



**School of Spiritual &
Cultural Studies**

An Introduction to the Science of Meditation

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MA OM- Mastery Over Mind

Why meditation and What Science Tells Us

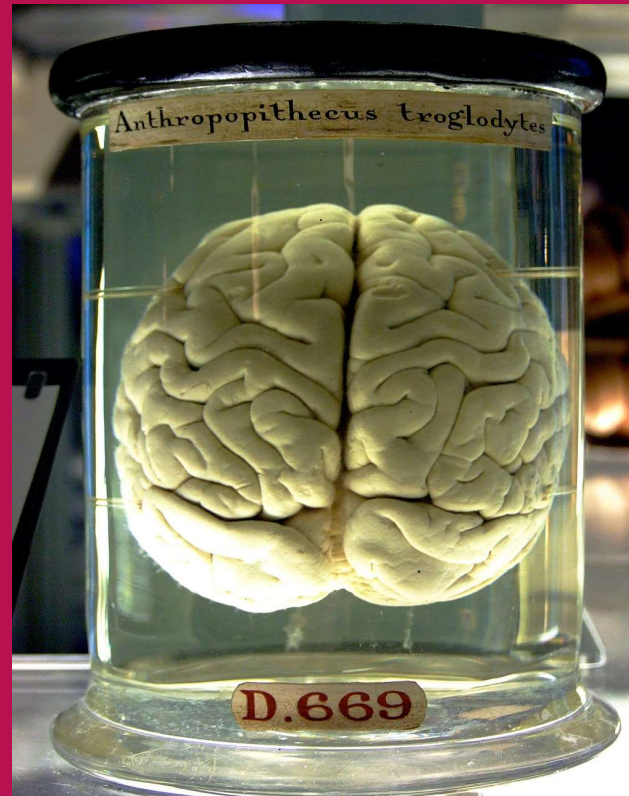
Lecture objectives:

A preliminary understanding of the Science of Meditation.

What can modern science tell us on this tradition-based method?

Meditators tool & Biology's final frontier: The Brain

- Brain function in the real world is the next frontier.
- Several parts, complex circuits
- 3 main brain parts: fore, mid and hind
- The cerebrum (outer layer - cerebral cortex)
- The cerebellum
- The brain stem



A chimpanzee brain at the Science Museum London.

PC: https://en.wikipedia.org/wiki/Brain#/media/File:Chimp_Brain_in_a_jar.jpg



Many Parts of the Forebrain are related to meditation

Function is **specialized** across the cerebral lobes:

- > Occipital lobe: for **vision**
- > Parietal lobe: handles information from the **senses**
- > **Temporal** lobe: hearing, memory, emotion, speaking
- > **Frontal** lobe: organization, planning, creative thinking

Attention – a function of brain circuits

Cortical networks coordinate to focus their processing on the same thought.

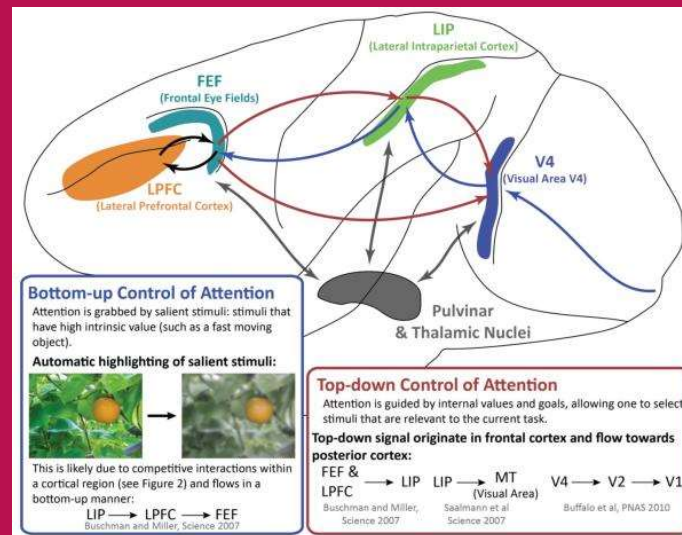
Ex. Visual Attention

Fronto-parietal Circuits -

Attention can be captured in a bottom-up fashion, by a **salient stimulus**. For example, brightly colored or fast moving objects are often important and are therefore salient.

Synchrony as a mechanism of attention

Coordinated actions **across circuits**



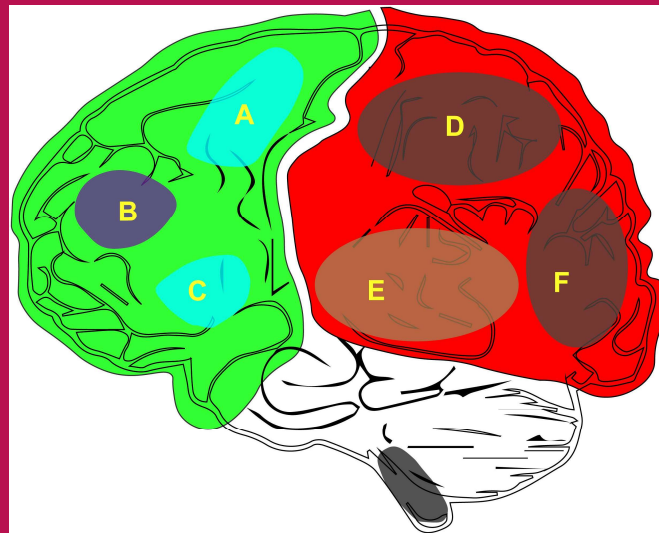
PC: Miller EK, Buschman TJ. Cortical circuits for the control of attention. Curr Opin Neurobiol. 2013 Apr;23(2):216-22, 2022
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3709832/figure/F1/>

Consciousness – neural implications

Only some states of consciousness are understood.

Different parts of the brain circuits are involved.

The distribution of the neurobiological basis of consciousness in the brain. (A) M1, primary **motor** cortex. (B) Attention or working **memory**. (C) **Verbal** report (Broca). (D) Other **content** of consciousness. (E) **Auditory** consciousness. (F) **Visual** consciousness.



Zhao et al, Front. Cell. Neurosci., 09 July 2019
Sec.Cellular Neurophysiology

Science of Meditation

History - Meditation Research

1960s - Swami Rama at the Menninger Clinic and Dr. Gardner Murphy.

1979s and later - Jon Kabat Zinn, Francisco Varela and others.



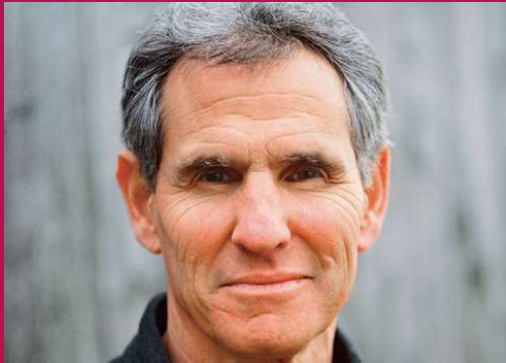
PC: Kansasmemory.org



“The real meditation practice is how we live our lives from moment to moment to moment.” – Jon Kabat-Zinn



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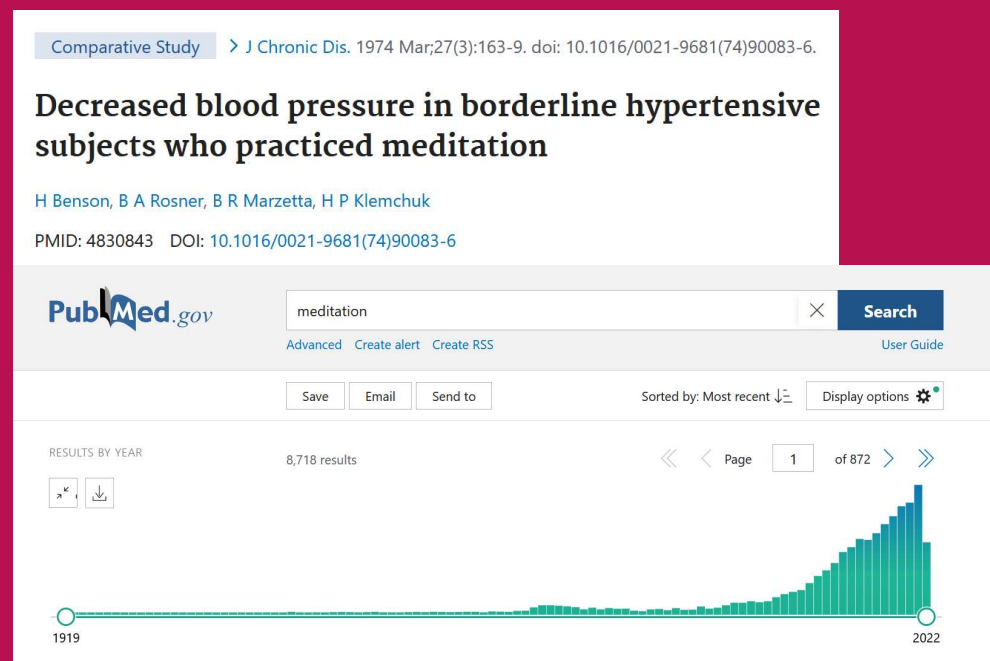


Prof. Jon Kabat-Zinn

- Mindfulness practices that were made available in clinical settings were first developed by Dr. John Kabat-Zinn for a group of chronically ill patients who were unresponsive to traditional medical treatments.
- In this context, mindfulness is defined as the “awareness that arises through paying attention, on purpose, in the present moment, non-judgmentally” (Kabat-Zinn, 1982; Kabat-Zinn, 1990).

Scientific studies

- Relaxation Response: 1974 study examined the effectiveness of meditation to support positive healthcare initiatives.
- Meditation & - cardiovascular disease, cognitive functioning. (Funderburk, 1977, Brown, Forte & Dysart, 1984, Hayes, Strosahl & Wilson, 1999, and Carter & Ernst, 2003).



Studies on meditation at Amrita



- Biochemistry

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Cellmed Orthocellular Medicine and Pharmaceutical Association (셀메드 세포교정의약학회)

Positive impact of integrated amrita meditation technique on heart rate, respiratory rate and IgA on young healthy adults

Vandana, Balakrishnan (Department of Physiology, Amrita Institute of Medical Sciences);
Saraswathy, Lakshmiammal (Department of Physiology, Amrita Institute of Medical Sciences);
Suseeladevi, Govinkutty K. (Department of Physiology, Amrita Institute of Medical Sciences);
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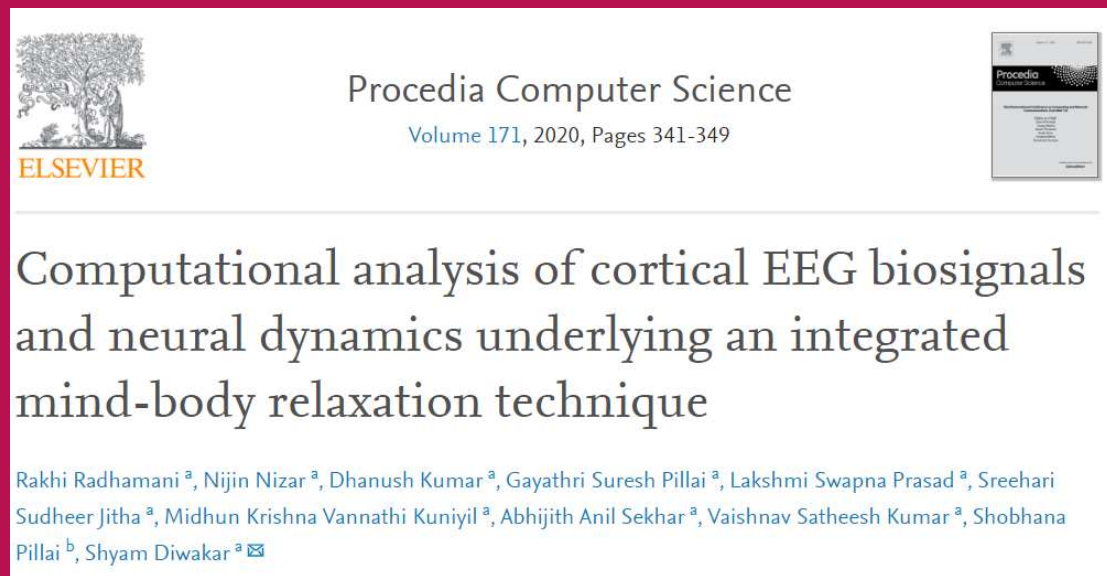
Impact of integrated amrita meditation technique on adrenaline and cortisol levels in healthy volunteers

Vandana, Balakrishnan^a ✉ ; Vaidyanathan, Kannan^b ✉ ;
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End of Journey – Pt 1

- Thank You.