

## Accepted Manuscript

Title: MACS – a new SPM toolbox for model assessment, comparison and selection

Author: Joram Soch Carsten Allefeld



PII: S0165-0270(18)30146-8

DOI: <https://doi.org/doi:10.1016/j.jneumeth.2018.05.017>

Reference: NSM 8013

To appear in: *Journal of Neuroscience Methods*

Received date: 3-11-2017

Revised date: 12-3-2018

Accepted date: 21-5-2018

Please cite this article as: Joram Soch, Carsten Allefeld, MACS ndash a new SPM toolbox for model assessment, comparison and selection, *Journal of Neuroscience Methods* (2018), <https://doi.org/10.1016/j.jneumeth.2018.05.017>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

# MACS – a new SPM toolbox for model assessment, comparison and selection

— *Research Article* resubmitted to *Journal of Neuroscience Methods* on 12/03/2018 —

Joram Soch<sup>a,c,•</sup>, Carsten Allefeld<sup>a,b</sup>

<sup>a</sup> Bernstein Center for Computational Neuroscience, Berlin, Germany

<sup>b</sup> Berlin Center for Advanced Neuroimaging, Berlin, Germany

<sup>c</sup> Department of Psychology, Humboldt-Universität zu Berlin, Germany

- Corresponding author: joram.soch@bccn-berlin.de.  
BCCN Berlin, Philippstraße 13, Haus 6, 10115 Berlin, Germany.

## Abstract

*Background:* In cognitive neuroscience, functional magnetic resonance imaging (fMRI) data are widely analyzed using general linear models (GLMs). However, model quality of GLMs for fMRI is rarely assessed, in part due to the lack of formal measures for statistical model inference.

*New Method:* We introduce a new SPM toolbox for model assessment, comparison and selection (MACS) of GLMs applied to fMRI data. MACS includes classical, information-theoretic and Bayesian methods of model assessment previously applied to GLMs for fMRI as well as recent methodological developments of model selection and model averaging in fMRI data analysis.

*Results:* The toolbox – which is freely available from GitHub – directly builds on the Statistical Parametric Mapping (SPM) software package and is easy-to-use, general-purpose, modular, readable and extendable. We validate the toolbox by reproducing model selection and model averaging results from earlier publications.

*Comparison with Existing Methods:* A previous toolbox for model diagnosis in fMRI has been discontinued and other approaches to model comparison between GLMs have not been translated into reusable computational resources in the past.

*Conclusions:* Increased attention on model quality will lead to lower false-positive rates in cognitive neuroscience and increased application of the MACS toolbox will increase the reproducibility of GLM analyses and is likely to increase the replicability of fMRI studies.

## Keywords

fMRI-based neuroimaging, mass-univariate GLM, SPM toolbox, analysis pipelines, model assessment, model comparison, model selection, model averaging

## Toolbox DOI

DOI 10.5281/zenodo.1129353

Download English Version:

<https://daneshyari.com/en/article/8840260>

Download Persian Version:

<https://daneshyari.com/article/8840260>

[Daneshyari.com](https://daneshyari.com)