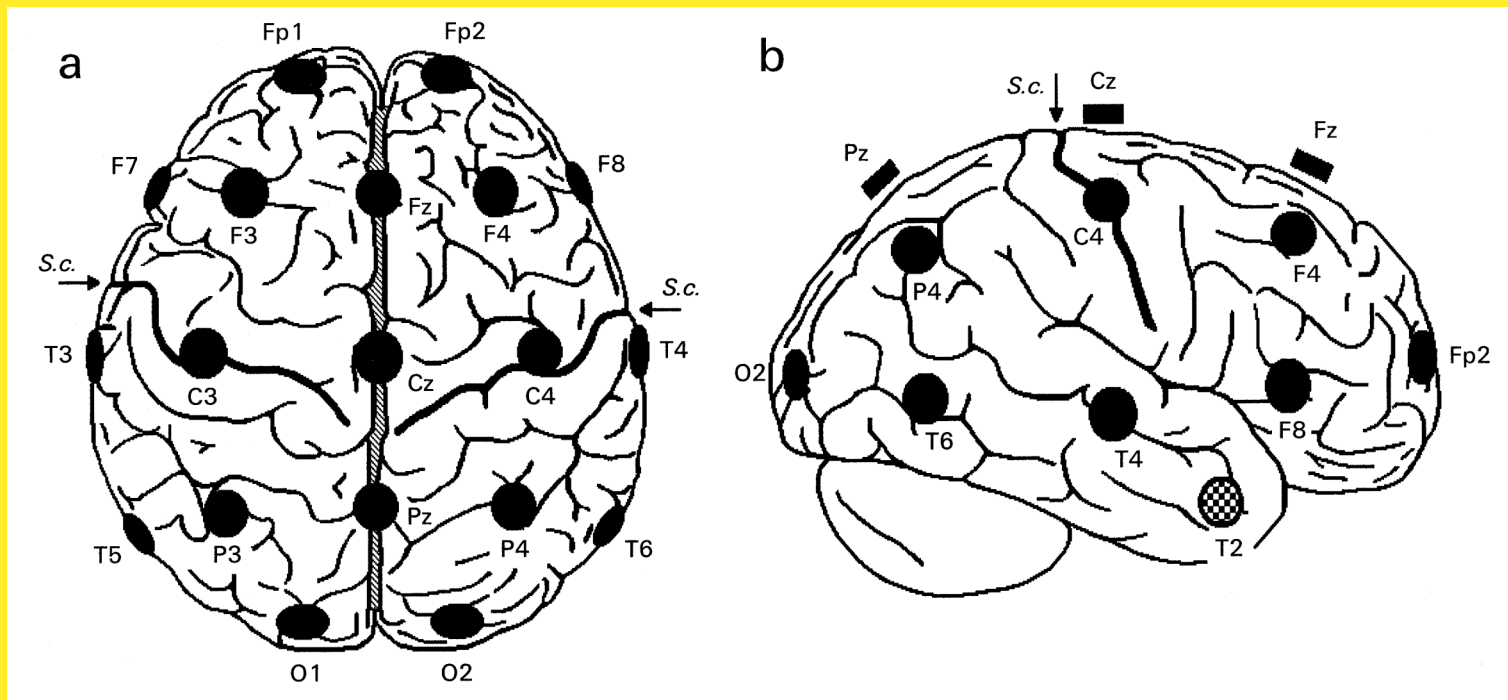
**Abb. 2.7.** Bezeichnungen der Elektroden im 10-20-System:

Fp = frontopolar,  
F = frontal,  
T = temporal,  
C = zentral,  
P = parietal,  
O = okzipital,  
A = aurikulär,  
G = Erdungselektrode (Ground).

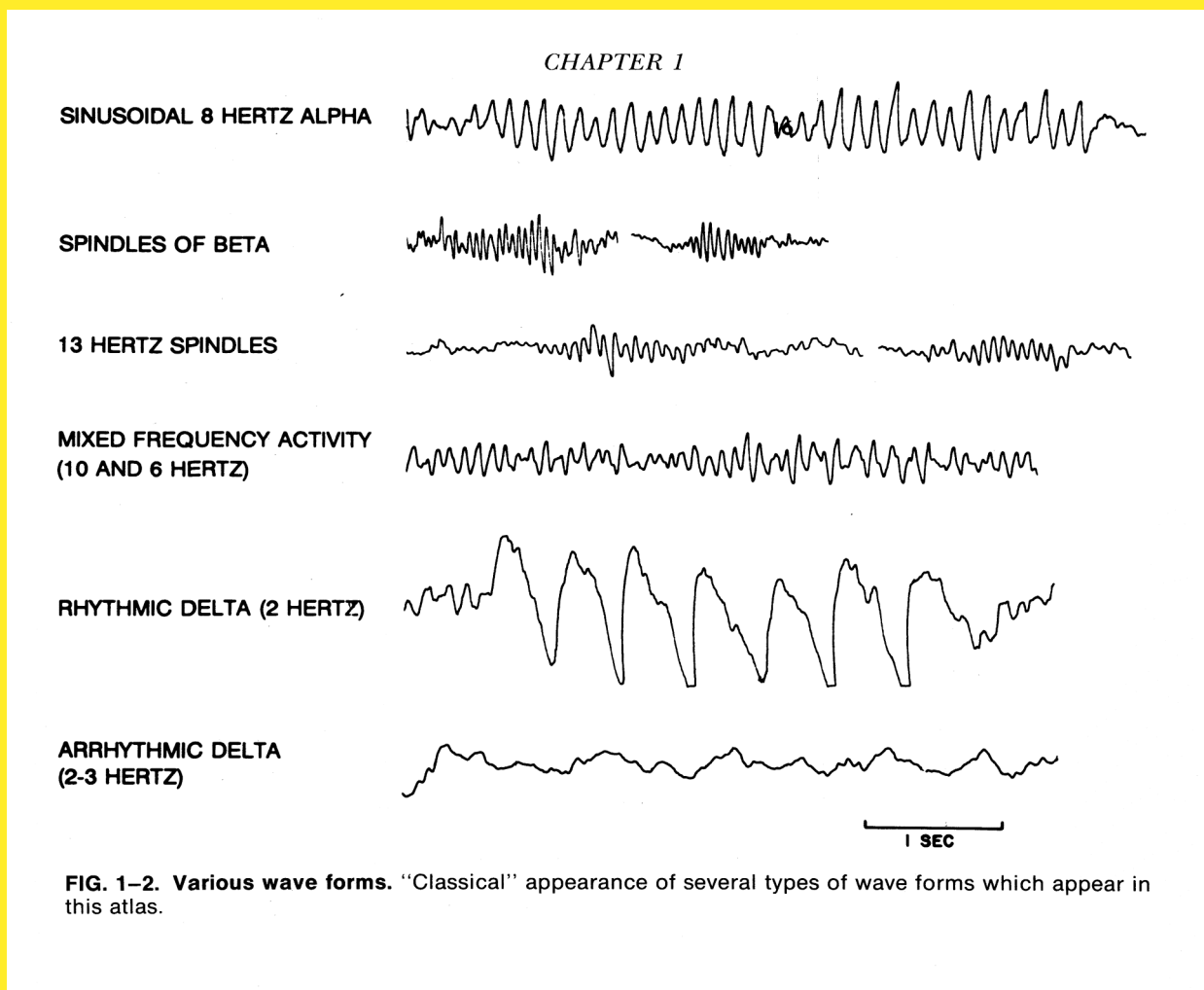
Indexziffern:  
ungeradzahlig = links,  
geradzahlig = rechts,  
z = „zero“ (statt 0).



# Topographic Electrode Placement



# Typical EEG patterns



# Resting EEG with Eyes Closed

(dataset „MLTalpha“)

P3



P4



Pz



O1



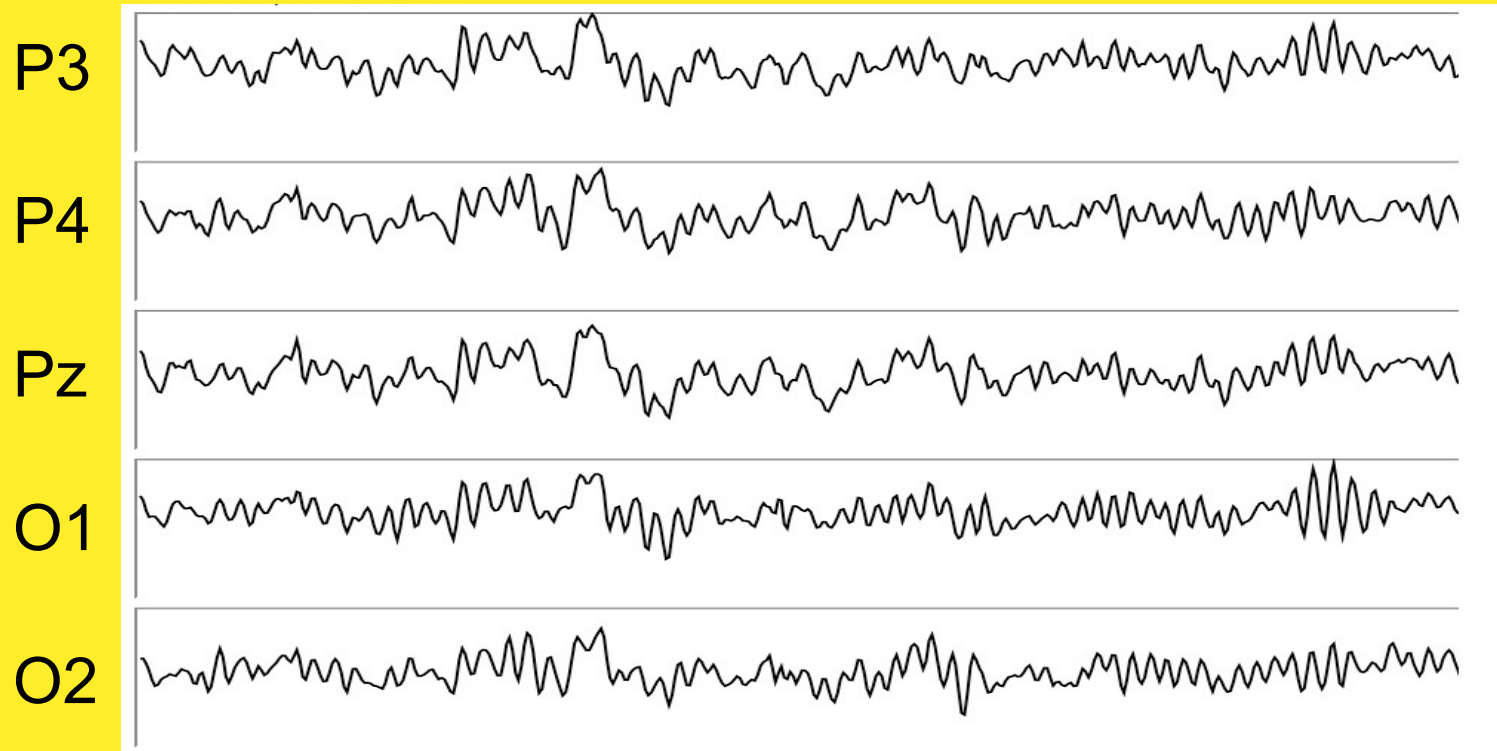
O2



- Traces of O1 and O2: Occipital alpha rhythm

# Resting EEG with Eyes Closed

(dataset „GBalpha“)

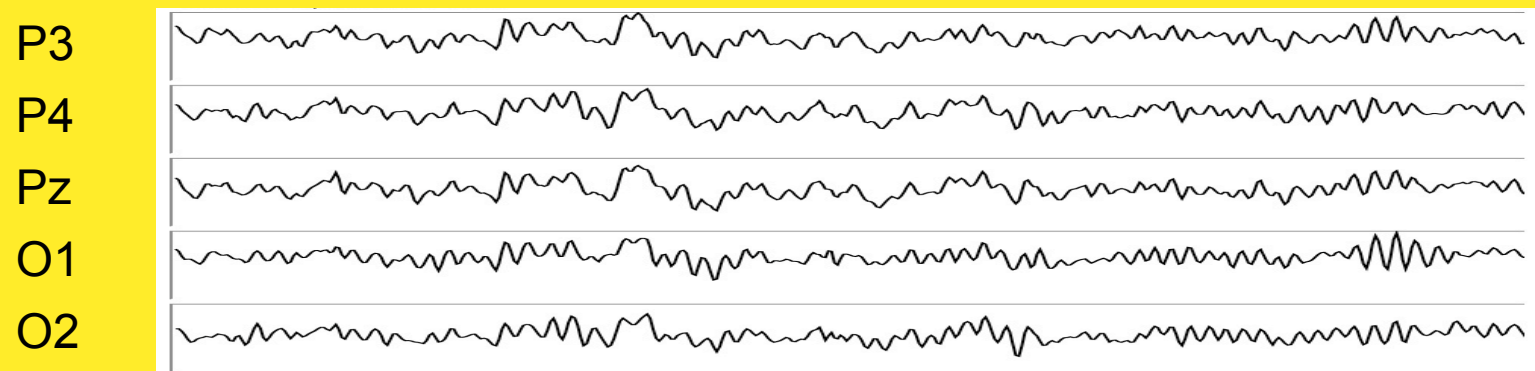
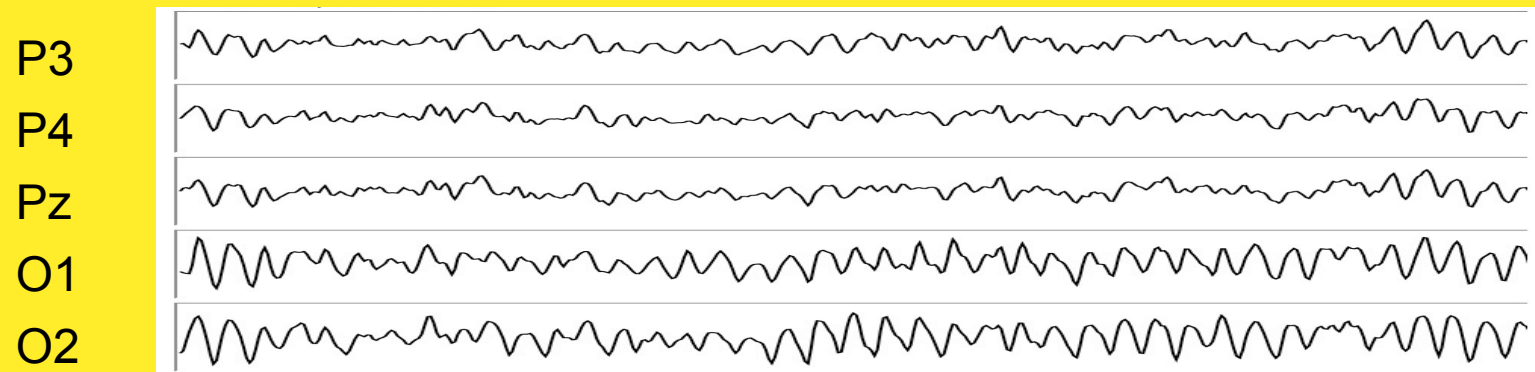


- Mixed rhythms, beta component



# Compare both datasets

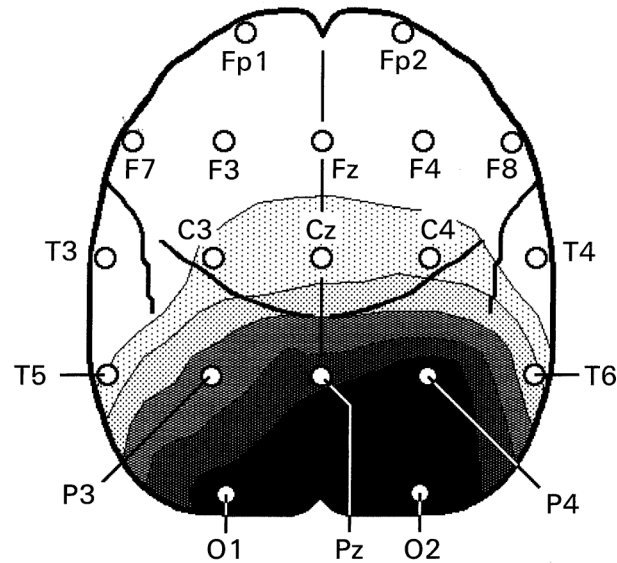
(top: dataset „MLTalpha“, bottom: „GBalpha“)



- Note different frequencies, and degrees of Regularity and Synchrony

# Spatial Distribution of $\alpha$ -rhythm (according to textbook)

**Abb. 1.20.** Topographische Verteilung der  $\alpha$ -Grundaktivität bei einer Normalperson. Zeichnerische Umsetzung einer EEG-Mappinganalyse. Die  $\alpha$ -Tätigkeit zeigt sich okzipital bis parietal mit der typischen rechtshirnrigen Betonung

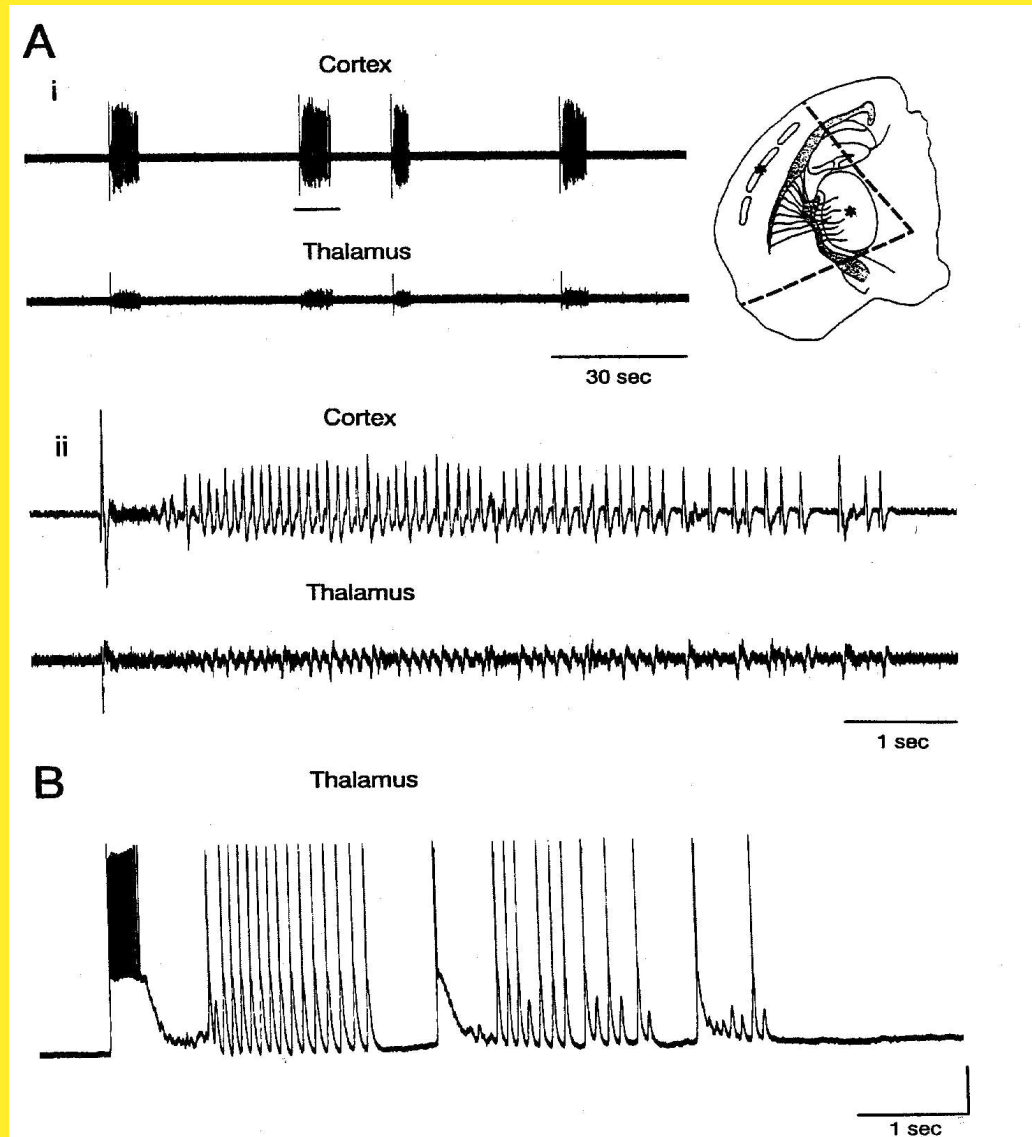


Occipital dominance

# Origin of $\alpha$ -rhythm

- Rhythm generator in the thalamus
- Drives visual cortex
- Stabilization by feedback mechanism

# Synchronized rhythm in cortex and thalamus



# Compare Epilepsy: 20 sec segment of a typical absence seizure

