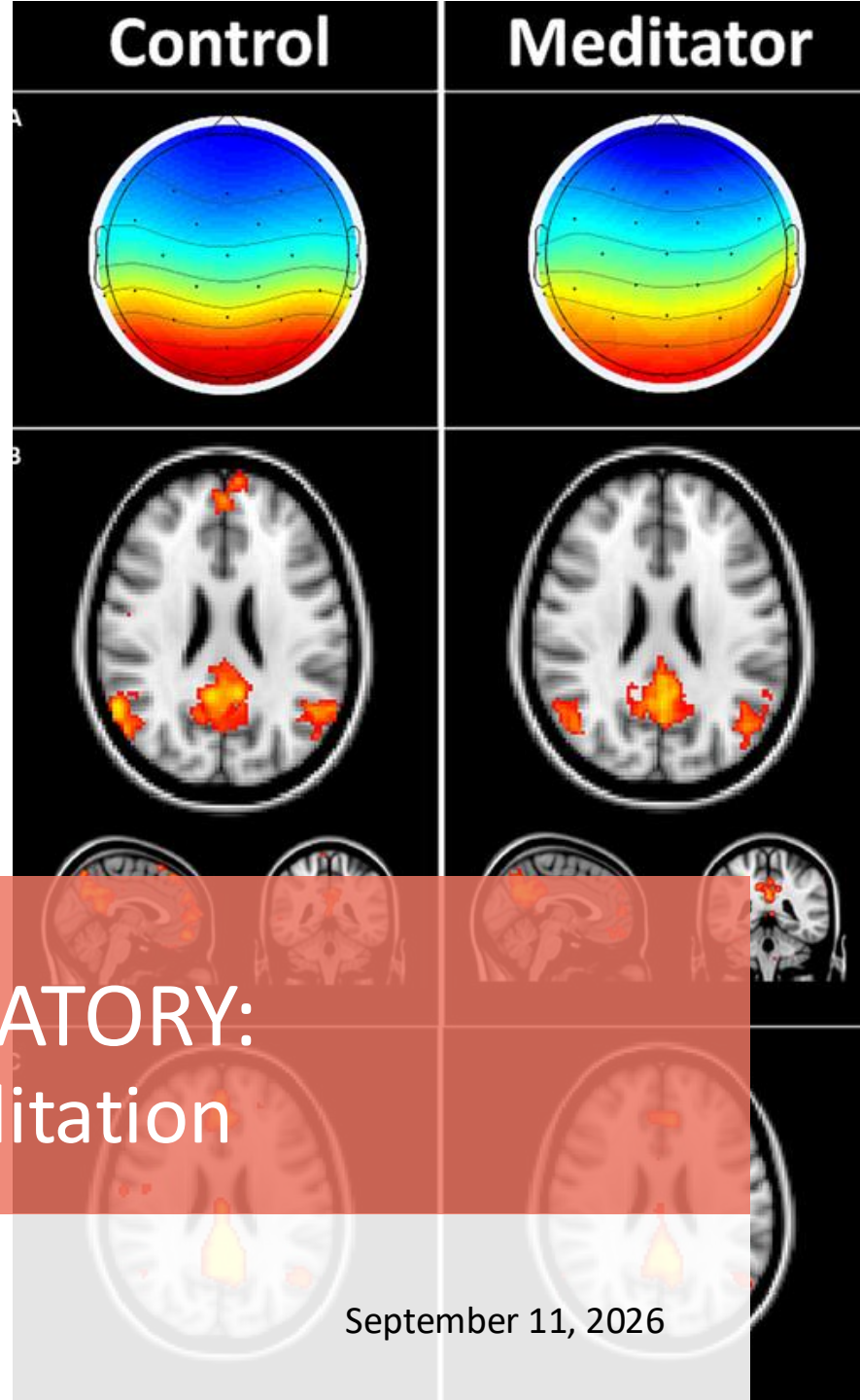
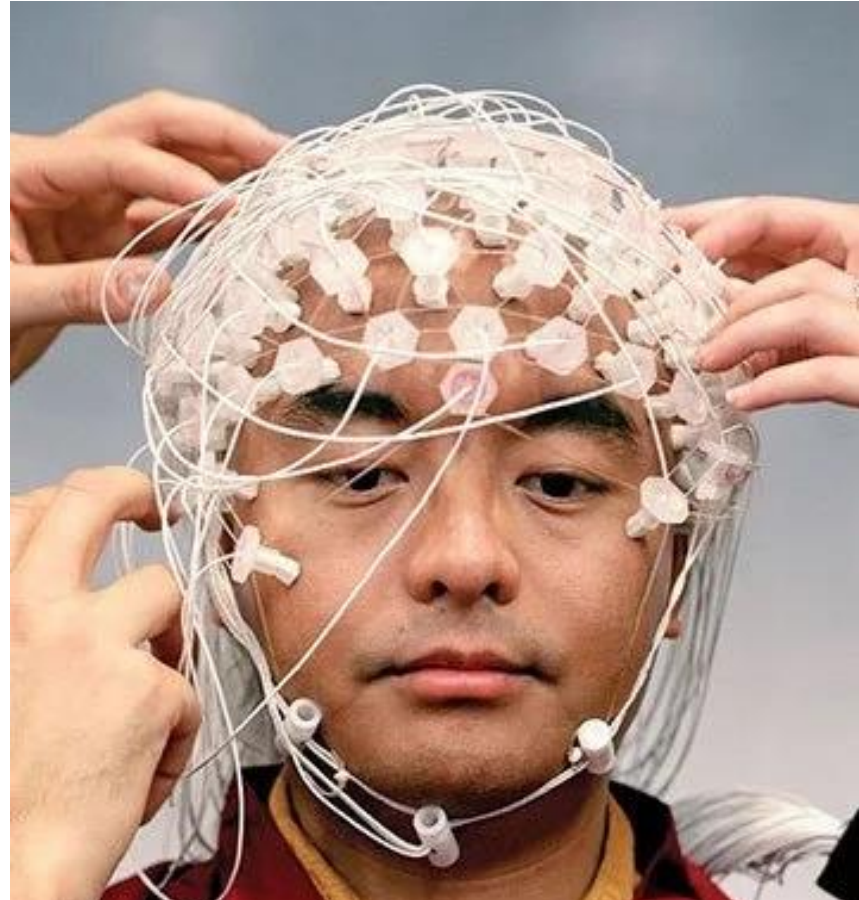




FROM CUSHION TO LABORATORY: The Science of Buddhist Meditation

Hans Burghardt & Marina Brucet
SHANTIDEVA CENTER NYC

September 11, 2026

The Departure Point of Our Journey



“Well-being is a skill.

The science behind this fact makes a kinder,
wiser, more compassionate world possible.”

— Richard Davidson, Neuroscientist

Photo from Wikimedia



The Effects of Meditation

- Long-term meditation: associated with robust functional and some structural brain differences.
- Beginners: mainly show functional changes and more modest structural changes.

The Effects of Meditation in Long-term Meditators

Area	Observed effect
Physiological control	gTum-mo practitioners increased finger and toe temperature by up to 8.3°C
Brain activity	Distinctive neural activity, including high-amplitude gamma-band oscillations and phase-synchrony during meditation. Different EEG spectral profile during the resting state before meditation.
Empathy	Increased activity in brain circuitry associated with empathy
Cellular aging	Long-term meditators show longer telomeres, which help protect chromosomes

The Effects of Meditation in Short-term Meditators

Area	Observed effect
Immunity	Improved immune function
Attention & self-regulation	Enhanced attention and behavioral regulation
Compassion	Increased compassionate responses to suffering
Stress & anxiety	Reduced stress and anxiety
Inflammation	Reduced inflammatory activity



Neuroplasticity

In response to experience, **brain changes occur**, such as the growth of new neurons or new connections between neurons.

Meditation induces changes in the brain through the process of neuroplasticity.





From Cushion: Attentional Practices

Training the Heart for Lasting Happiness
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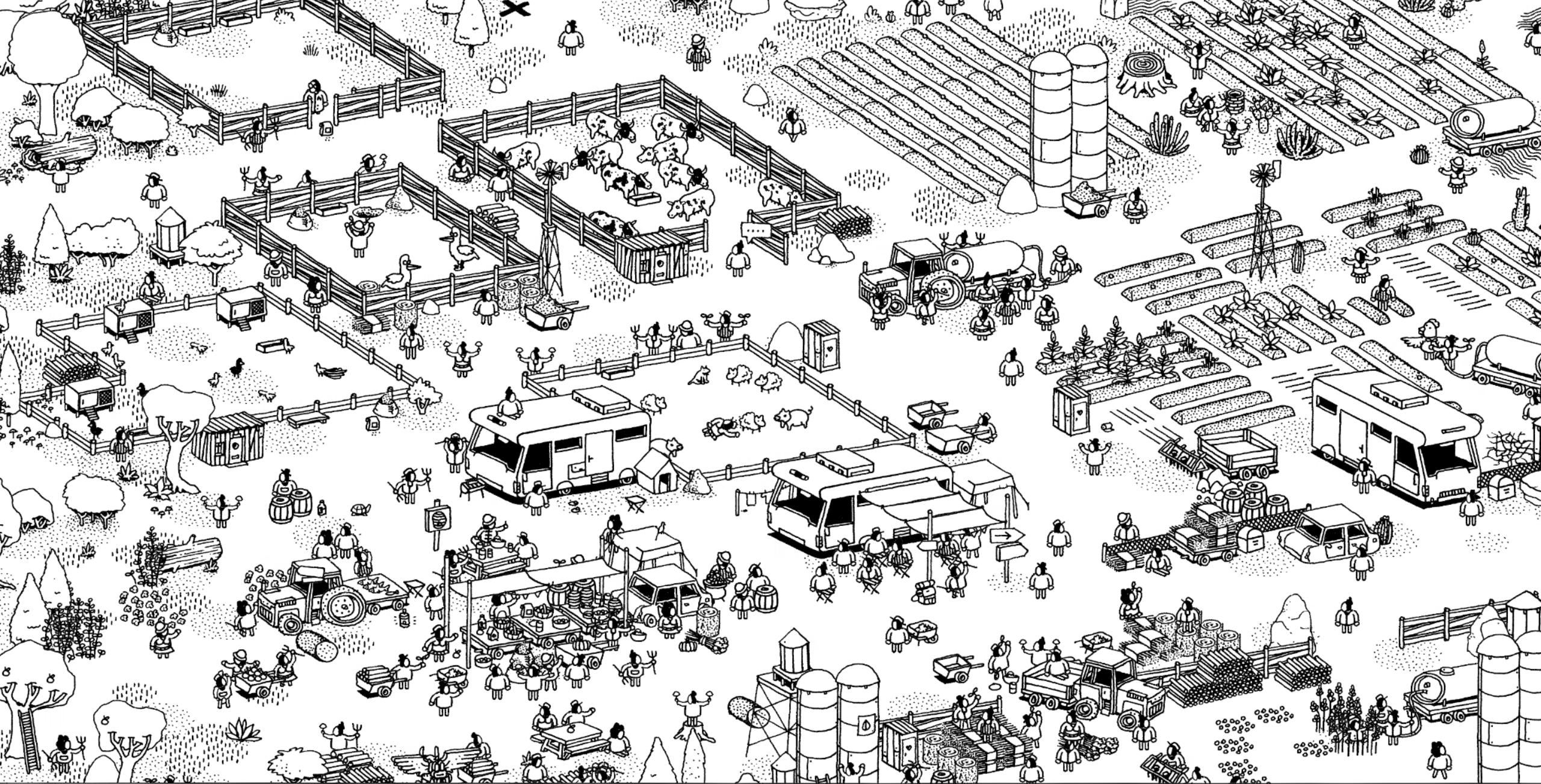
Dealing with Distractions

The usual way

Blocking distractions

Mental fatigue





Dealing with Distractions

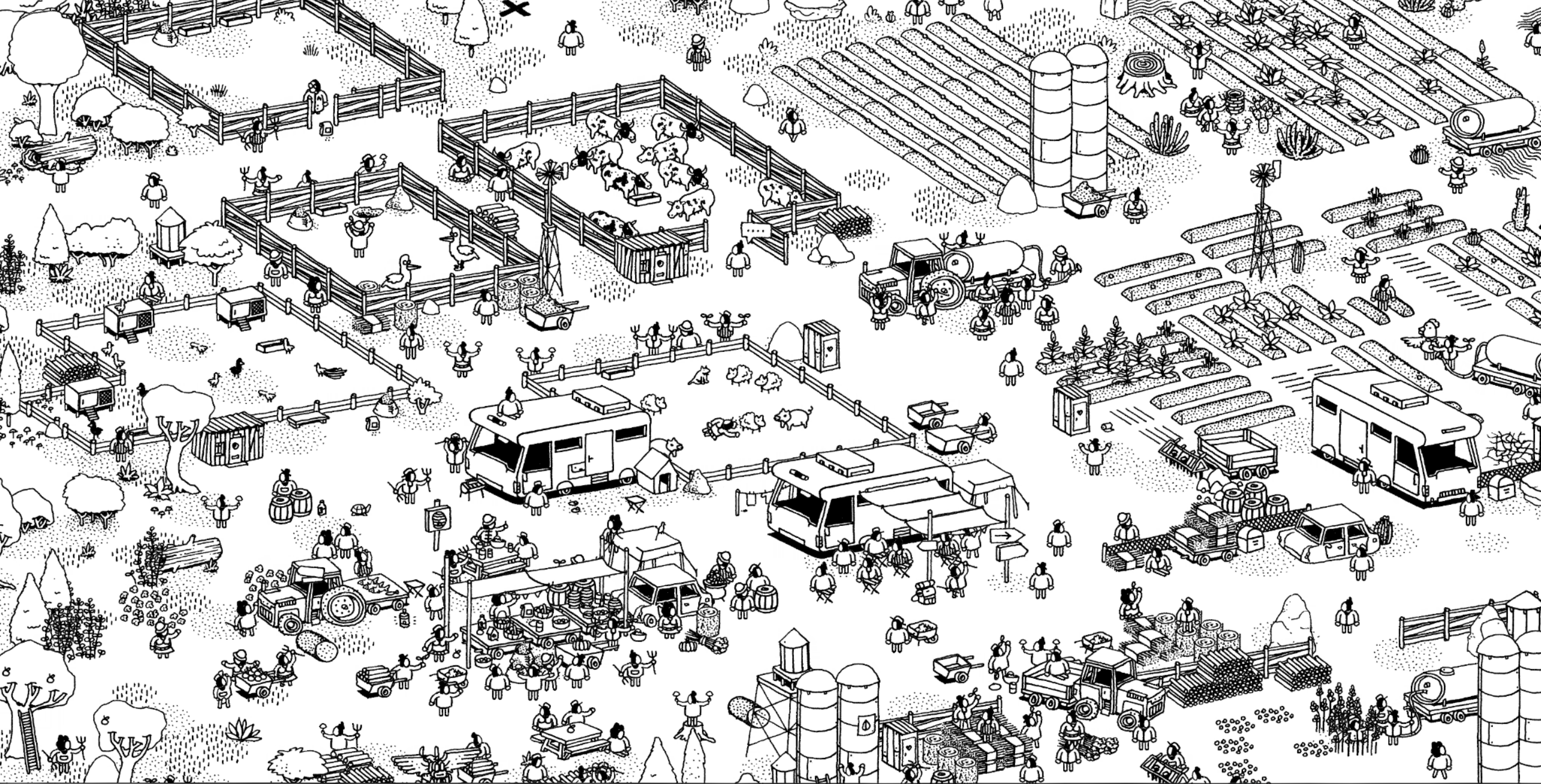
In meditation

With equanimity: acknowledge distractions, neither grasping at nor rejecting them

Then, we let them go and bring attention back to the object of meditation; or let them be, observing them without pursuing or rejecting them

Focused, yet relaxed





Take the Middle Way



“Being a meditator isn’t an easy job. How much effort should you exert and when? **Take the middle way. Too much effort makes you tense.** When you get tense, you get tired. Then the quality of your meditation deteriorates. That’s its nature. So be reasonable. It’s like human relationships, when there’s tension. Meditation is similar; so, you have to be very skillful in the way you apply effort.”

— Lama Thubten Yeshe



Inner Tools to Meditate

Mindfulness

Remembrance, non-forgetting the object of meditation

It keeps the mind on the object

Introspection

Examination inwards of one's own mind and body

It checks whether the focus is kept on the object



Photo by Clay Banks on Unsplash



Meditation and Ethics

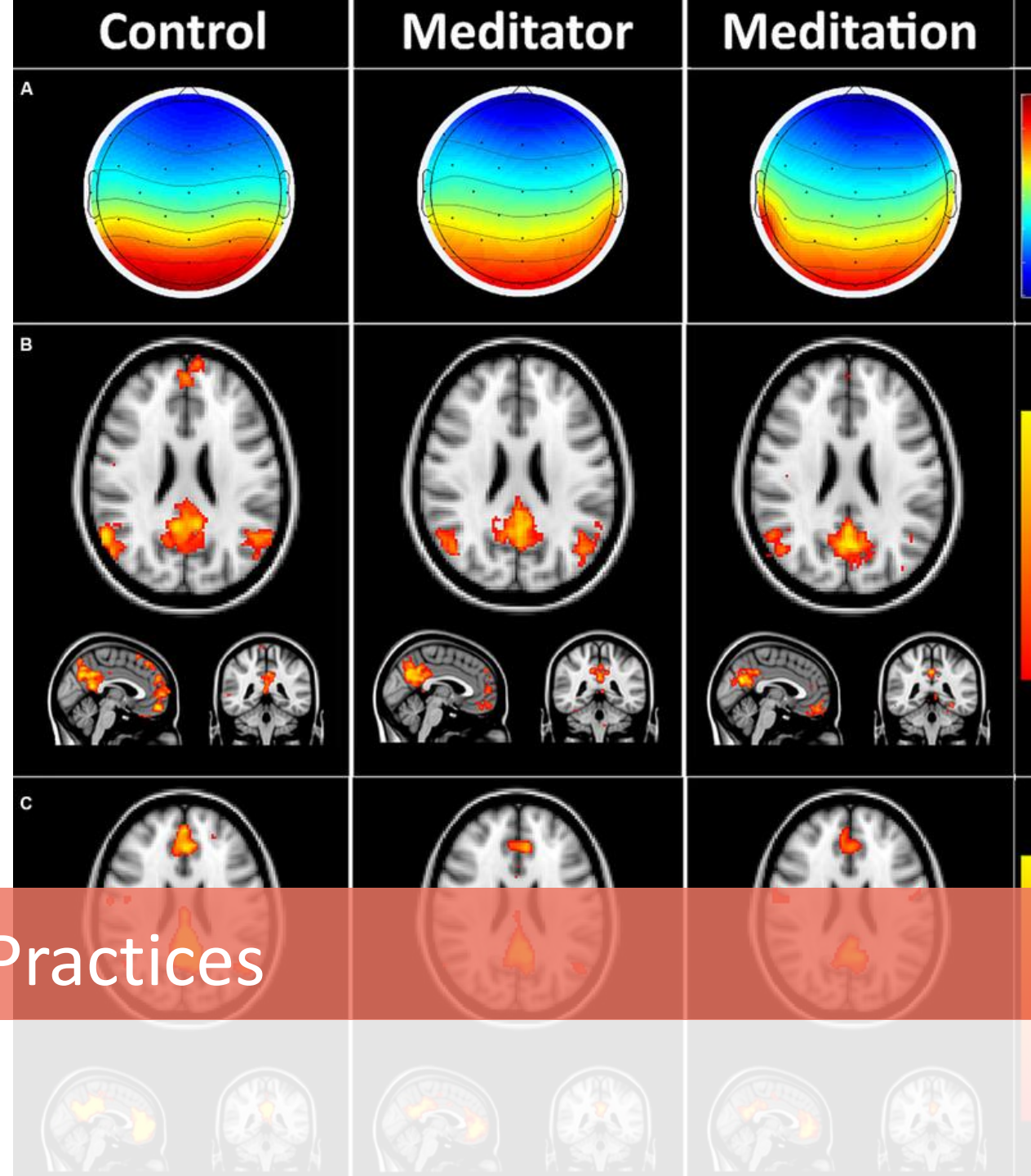
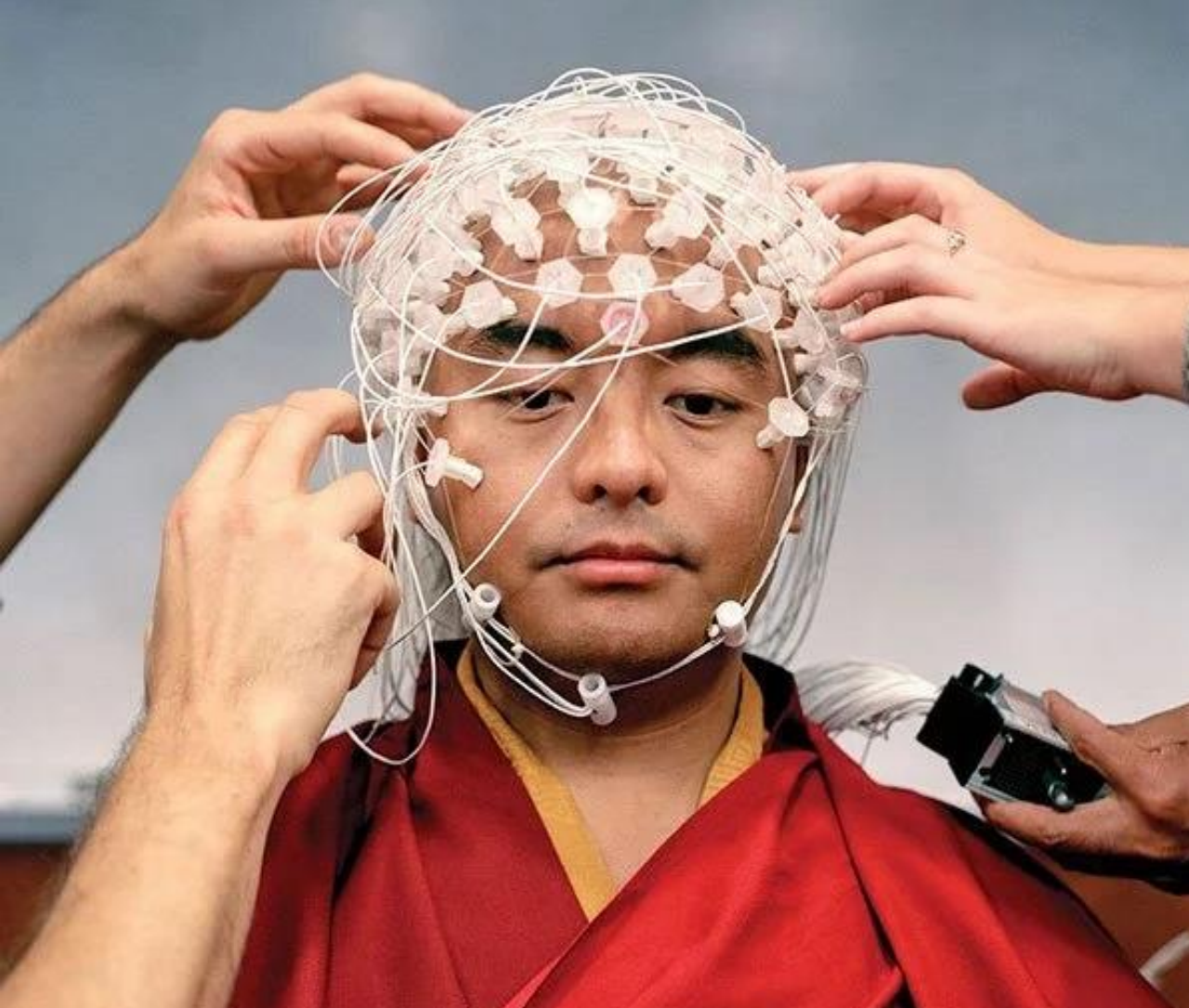
- **Mindfulness** can help us be aware of our values, and **and introspection** to see whether we are at risk of going against them
- **The ability to focus our attention** allows us to not follow our first impulse, but instead direct our attention towards what we choose to focus on



Meditation and Ethics

- Based on these, we can then develop **heedfulness** (Skt. apramāda), the ability to keep the mind away from harmful attitudes or actions, while exerting to cultivate wholesome mental states or actions
- Thus, these are key tools to live an **ethical life**





...to Laboratory: Attentional Practices

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Neuroscience of Attention

- **Mental wandering** is very frequent, even when we try to focus
- We wander towards **pleasant, unpleasant, and neutral things** (past, future, myself, others...)
- It is related to the **Default Mode Network (DMN)** of the brain
- An increased activity of the DMN have been related to **depression** and **anxiety**



Neuroscience of Attention

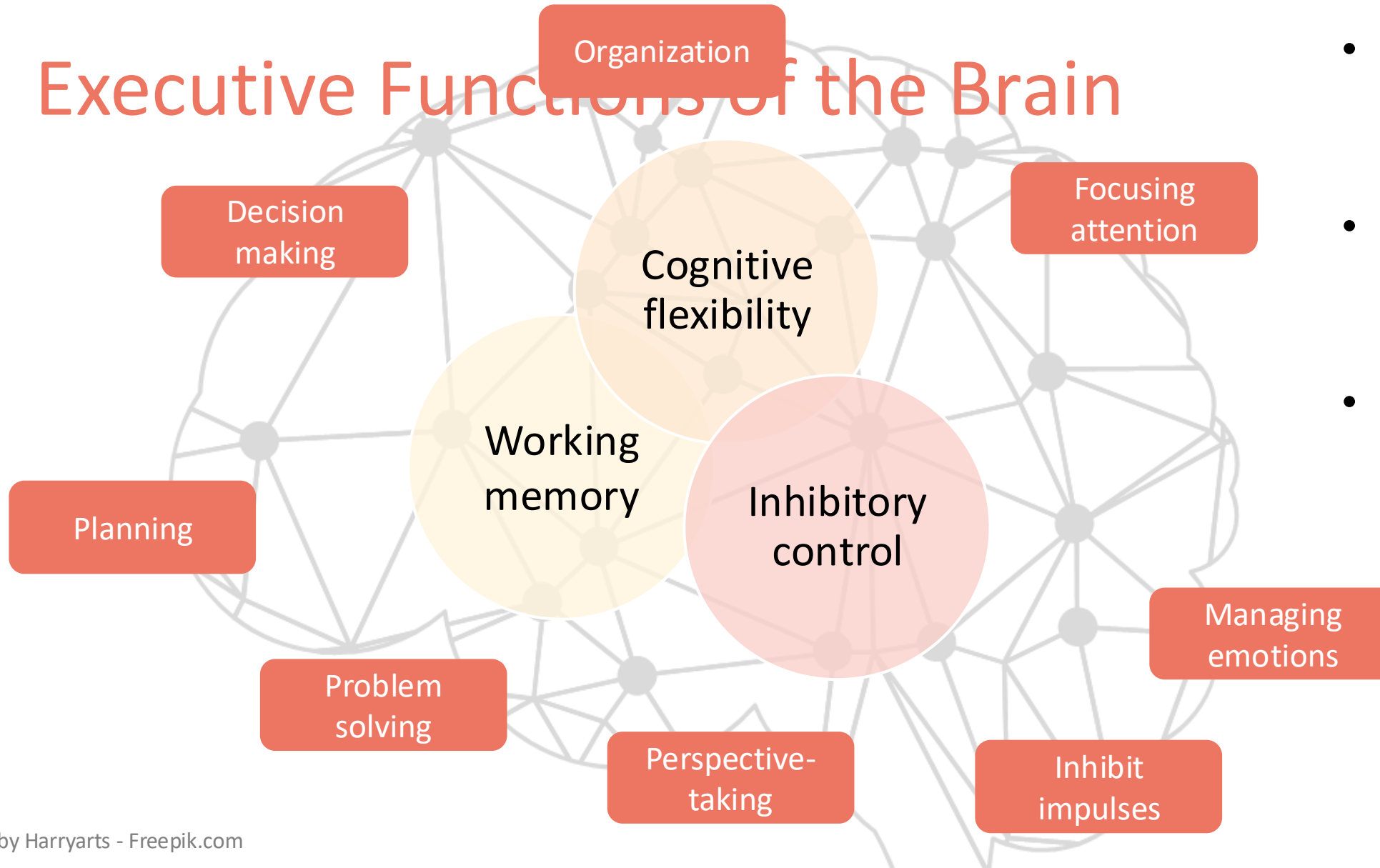
Meditation:

- Lessens the activity of the DMN and reduces mental wandering
- Calms the mind and reduces stress
- Enhances the *Executive Functions* of the brain

And... being focused on a particular task is even more pleasant than wandering towards pleasant things



Executive Functions of the Brain

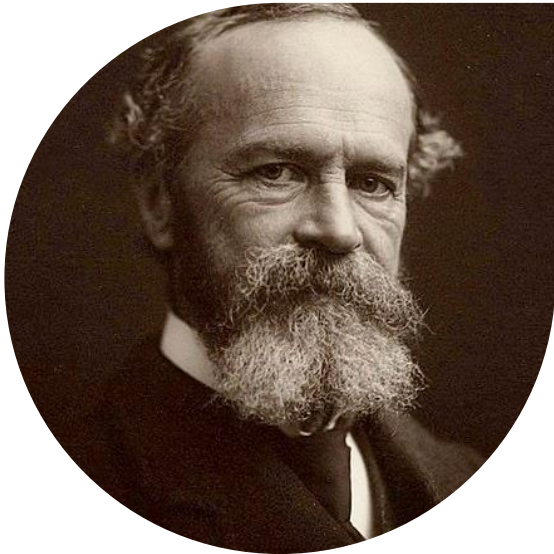


- Higher level cognitive processes
- Allow for important abilities
- Essential for a proper development

Image by Harryarts - Freepik.com



The Root of Judgment, Character, and Will



“The faculty of voluntarily bringing back a wandering attention, over and over again, is the very root of judgment, character, and will. [...] An education which should improve this faculty would be the education par excellence.”

— William James





From Cushion: Loving-kindness and Compassion

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Maitri *A fundamental attitude in which one sincerely wishes oneself and others to experience lasting happiness*

Karuna *A fundamental attitude in which one sincerely wishes oneself and others to be free from duhkha*

Mudita *The joy that one experiences when seeing the joys, success, and virtues of others*

Upeksha *A balanced attitude towards others, avoiding seeing them through the eyes of attachment, aversion, or indifference*

Their Characteristics and Cause

	Characteristic	Cause
Loving-Kindness	Friendliness	See oneself and others with affection
Compassion	Seeks to alleviate suffering	Noticing the helplessness of those overwhelmed by dukkha and its causes
Sympathetic Joy	Brings joy	Noticing others' success and joy
Equanimity	Promotes impartiality towards beings	Understanding that beings are subject to their karma



How to Practice the Four Immeasurables

1. Get familiar with the subject
2. Explore the advantages of having it and the disadvantages of not having it and having the opposite
3. Actual meditation
 - i. With specific beings
 - ii. Expanding it to all directions



Actual Meditation with Specific Beings

Loving-Kindness Compassion Symmetrical Joy Equanimity

1. Yourself
2. Someone you respect
3. A very dear friend
4. A neutral person
5. A hostile person

1. Someone greatly suffering
2. Someone creating strong negative karma
3. Yourself
4. A dear person
5. A neutral person
6. A hostile person

1. A jolly dear person
2. Yourself
3. A dear person
4. A neutral person
5. A hostile person

1. A neutral person
2. A dear person
3. A jolly dear person
4. A hostile person
5. Yourself



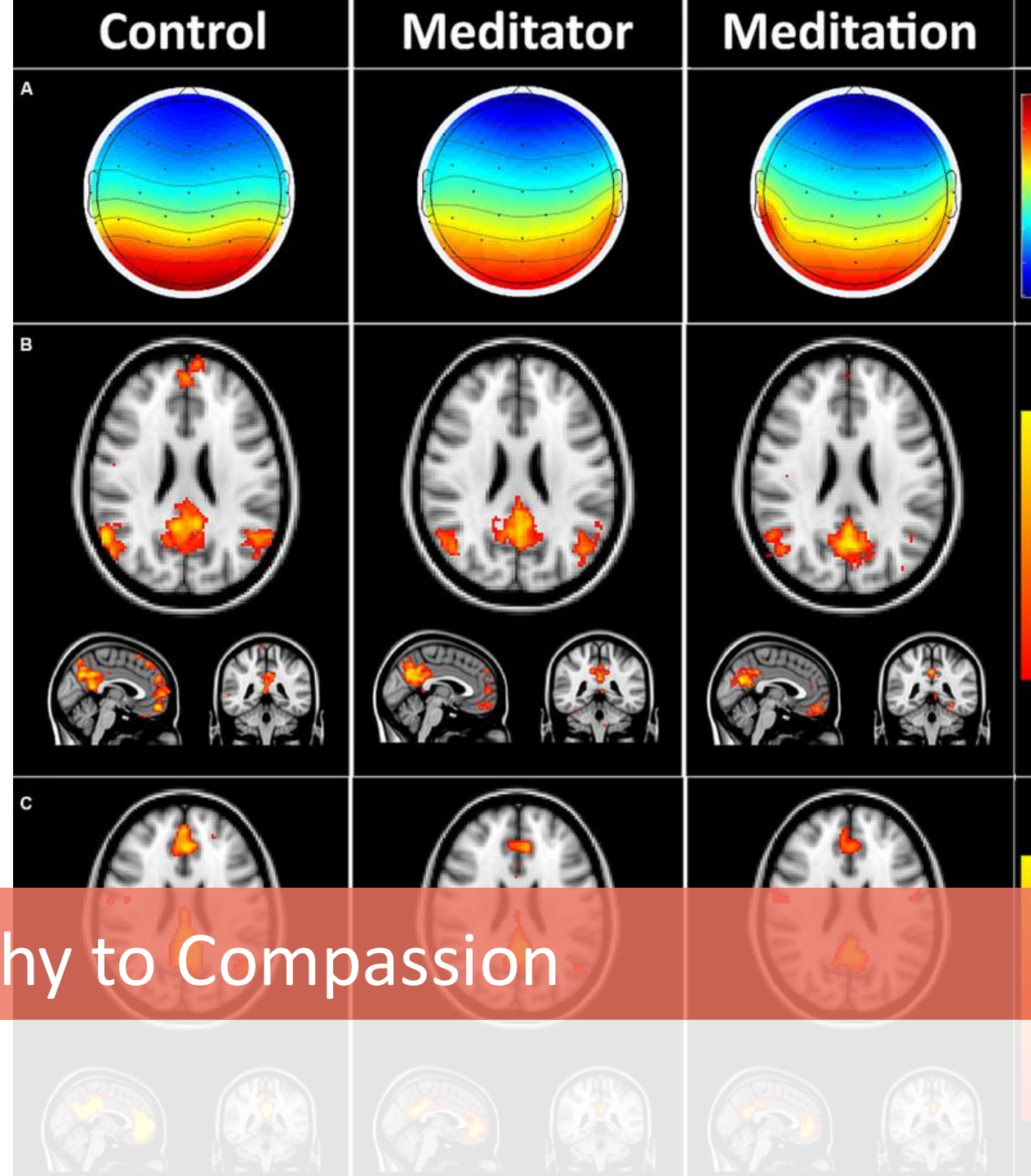
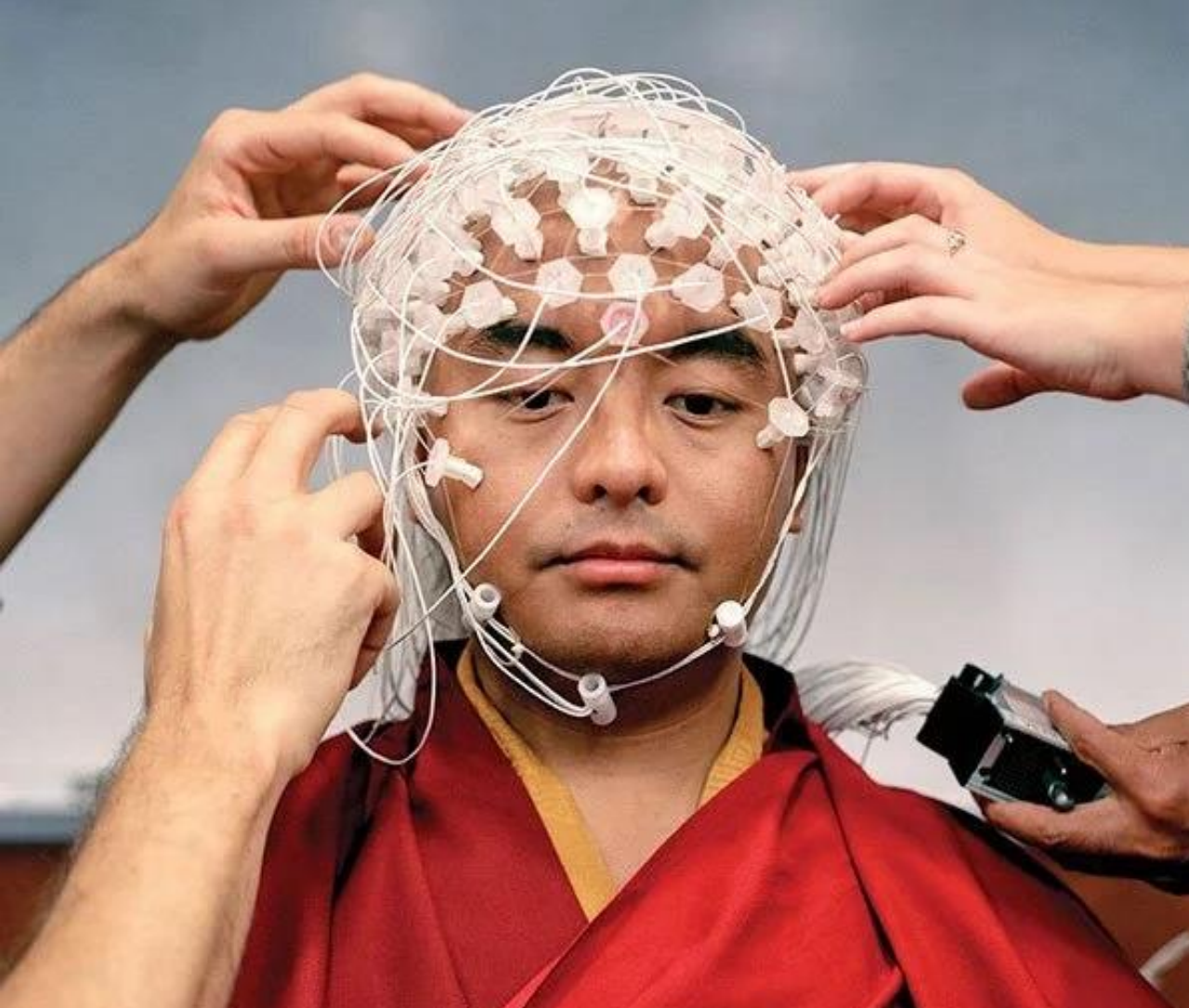
Actual Meditation Expanding It to All Directions



1. Bring to mind the experience of loving-kindness
2. Pervade the east, in front of you, with that loving-kindness
3. Likewise, pervade the south, at your right
4. Then, the west, at your back
5. The north, at your left
6. Thus, above and below
7. Extend it to all directions, everywhere
8. Intensify it

Image by Kjpargeter - Freepik.com





...to Laboratory: From Empathy to Compassion

Training the Heart for Lasting Happiness
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Empathy and Compassion

- **Empathy**

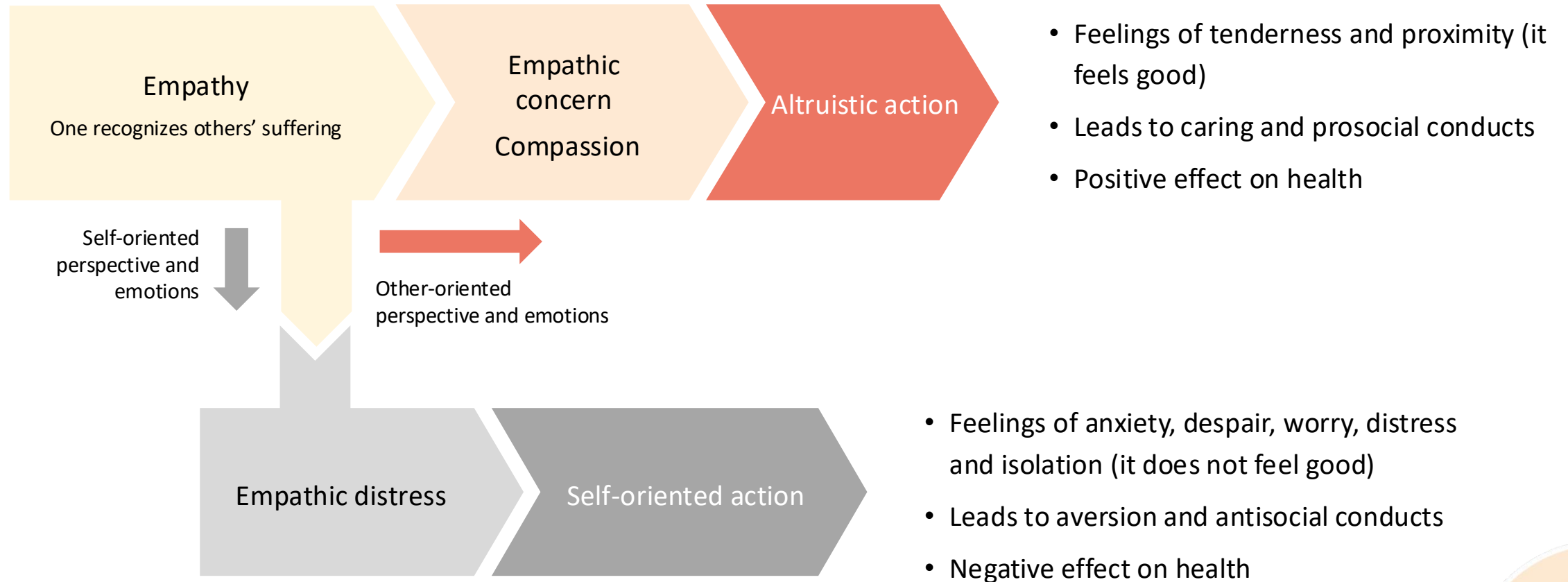
Ability to experience what others feel (emotional) and to understand their mental state (cognitive)

- **Compassion**

A mental state that is a genuine wish to relieve someone's suffering



From Empathy to Compassion

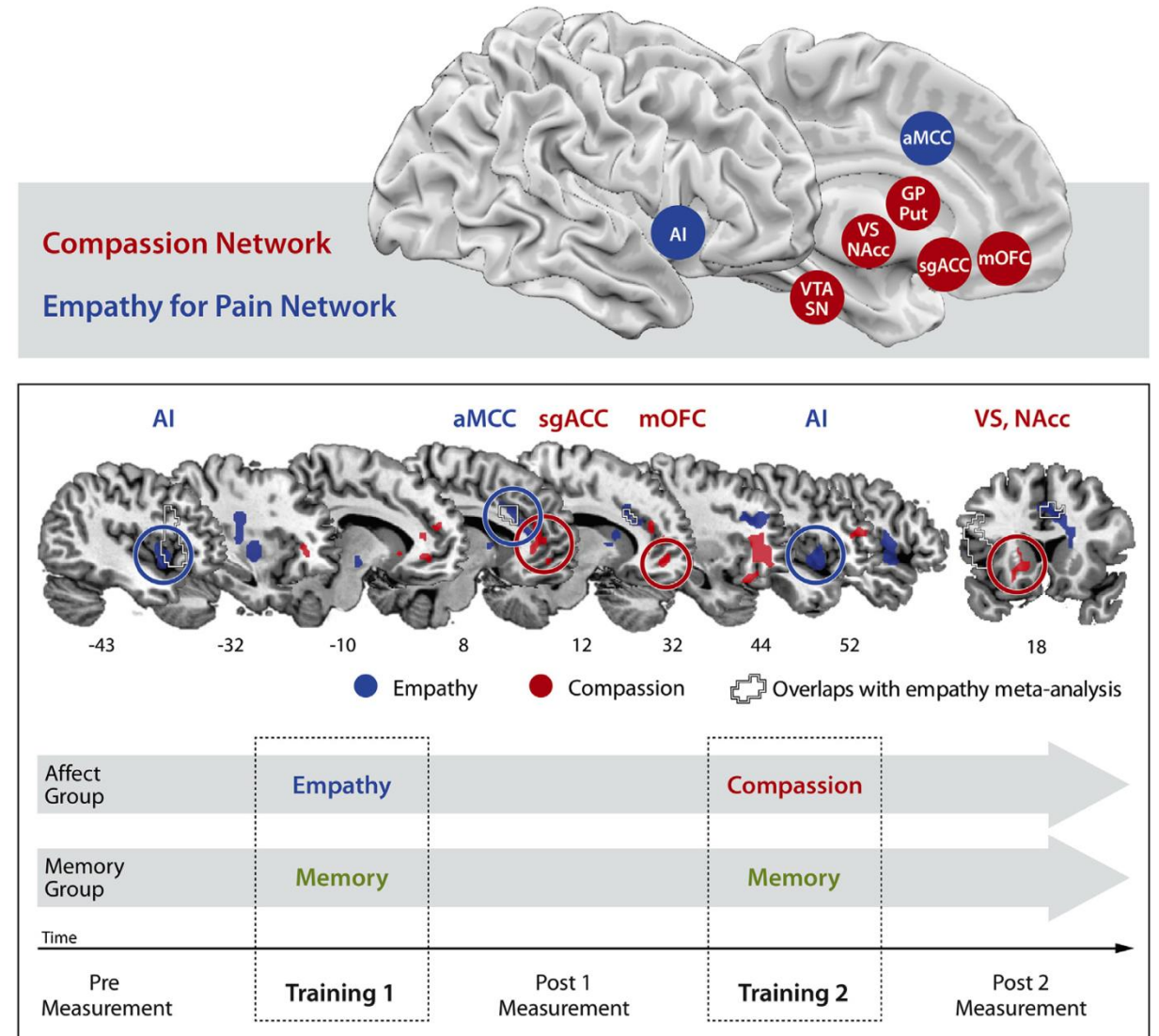


Empathy and Compassion Activate Different Regions of the Brain

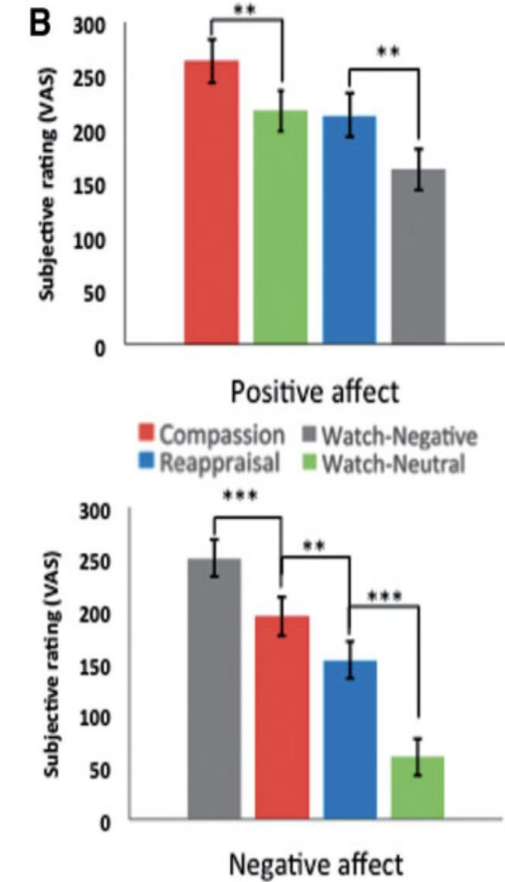
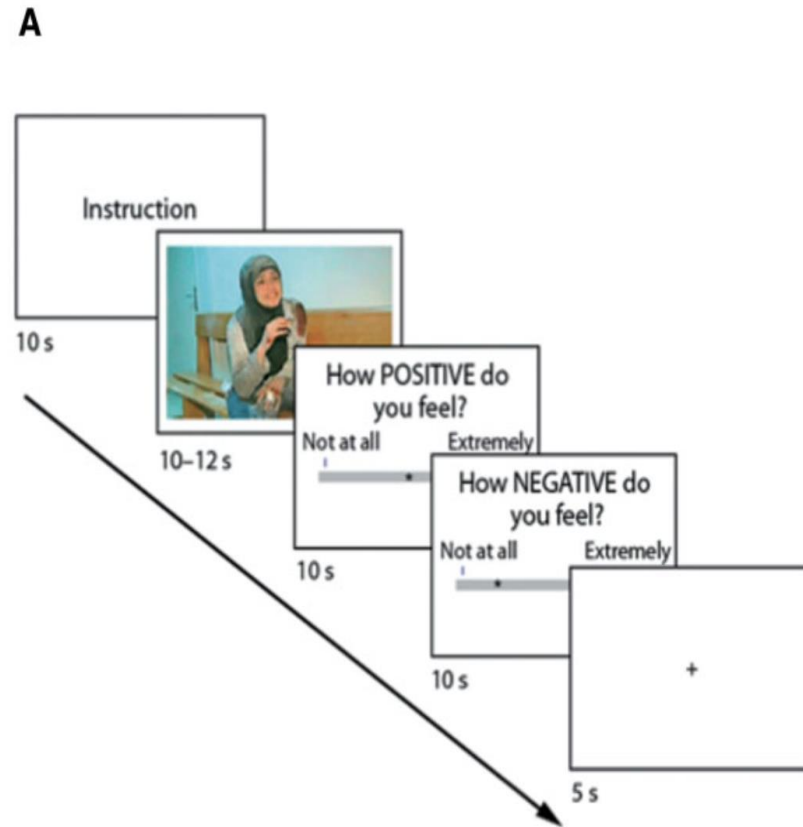
- When empathizing circuits of the Anterior Insula are activated, circuits that light up when we ourselves suffer.
- When feeling love for those suffering the areas activated are related to parental love.

Adapted from:

Singer, T., & Klimecki, O. M. (2014). Empathy and compassion. *Current Biology*, 24(18), R875–R878



Compassion Training and Reappraisal Effects on Affect



Engen, H. G., & Singer, T. (2015). Compassion-based emotion regulation up-regulates experienced positive affect and associated neural networks. *Social Cognitive and Affective Neuroscience*, 10(9), 1291–1301.

Scientific Perspectives on Well-Being

- **Purpose:** meaningful aims and values and applying them
- **Awareness:** heightened and flexible attentiveness to the external and the internal
- **Connection:** care and kinship toward others that promotes supportive relationships
- **Insight:** self-knowledge on how emotions, thoughts, beliefs, and other factors shape one's experience, especially one's sense of self

Purpose

- Healthy aging
- Reduced risk of mortality
- Increased life expectancy
- Greater income and net worth
- Less perceived stress
- Higher positive emotions and lower negative ones

Awareness

- Increased well-being
- Reduced stress and anxiety
- May help in hyperactivity disorders
- May help reduce depression
- Improved emotion management

Connection (pro-social skills)

- Supports well-being
- Positive impact in health
- Positive relationships help prevent depression and anxiety
- Loving-kindness: positive feelings and connection
- Compassion: more sensitive to other's suffering without distress

Insight

- A healthy sense of self (neither flattered nor rigid) contributes to well-being
- Lacking it, can lead to depression and anxiety
- Reappraisal: more positive emotions and less negative ones