



MINDFULNESS MEDITATION AS BRAIN NETWORK TRAINING

Dr Peter Malinowski

A simple mindfulness meditation, where attention rests on an object – such as the sensation of the breath – trains cognitive functions and the associated brain networks. Each time the mind gets distracted, loses its focus and attention wanders off, these brain networks will engage consecutively.

The circularity of this process emphasizes that distraction is an opportunity to strengthen these networks and cognitive functions, rather than a meditation failure. Over time, as the brain networks get trained, this process will become increasingly automatic, and less effortful.



Meditation process

The meditator **focuses on an object**, such as the sensation of the breath. When the **mind wanders off** to other experiences, such as thoughts, feelings, or sensations, the meditator **recognizes the wandering mind**, **lets go** of the distraction and **returns** the focus of attention to the meditation object.



Cognitive Functions

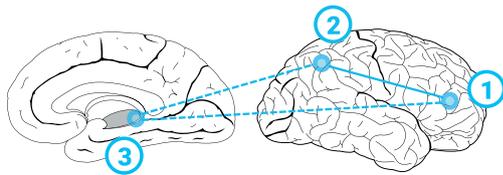
Cognitive Psychology offers a precise understanding of the functions that are involved in these consecutive steps. The meditator **sustains attention**, until **distraction** occurs. The **monitoring** function detects that the focus has been lost and the **disengagement** from the distraction is initiated. Subsequently, attention is **shifted** back to the meditation object.



Brain Networks

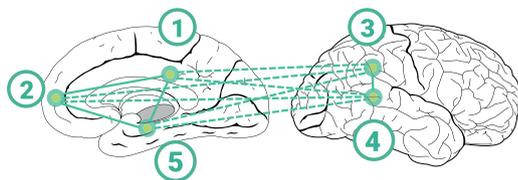
Specific brain networks subserve these functions. The **alerting network** maintains the alertness required for sustaining the focus on the meditation object. The **default mode network** is activated when the focus is lost and the mind engages in mind wandering and self-referential thought. The **salience network** gets activated when a situationally relevant event occurs. In meditation this would be the detection of mind wandering. The **executive network** then instigates the disengagement from the distracting experience, followed by the **orienting network**, which redirects the focus back to the meditation object.

Brain networks of attentional control during mindfulness meditation



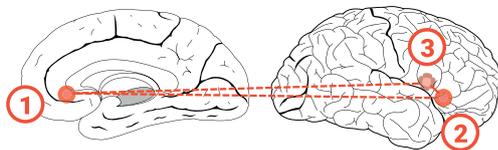
ALERTING NETWORK

- 1 right frontal cortex
- 2 right parietal cortex
- 3 thalamus



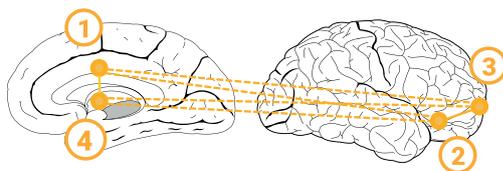
DEFAULT MODE NETWORK

- 1 posterior cingulate cortex (PCC)
- 2 medial prefrontal cortex (MPFC)
- 3 posterior lateral parietal cortex
- 4 posterior temporal cortex
- 5 parahippocampal gyrus



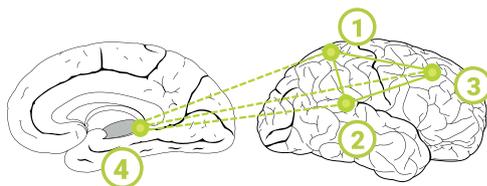
SALIENCE NETWORK

- 1 dorsal anterior cingulate cortex (d-ACC)
- 2 ventrolateral prefrontal cortex (VLPFC)
- 3 anterior insula



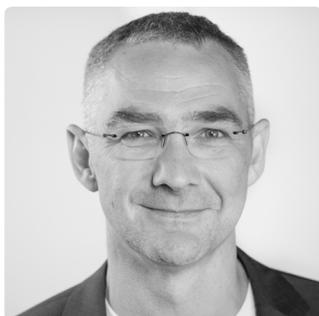
EXECUTIVE NETWORK

- 1 anterior cingulate cortex (ACC)
- 2 lateral ventral cortex
- 3 prefrontal cortex (PFC)
- 4 basal ganglia



ORIENTING NETWORK

- 1 superior parietal cortex
- 2 temporal parietal junction (TPJ)
- 3 frontal eye fields (FEF)
- 4 superior colliculus



DR PETER MALINOWSKI

Dr Peter Malinowski is the founder and chief editor of MeditationResearch, where he shares his passion for a scientific understanding of meditation.

www.meditation-research.org.uk

His research is regularly published in high quality international scientific journals. He is a sought after speaker and appears on national TV programmes (e.g. BBC One), radio channels (e.g. ABC Australia) and international news outlets (e.g. New York Times).

Dr Malinowski is a Reader in Cognitive Neuroscience at Liverpool John Moores University, where he works as Co-Director of the Research Centre for Brain and Behaviour, Programme Leader of the MSc Positive Psychology and Wellbeing and directs the Meditation Research Lab. He is also on the Board of Directors of Consciousness Mind-

fulness Compassion – International Association and works as scientific advisor for NeuroMindset (Mindset Neuroeducación) and for the Timeless Impact Academy.

His research focuses on investigating how meditation influences psychological functions and related brain processes, aiming to take a long term perspective. He is particularly interested in advancing meditation as a preventative approach and a way of unveiling inherent qualities of mind. Some of his projects also take an applied focus, for example concerning healthy cognitive ageing, meditation in the workplace or as surgery preparation.

How to use this resource and copyright notice

We produced the material for your use free of charge. Feel free to reprint the poster and handout and share them with your customers or workshop participants. It is made available under [Creative Commons Attribution – No Derivatives Licence \(CC-BY-ND 4.0\)](https://creativecommons.org/licenses/by-nd/4.0/). This means that you can use the provided material, also commercially, as long as you attribute the source. You can make changes in a reasonable manner, but not in a way that suggests that

we endorse you or your use of the work. You should also indicate the changes you made.

If you are reprinting the material as it is provided, no further credit is required. Otherwise, you can give appropriate credit by including a brief description of the changes you made and the following note:

*Copyright © Peter Malinowski;
<https://meditation-research.org.uk>.*

