

University of Groningen

Plasticity of visual field representations

De Oliveira Carvalho, Joana

DOI:
[10.33612/diss.128352681](https://doi.org/10.33612/diss.128352681)

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version
Publisher's PDF, also known as Version of record

Publication date:
2020

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):
De Oliveira Carvalho, J. (2020). *Plasticity of visual field representations*. [Thesis fully internal (DIV), University of Groningen]. University of Groningen. <https://doi.org/10.33612/diss.128352681>

Copyright

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

Take-down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.

CHAPTER 8

Summary

Unravelling the organization of the visual cortex is fundamental to understanding the degree to which the adult visual cortex has the capability to adapt its function and structure. The research in this thesis aimed to: 1) understand how the visual field representations present in the adult visual cortex are shaped by visual experience, predictive mechanisms, damage due to visual field defects or developmental disorders, and 2) develop advanced techniques and paradigms to characterize receptive fields (RFs) and their connections using neurocomputational models. To do so, I combined the neuroimaging technique functional magnetic resonance imaging (fMRI) with biologically-driven neurocomputational models to investigate whether neurons – at the population or sub-population level – have the capacity to modify their receptive field properties following damage (artificial and natural) to the adult visual system or following changes in the stimulus. The main project outcomes are: 1) the development of a new a versatile brain mapping technique that captures the activity of neuronal subpopulations with minimal prior assumptions and high resolution, which we call micro probing (MP); 2) the design of alternative visual mapping stimuli, with which we have shown that the recruitment of neural resources depends on the task and/or stimulus; 3) the development of a novel approach to map the visual field and that enables the evaluation of vision loss and provides important information about the function of the visual cortex and 4) the finding that in response to an artificial scotoma (mimicking a lesion to the visual system), there is a system-wide reconfiguration of cortical connectivity and RFs which may underlie the predictive masking of scotomas. These novel techniques and findings increase our understanding of the neuroplastic properties of the visual cortex and may be applied in the evaluation of pre- and post-treatment strategies that aim for vision restoration and rehabilitation.

