To: [r.d.mcintosh@ed.ac.uk](mailto:r.d.mcintosh@ed.ac.uk)

# Long version

Dear Prof. McIntosh

We are writing to you with a pre-submission enquiry concerning a project we are currently in the process of writing up. The project is an exploratory attempt at identifying which fMRI studies in social neuroscience are in particular need of replication, and we were wondering if this might be suitable for the Exploratory Reports format at Cortex.

**Study description:**

**Title:** Deciding what to replicate. Applying an quantitative approach to replication study selection to fMRI studies in the field of social neuroscience.

**Purpose:** Our initial study motivation stems from our intention to conduct a replication of a study in the field of social fMRI research. As part of our initial study selection efforts, we identified >2000 candidate studies that fit our initial selection criteria. The goal of this exploratory study is to identify which of these candidates are most in need of replication. If we succeed, this will (1) help us select a target study for replication, and (2) let us identify social fMRI studies that other researchers in the field might want to focus replication efforts on, and (3) provide guidelines for researchers who wish to apply the same study selection strategy in related research fields.

Reaching these goals will depend on our ability to find evaluation criteria that (i) are valid for measuring “replication value”, (ii) can be applied reliably and efficiently to a large number of social fMRI studies.

**Study:** We aim to quantify “replication value” based on quantitative information. All replication candidates will receive a numeric estimate of their replication value. We will then qualitative evaluate a selection of the candidates to (1) confirm that the algorithm produces meaningful results, and (2) identify problematic study types where the algorithm consistently over- or underestimates the replication value. Our study is in principle similar to Pittelkow et al. (2020), but we apply a different selection algorithm to a much larger number of studies in a different scientific field.

The study consist of 3 parts:

1. Describing and justifying the algorithm used to evaluate replication value. The algorithm is based on a formal model of replication study selection as a decision problem (forthcoming preprint) and is based on information about study sample size and publication citation count. This section includes:
   1. Survey interviews with a small number of experts in the field to determine which factors are important for judging the credibility of social fMRI studies.
   2. A qualitative description of our own unsuccessful efforts to extract quantitative information to indicate study credibility, other than sample size, from the studies in our sample.
2. Describing our initial search process that lead to our set of 2000 candidates. The section includes our Web of Science search criteria, our exclusion process, and descriptive information about all studies in the final sample (e.g. which journals they were published in, popular key terms, etc.)
3. Applying our predetermined study selection strategy to the final sample and evaluating performance of this strategy. This section includes:
   1. Inter-rater reliability estimates for the sample size coding.
   2. Relevant descriptive statistics such as the distribution of sample size, citation impact and publication year.
   3. Quantitative estimates of replication value for all candidates in the sample.
   4. Qualitative assessment of the quantitative results to ensure validity.

We believe our manuscript fits within the scope of Cortex. All articles in our dataset pertain to the relationship between the nervous system and mental processes in normal volunteers. Indeed, a subsection of the articles in our dataset are published in Cortex.

The “Exploratory report” format seems like a good fit for the paper we would like to write. We are addressing an open research question (“can we quantify replication value in a valid and efficient way?”) with no strong a-priori predictions, and we explore this question using a broad range of datatypes, qualitative and quantitative, which we will need to report on comprehensively. If the procedure performs well, we will be able to recommend future replication studies to other authors. We will also be able to provide recommendations for future studies to test the validity of our approach. If the procedure performs poorly, our study should still be informative for researchers attempting to implement similar study selection procedures in the future. Thus, we consider our research “generative”, but we are not sure if it would be considered “hypothesis generating” as per Cortex Exploratory Reports guidelines.

Based on this description, do you think our study would fit the scope and format of a Cortex Exploratory Report? If you require any additional information to answer this question, we would be happy to provide it.

Kind regards,

Peder M. Isager & Anna van ‘t Veer.

# Shorter 1-page version

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We are writing to you with a pre-submission enquiry concerning a project we are currently in the process of writing up. The project is an exploratory attempt at identifying which fMRI studies in social neuroscience are in particular need of replication. We are wondering if it might be suitable for the Exploratory Reports format at Cortex.

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The study consists of 3 parts:

1. Describing and justifying the algorithm used to evaluate replication value.
2. Describing our initial search process that lead to our set of 2000 candidates.
3. Applying our predetermined study selection strategy to the final sample and evaluating performance of this strategy.

We believe our manuscript fits within the scope of Cortex. All articles in our dataset pertain to the relationship between the nervous system and mental processes in normal volunteers. Indeed, a subsection of the articles in our dataset are published in Cortex.

The “Exploratory report” format seems very appealing to us. We are addressing an open research question (“can we quantify replication value in a valid and efficient way?”) with no strong a-priori predictions, and we explore this question using a broad range of datatypes, qualitative and quantitative, which we will need to report on comprehensively.

Based on this description, do you think our study would fit the scope and format of a Cortex Exploratory Report? If you require any additional information to answer this question, we would be happy to provide it.

Kind regards,

Peder M. Isager & Anna van ‘t Veer.