

BRAIN SCIENCE AND RELIGIOUS EXPERIENCE

뇌 과학과 종교 체험

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이경민

OUTLINE OF THE TALK

- Modern explications of religious experiences
 - Findings from brain science
 - Psychological views
 - Rationality of religion
- Modes of conversation between religion and science
 - Competitive modes
 - Scientific investigations of religious experiences
 - Quasi-religiosity of scientific beliefs
 - Collaborative modes

OUT-OF-BODY EXPERIENCE AND THE BRAIN



OUT-OF-BODY EXPERIENCE AND THE BRAIN

- Causes of OBE
 - Spontaneous
 - During/near sleep
 - Near-death experiences
 - Resulting from extreme physical effort
 - Induced
 - Chemical: hallucinogen
 - Mental induction: conscious sleep, meditation
 - Mechanical induction: binaural-beats, brain stimulation
- Interpretations of OBE
 - Spiritual
 - Psychological
 - Neurological: right TPJ (AG-SMG margin)

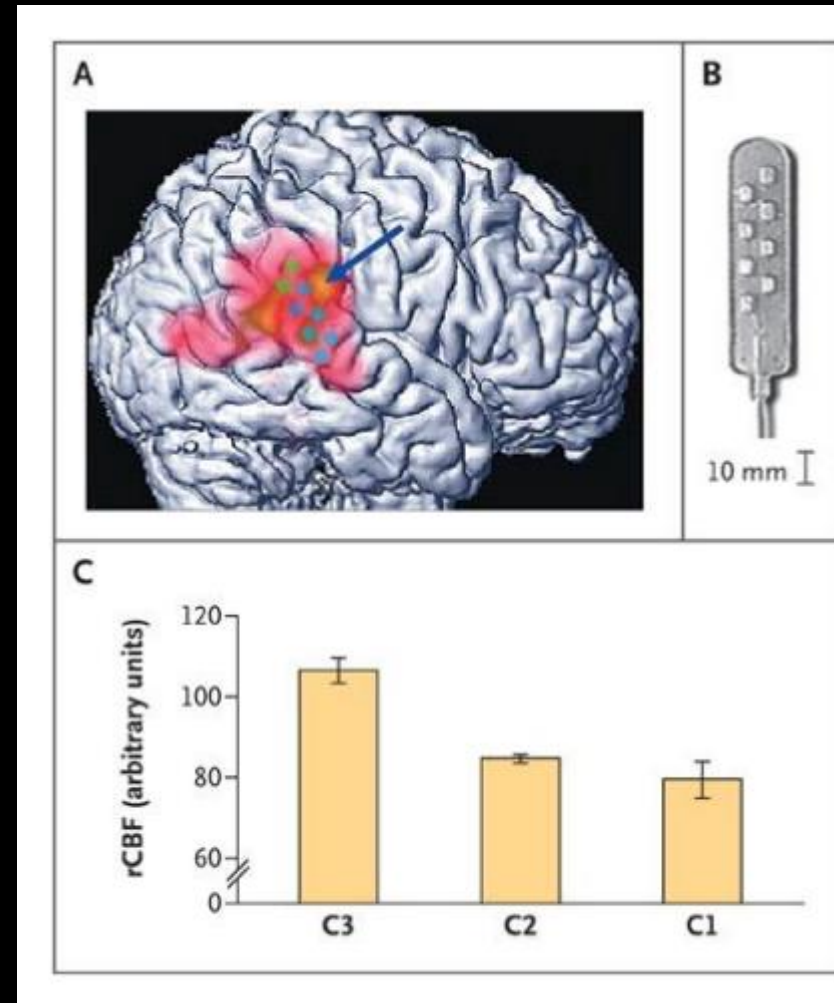
BRIEF REPORT

Visualizing Out-of-Body Experience in the Brain

Dirk De Ridder, M.D., Ph.D., Koen Van Laere, M.D., Ph.D., D.Sc.,
Patrick Dupont, Ph.D., Tomas Menovsky, M.D., Ph.D.,
and Paul Van de Heyning, M.D., Ph.D.

... brain activation at the temporoparietal junction — more specifically, at the angular-supramarginal gyrus junction and the superior temporal gyrus-sulcus on the right side

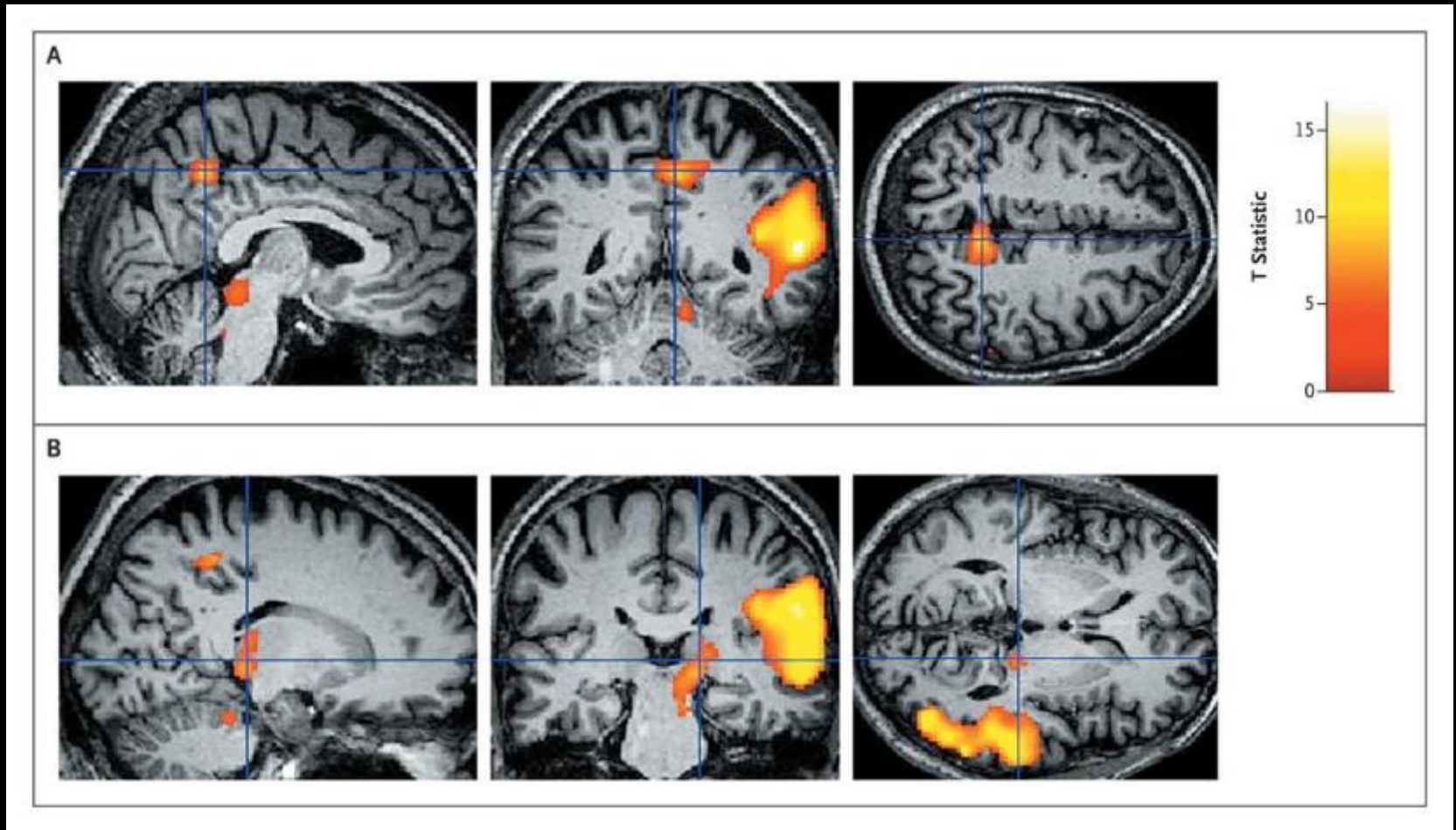
- C3) Stimulation at 3.7 V in 40-Hz burst mode (5 spikes at 500 Hz), with a 1-msec pulse width and a 1-msec interval between spikes, repeated 40 times per second.
- C1) 3.7 V in 40-Hz tonic mode
- C2) 2.7 V in burst as in C3)



De Ridder D et al. N Engl J Med 2007;357:1829-1833.



Additional Clusters of Activity in the Patient's Brain during an Out-of-Body Experience.

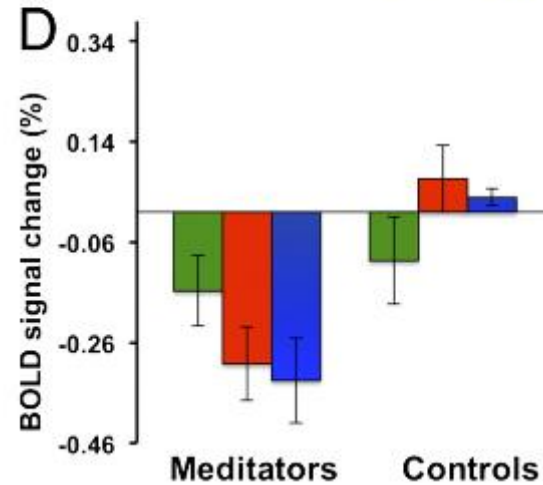
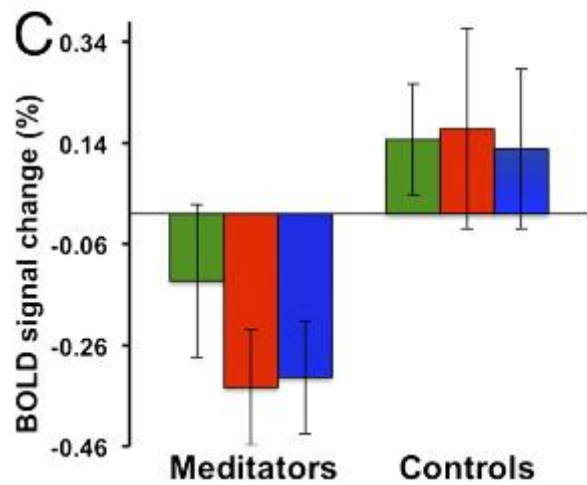
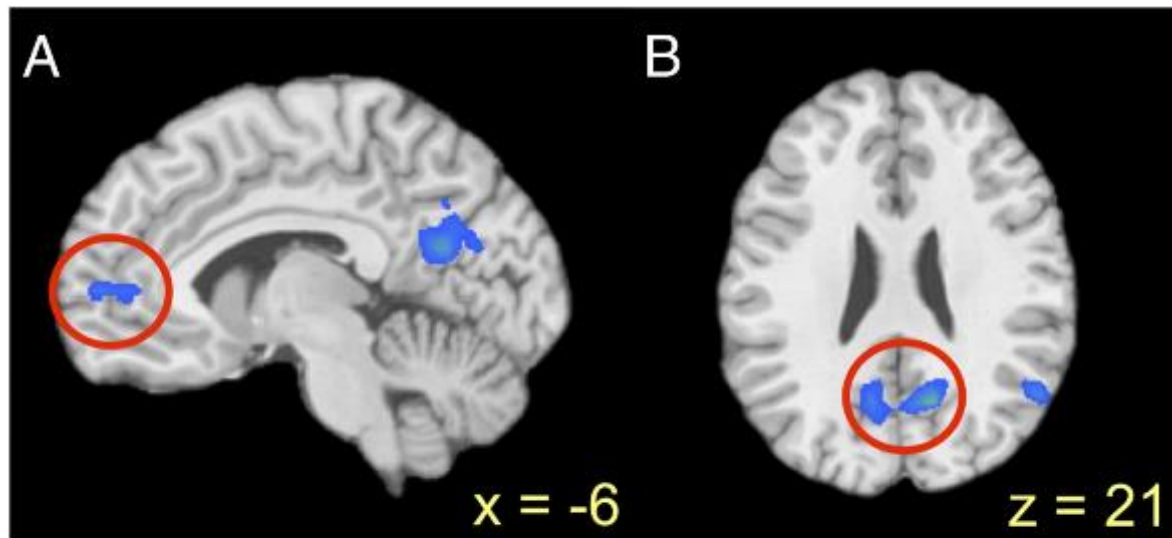


De Ridder D et al. N Engl J Med 2007;357:1829-1833.



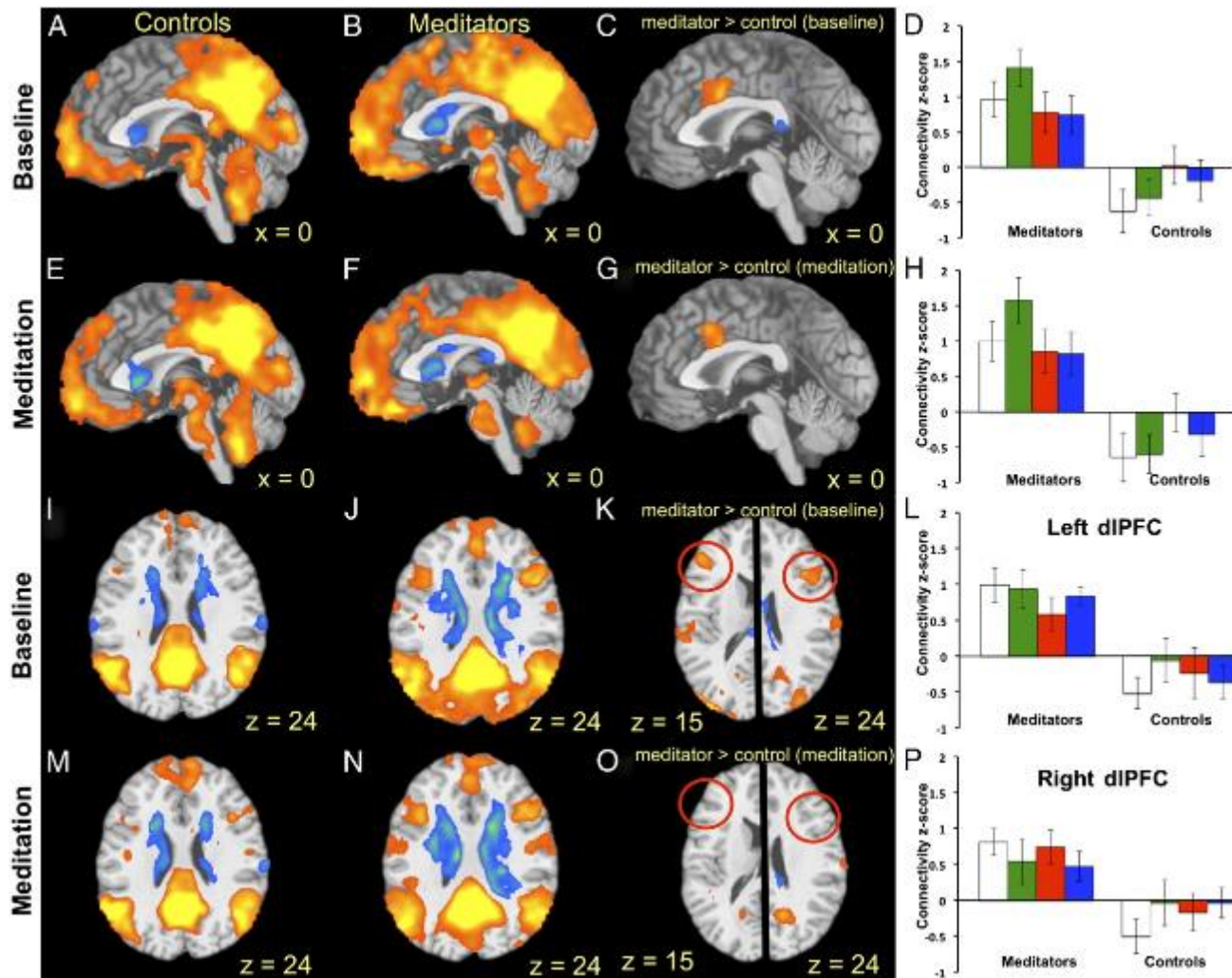
The NEW ENGLAND
JOURNAL of MEDICINE

Experienced meditators demonstrate decreased DMN activation during meditation.



Judson A. Brewer et al. PNAS 2011;108:20254-20259

Experienced meditators demonstrate coactivation of PCC, dACC, and dIPFC at baseline and during meditation.

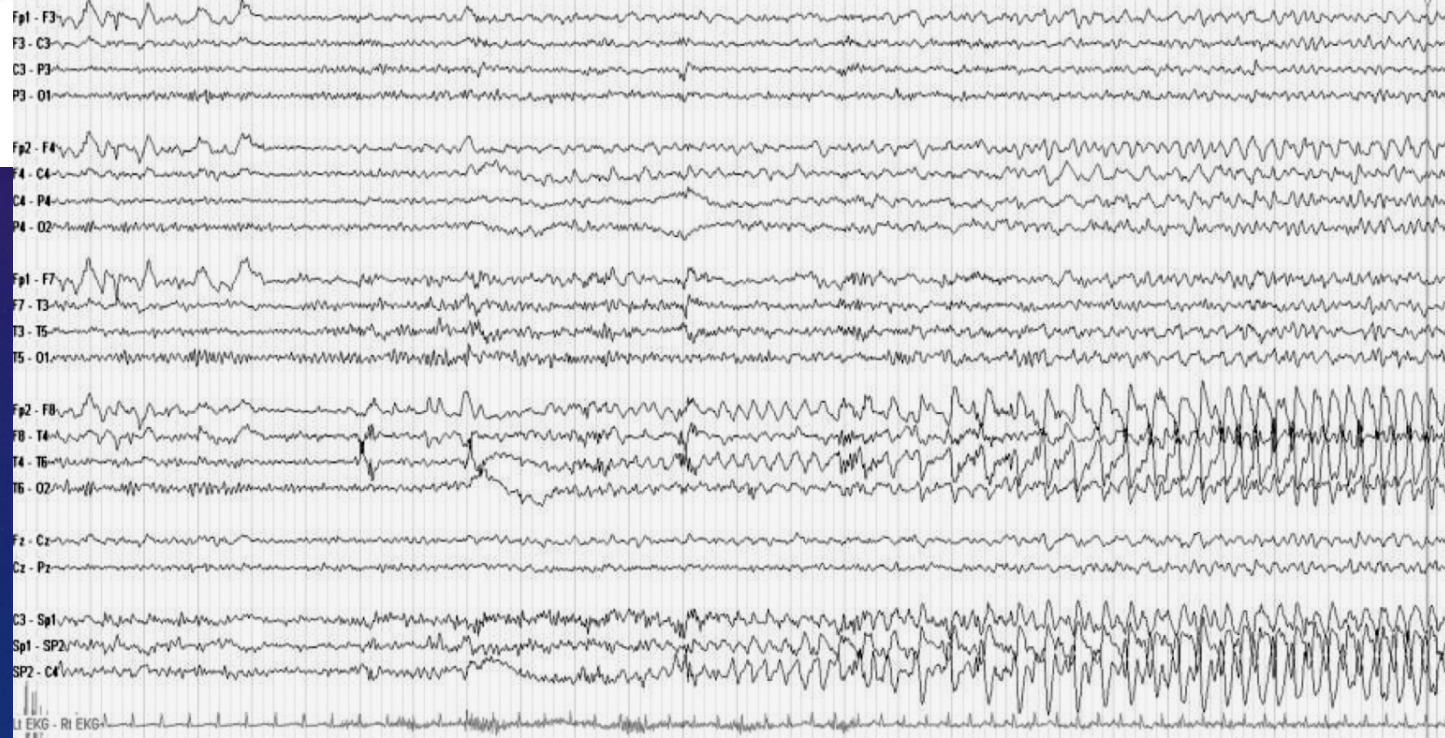
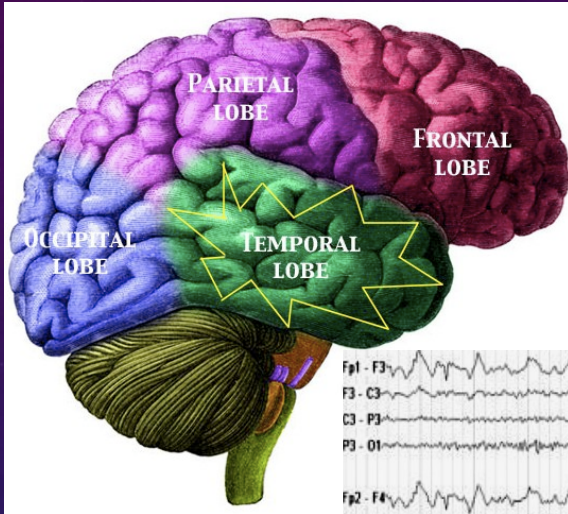


Judson A. Brewer et al. PNAS 2011;108:20254-20259

MEDITATOR'S BRAIN

- Changes in brain state
- Changes in brain due to the prolonged practice of meditation
- The brain state changes found in meditators are almost exclusively found in **higher-order executive and association cortices**. [13] This supports the notion that meditation **increases self-regulation and attentiveness**. ...
Fox et al. suggests a **publication bias may be leading to the over-reporting of significant results**. [18] Fox et al. also acknowledged that the significant brain differences found in many meditation studies could be explained by **preexisting brain differences in those who meditate**. [18]
- Wikipedia entry titled “Brain activity and meditation”

RELIGIOSITY AND THE TEMPORAL LOBE



RELIGIOSITY AND THE TEMPORAL LOBE

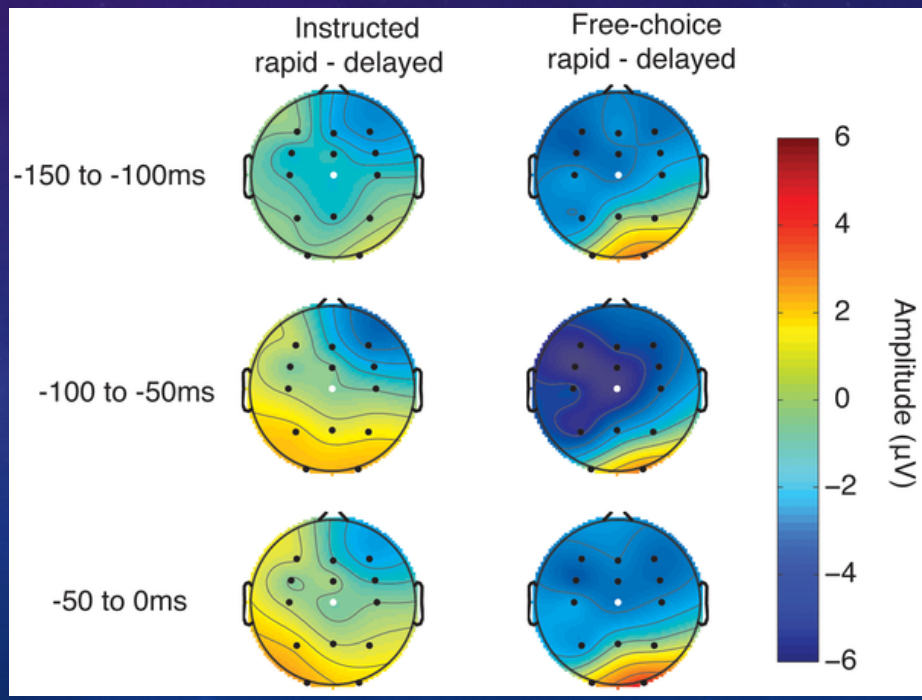
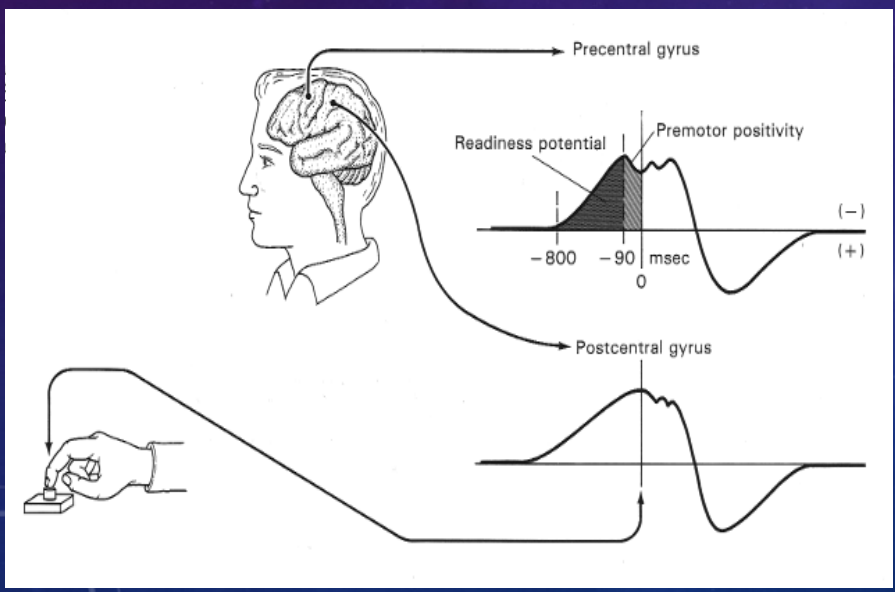
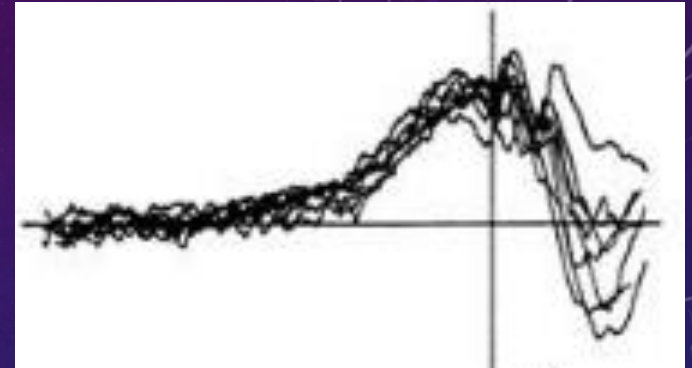
- Neural substrates of (hyper-)religiosity
 - The Geschwind syndrome in the temporal lobe epilepsy patients: hyper-religiosity, hypergraphia, atypical sexuality, circumstantiality, and intensified mental life
 - Religiosity negatively related with the right hippocampal volume (Wuerfel et al., 2004. *J Neurol Neurosurg Psychiatry* 75:640-642)
 - Interpreted as religious experience by conditioning (Ogata, A., Miyakawa, T., 1998. *Psychiatry Clinical Neurosci.* 52, 321-5)

PSYCHOLOGICAL VIEWS ON SELF AND RELIGION

- Sigmund Freud
 - The components of self
 - Discovery of unconscious mind
- Julian Jaynes
 - Consciousness and the bicameral mind
 - Attribution of non-self
- A society of minds in the brain
 - Split between the right and the left hemisphere
 - Anterior vs posterior brain regions
 - Cortical vs subcortical (reptile) brains

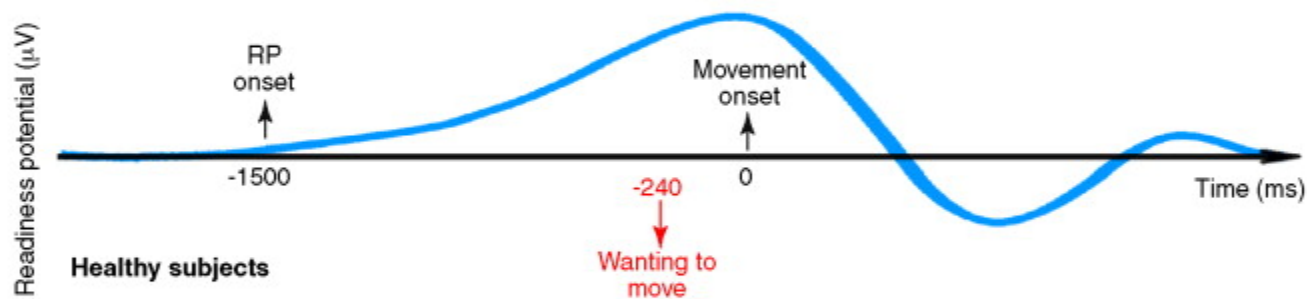
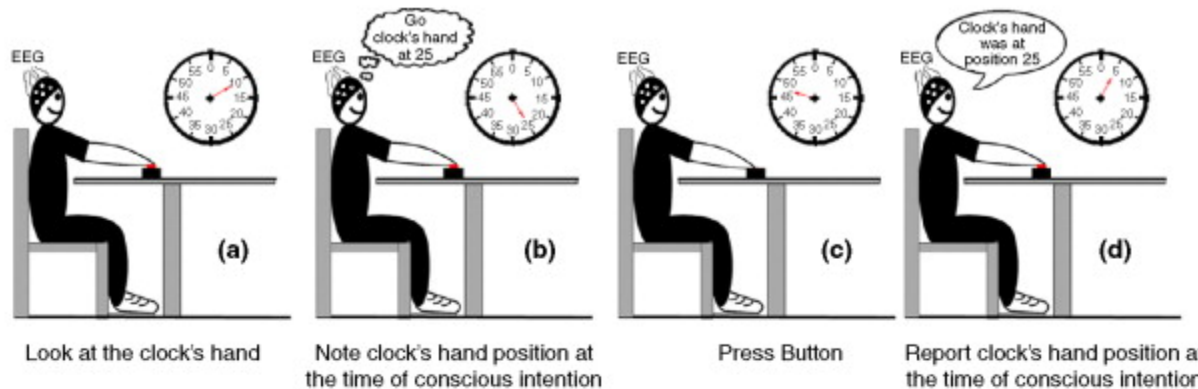
LIBET'S CLOCK AND FREE WILL

- Bereitschaftspotential (BP, = readiness potential)
- SMA, the site of soul (Sir John Eccles)
- Apathy



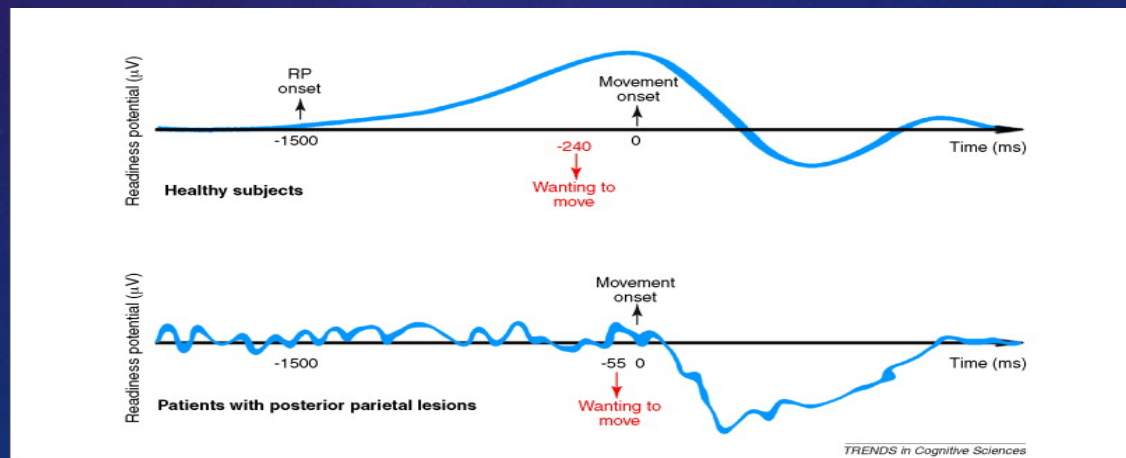
LIBET'S CLOCK AND FREE WILL

- Benjamin Libet's claim of no free will
 - BP started about 0.35 sec earlier than the subject's reported conscious awareness that "now he or she feels the desire to make a movement."



LIBET'S CLOCK AND FREE WILL

- Disputes on Benjamin Libet's claim of no free will
 - Free won't at the last moments (veto power)
 - Relative free will (Kornhuber and Deecke) or free will riding on the natural fluctuations
 - Epiphenomenon or illusions in the awareness of will
 - Sources of BP from other brain areas



IS RELIGIOUS COMMITMENT RATIONAL?

- Irrational behavior of the rational people (Kahnemann and Tversky)
- Great rationality debate
 - Panglossians vs meliorists vs apologists (Stanovich)
 - The dual-process theory of mind
 - System 1: Associative, holistic, automatic, fast, undemanding
 - System 2: Rule-based, analytic, controlled, slow, demanding
 - System 1: Context sensitive: for propagating the genes
 - System 2: Context free: for maximizing individual goals

IS RELIGIOUS COMMITMENT RATIONAL?

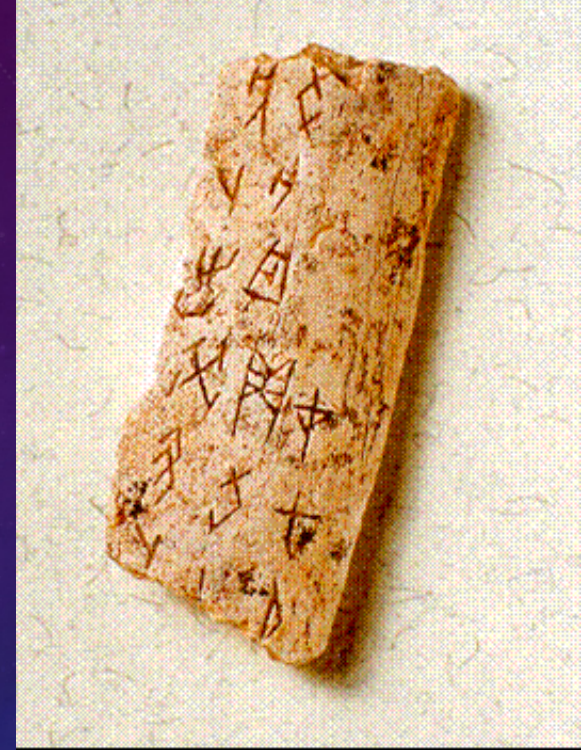
- Two kinds of rationality
 - Theoretical rationality: (philosophy & science)
logical analysis of propositions and beliefs
 - Practical rationality: (ethics & religion)
reasoning of attitudes and behaviors
- Goals or contents of Religious commitment
 - Beliefs and tenets
 - Spiritual tranquility and nirvana
 - Faith in Jesus enacting God's will on earth

TRENDS IN COGNITIVE SCIENCE

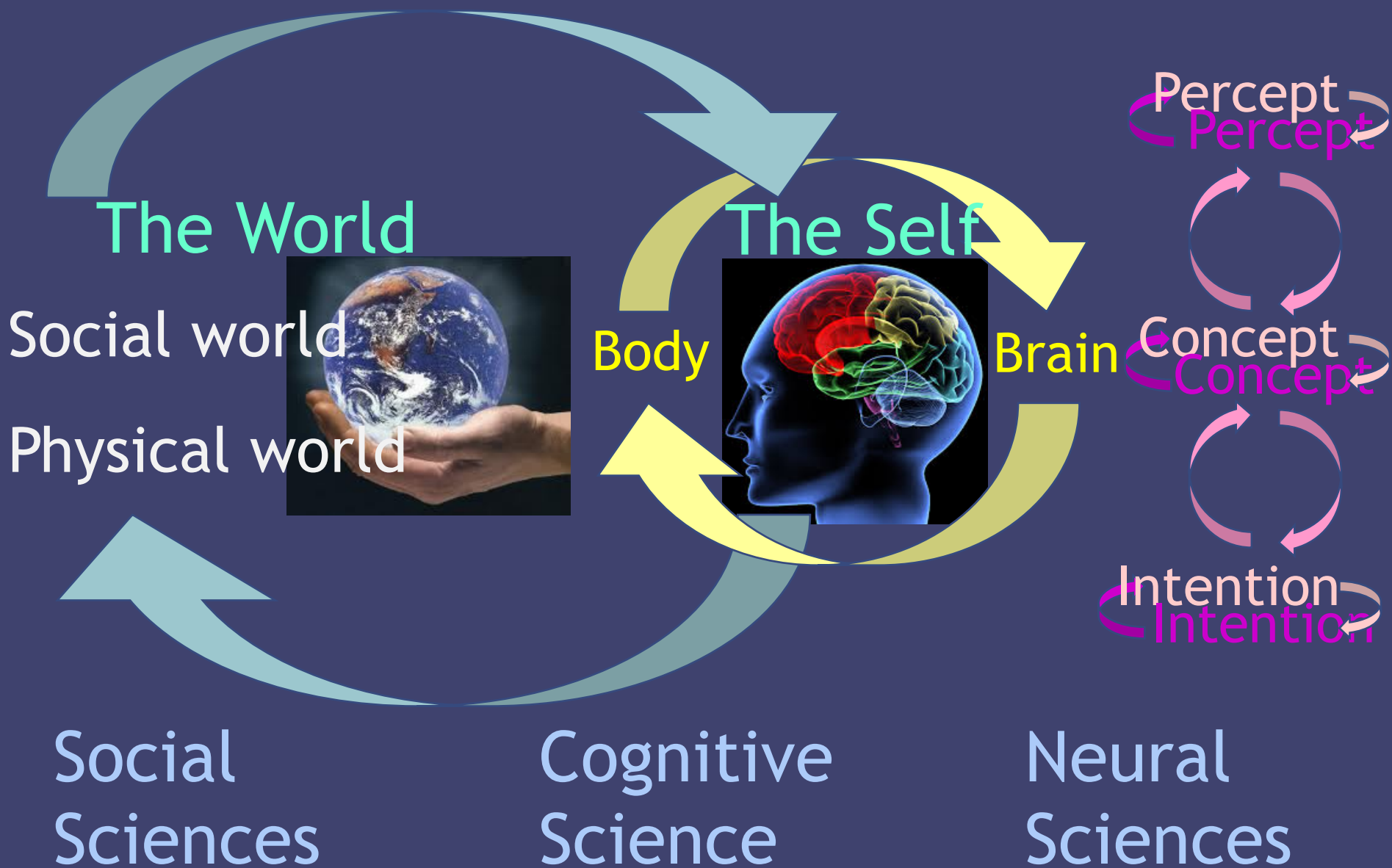
- Computation, association, and representation
 - Cognition as knowledge and algorithms
 - Expert systems and artificial intelligence
- Neurophenomenology and subjectivity
 - Cognition as a complex, self-organizing system
 - “Autopoiesis” of the mind
- Embodied, embedded, and situated cognition
 - Inter-actions between self and the environment
 - The environment includes not only the physical but also socioeconomic and cultural structures.

HUMAN INTELLIGENCE

- Clever
- Compassionate
- Soul-searching



Cognition: situated at multiple levels



COMMENTS FROM PERSONAL EXPERIENCES

- Christian scientists' uneasiness in mind
- Faith and reason: Two sides of the same coin
- Human intelligence in context
- From subjectivity and selfhood to Inter-subjectivity
or vice versa

CONVERSATIONS BETWEEN RELIGION AND SCIENCE

- Competitive modes
 - Scientific investigations of religious experiences
 - Quasi-religiosity of scientific beliefs
- Collaborative modes
 - Practical rationality in combining **religious faith** and **scientific fervor** **
 - Praxis in making a better human and world

** According to Merriam-Webster English Dictionary

- faith: allegiance to a duty or person
- fervor: a strong feeling of excitement and enthusiasm

Thank you.

