

Mindfulness as cognitive closure: A Rosennean model



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Mindfulness meditation

Mindfulness is a non-elaborative, non-judgmental, present-centered awareness in which each thought, feeling or sensation that arises in the attentional field is acknowledged and accepted as it is [1].

Novices usually attempt to focus on their own breathing. If attention wanders to arising thoughts and feelings, they take notice of them, but let them go while attention is refocusing on the breath each time that attention wanders away from the breath.

Components of Mindfulness

1. Self-regulation of attention, which is maintained on immediate experience (e.g. breath), but allowing recognition of all mental events in the here and now.
2. Adoption of a particular orientation or attitude toward one's experiences, characterized by openness, non-striving and acceptance [1].

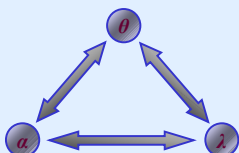
Qualities of Mindfulness

- Sustained attention and attention switching.
- Attitude of curiosity about all the events in the mind, which should be seen as relevant and not a distraction. Avoidance of thought suppression.
- Inhibition of secondary ruminative elaborative processing of thoughts, implications, associations or automatic reactions.
- Investigative awareness of the subjective and transient nature of events in the mind, leading to a clear view of own cognitive and affective states.
- Stability of mindfulness as a process, while in its environment all hell may be breaking loose [1][2].

Cognitive Models of Mindfulness

A testable theory of mindfulness is necessary to understand how mindfulness emerges out of an unstable cognitive milieu, and how mindfulness fosters meaningful change and transformation.

Shapiro et al. [3] have advanced a minimal relational model of mindfulness as the cooperative actions of three main processes: attention (α), attitude (λ), and intention (θ).



In the Shapiro et al. model, α , λ , and θ are not considered as separate processes – they occur simultaneously, are interwoven and influence each other.

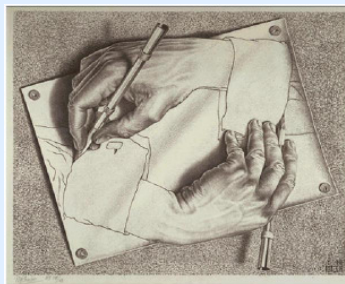
Limitations of this model

The Shapiro et al. model does not give a clear account of the causal interactions between α , λ , and θ , and how they co-evolve with practice. Thus, it can not explain how the complex interplay among these processes leads to a stable mindfulness state.

The theory of (M-R) systems developed by the theoretical biologist Robert Rosen (1934-1998) might provide us with a remedy.

Closure to efficient causation

Robert Rosen's (M,R)-systems are a class of relational models with a structure that defines a necessary distinguishing feature of living-systems. This feature corresponds to the closure of an organism's entailment relations with respect to efficient causation [4].

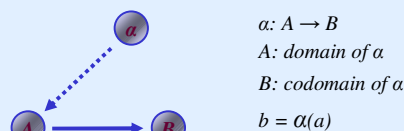


M. C. Escher's 1948 lithograph "Drawing Hands" (reproduced with kind permission)

We argue that a similar causal structure is encountered when facing the circular organization of cognitive processes involved in mindfulness meditation.

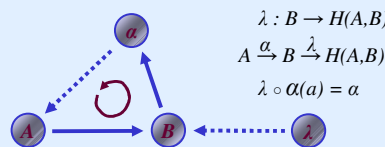
In our model, a cognitive process is identified with a mathematical mapping, or operator between two sets (i.e. sets of inputs and outputs) [5].

Rosennean Model of Mindfulness



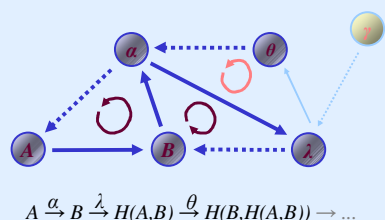
Why b? "Because a" (material cause)
"Because a" (efficient cause)

To ensure that α is self-regulated, the diagram can be expanded by introducing a mapping λ [6]:



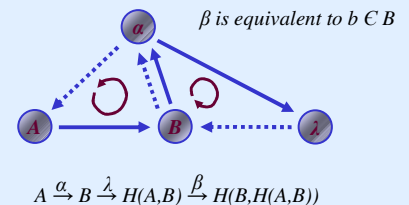
Why a? "Because b" (material cause)
Why b? "Because a" (efficient cause) } closed loop

To ensure that λ is also self-regulated, the diagram can be expanded by introducing a mapping θ [6]:



Adding new mappings would lead to an infinite regress

Cognitive closure



$\alpha(a)=b$
 $\lambda(b)=\alpha$
 $\beta(a)=\lambda$ } α is the efficient cause of β ,
 β is the efficient cause of λ ,
 λ is the efficient cause of α

Conclusions

- Mindfulness might be interpreted as the cognitive realization of Robert Rosen's (M,R)-systems.
- Cognitive closure might be supported by closed-loop hierarchies of short- and long-range neural interactions in the brain [7].

References

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Poster (pdf):
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Acknowledgements

We wish to thank the Buddhist monks Robert Szalies, Bhante Sukhacitto, and Bhikkhuni Mudita Teresa for sharing with us their experience as mindfulness meditators and discussing our modeling approach.