

Improving pattern separation and cognition

Citation for published version (APA):

van Hagen, B. T. J. (2020). *Improving pattern separation and cognition: effects of pharmacological interventions on rodent behavior and neuroplasticity*. [Doctoral Thesis, Maastricht University]. Maastricht University. <https://doi.org/10.26481/dis.20200914bh>

Document status and date:

Published: 01/01/2020

DOI:

[10.26481/dis.20200914bh](https://doi.org/10.26481/dis.20200914bh)

Document Version:

Publisher's PDF, also known as Version of record

Please check the document version of this publication:

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**Improving Pattern Separation and Cognition:
Effects of Pharmacological Interventions on Rodent Behavior and Neuroplasticity**

Britt T.J. van Hagen
14 September 2020

1. The object pattern separation task is an easy implementable and versatile behavioral task to measure spatial pattern separation in rodents utilizing their voluntary exploration behavior. *(this dissertation)*
2. Somatodendritic 5-HT_{1A} autoreceptors and 5-HT_{1A} heteroreceptors have distinctive behavioral and neurochemical effects upon activation. *(this dissertation)*
3. Selectively targeting post-synaptic 5-HT_{1A} heteroreceptors with a biased agonist has more beneficial effects on memory/pattern separation processing than unbiased 5-HT_{1A} receptor activation, due to the lack of opposing effects that pre-synaptic autoreceptors exert on memory function. *(this dissertation)*
4. In vivo (sub)chronic selective activation of pre-synaptic 5-HT_{1A} autoreceptors with F13714 can rapidly desensitize these receptor populations facilitating a shift towards post-synaptic heteroreceptor activation which is reflected in behavioral and mechanical measurements. *(this dissertation)*
5. Acute activation of post-synaptic 5-HT_{1A} heteroreceptors ameliorates a schizophrenia-like cognitive deficit in rats in both the object pattern separation task and the set-shifting task. *(this dissertation)*
6. The market-approved soluble guanylate cyclase stimulator riociguat has beneficial effects on the spatial memory performance of mice, however, not on that of man. This finding illustrates that a mouse is not a small human and a positive drug effect in mice is of limited value for humans eventually. *(this dissertation)*
7. "Effectively, change is almost impossible without industry-wide collaboration, cooperation, and consensus." *(Simon Mainwaring)*
8. "All experience is a drug experience. Whether it's mediated by our own endogenous drugs, or whether it's mediated by substances that we ingest that are found in plants, cognition, consciousness, the working of the brain, it's all a chemically mediated process. Life itself is a drug experience." *(Dennis McKenna)*
9. "Medicine is a science of uncertainty and an art of probability." *(William Osler)*
10. "Any fool can know. The point is to understand." *(Albert Einstein)*