

**Concept Paper Form**

<b>Provisional Paper Title:</b> Infinite Reflections: How Mathematics Changed the Way we Understand our Brain (Book at OUP)
<b>Proposing Author:</b> Alain Goriely
<b>Author's Email:</b> goriely@maths.ox.ac.uk
<b>P.I. Sponsor:</b> Avshalom Caspi (if the proposing author is a student or colleague of an original PI)
<b>Today's Date:</b> 10/30/2019

Please describe your proposal in 2-3 pages with sufficient detail for helpful review.

**Objective of the study:** The goal of the study is to show the relationship between cognitive measures and morphological characteristics.

**Data analysis methods:** I will use basic regression and correlation methods to find overall trends. Only overall plots relating variables of interest will be published.

**Variables needed at which ages:** At age 45: cognitive measures (IQ and others if available), brain volume, cortex thickness, white hyperintensities, gender, height and weight.

If available, longitudinal data on the same variables

**Significance of the Study (for theory, research methods or clinical practice):**

The main goal of the study is to educate the public (through lectures and the publication of a popular science book with Oxford University Press) on the general trend between cognitive functions and morphological characteristics (and the method side, the danger of reaching simple conclusions from correlation). I will use this modern data together with historical work from the 19<sup>th</sup> century to show how our understanding of the brain has evolved and how proper mathematical treatment can be used to show trends on a population level, while not allowing us to reach conclusion at the individual level.

## Data Security Agreement

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<input checked="" type="checkbox"/>	I am current on Human Subjects Training (CITI ( <a href="http://www.citiprogram.org">www.citiprogram.org</a> ) or equivalent)
<input checked="" type="checkbox"/>	My project is covered by the Duke ethics committee OR I have /will obtain ethical approval from my home institution.
<input checked="" type="checkbox"/>	I will treat all data as "restricted" and store in a secure fashion. My computer or laptop is: a) encrypted (recommended programs are FileVault2 for Macs, and Bitlocker for Windows machines) b) password-protected c) configured to lock-out after 15 minutes of inactivity AND d) has an antivirus client installed as well as being patched regularly.
<input checked="" type="checkbox"/>	I will not "sync" the data to a mobile device.
<input checked="" type="checkbox"/>	In the event that my laptop with data on it is lost, stolen or hacked, I will immediately contact Moffitt or Caspi.
<input checked="" type="checkbox"/>	I will not share the data with anyone, including my students or other collaborators not specifically listed on this concept paper.
<input checked="" type="checkbox"/>	I will not post data online or submit the data file to a journal for them to post.  <i>Some journals are now requesting the data file as part of the manuscript submission process. Study participants have not given informed consent for unrestricted open access, so we have a managed-access process. Speak to Temi or Avshalom for strategies for achieving compliance with data-sharing policies of journals.</i>
<input checked="" type="checkbox"/>	I will delete all data files from my computer after the project is complete. Collaborators and trainees may not take a data file away from the office.  This data remains the property of the Study and cannot be used for further analyses without an approved concept paper for new analyses.

**Signature: Alain Goriely**