

Date of submission:  
Project title:

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## SINAPSE PhD Project Proposal Template for PhDs starting in 2009

Title:

Spatial and temporal imaging of attention reorienting mechanisms

SINAPSE Centre (i.e. primary university to which this studentship will be attached\*):

University of Dundee

First supervisor: contact details

**Name:** Dr Douglas Potter  
**Department:** School of Psychology  
**Address:** Scrymgeour Building, Park Place, Dundee, DD1 4HN  
**Email:** [d.d.potter@dundee.ac.uk](mailto:d.d.potter@dundee.ac.uk)      **phone:** 01382 384632

Co- supervisors: contact details

**Name:** Dr Cyril Pernet  
**Department:** Division of Clinical Neurosciences, SFC Brain Imaging Centre  
**Address:** Western General Hospital, Cewe Road, EH4 2XU Edinburgh  
**Email:** [cyril.pernet@ed.ac.uk](mailto:cyril.pernet@ed.ac.uk)      **phone:** 01315373661

**Name:** Dr Guillaume Rousselet  
**Department:** Centre for Cognitive Neuroimaging (CCNi) & Department of Psychology  
**Address:** 58 Hillhead Street, G12 8QB Glasgow  
**Email:** [g.rousselet@psy.gla.ac.uk](mailto:g.rousselet@psy.gla.ac.uk)      **phone:** 01413306652

Speciality of first supervisor:

Cognitive Electrophysiology

Speciality of the co- supervisor:

Cognitive neuroimaging (EEG, fMRI)

Planned start date (month/year):

Sept 2009

Date of submission:  
Project title:

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## PROJECT

### Summary of proposed project (approximately 200 words):

**Background:** Fox et al. (Fox et al., 2005) hypothesize that a dorsal 'goal-driven' attention network controls environmentally directed processes (perception and action) and a 'default network' controls internally directed processes (memory and introspection). Within this model it is hypothesised that a ventral 'stimulus-driven' network facilitates reorientation in goal-driven attention as well as between internally and externally directed processing modes. We have demonstrated abnormal patterns of brain activity in both the goal-driven and stimulus-driven networks in individuals with a history of mild concussion (Potter et al., 2001) and in patients diagnosed with schizophrenia (Potter et al., 2008). These abnormalities may result from reduced effectiveness of frontal control caused by diffuse neurotransmitter imbalances (Rolls et al., 2008). The planned research will extend our previous work by providing a better understanding of the role of the stimulus-driven system in switching between goal-driven and default processing modes. **Aims:** (i) To better characterise the function of the stimulus-driven system by determining the effects of task load and distractor contingency on the temporal relationships between the components of the stimulus-driven system. (ii) To better characterise the function of the stimulus-driven system by inducing more explicit switching and maintenance of processing modes. **Method:** Combine fMRI and EEG to visualise selective activation or suppression of posterior and anterior components of the 'stimulus-driven' control system while participants perform a number decision paradigm in which the temporal and spatial relationship of goal relevant and distractor stimuli are systematically manipulated. **Outcome:** The development of optimised, inexpensive (EEG), measures of cognitive control for use in the assessment of pharmacological efficacy in patients diagnosed with schizophrenia, depression and mild cognitive impairment.

Within this project, the successful applicant will (i) help with the EEG data acquisition, (ii) set up and acquire combined fMRI/EEG data, (iii) process the data, (iv) and contribute to the development of the framework described in Rousselet et al. (2008); i.e. parametric experimental designs combined with general linear analyses of single trial EEG.

### Key references (up to five):

Fox MD, Snyder AZ, Vincent JL, Corbetta M, Van Essen DC, Raichle ME (2005) The human brain is intrinsically organized into dynamic, anticorrelated functional networks. PNAS 102:9673-9678.  
Potter DD, Bassett MRA, Jory SH, Barrett K (2001) Changes in event-related potentials in a three-stimulus auditory oddball task after mild head injury. Neuropsychologia 39:1464-1472.  
Potter DD, Schloerscheidt A, Back D, Nerad L, Day R, Tatler B, Hurko O (2008) Development of Translational Biomarkers of Attention Function. In: TMRC 2nd Annual Scottish Translational Medicine Research Conference. Glasgow.  
Rolls ET, Loh M, Deco G, Winterer G (2008) Computational models of schizophrenia and dopamine modulation in the prefrontal cortex. Nature Reviews Neuroscience 9:696-709.  
Rousselet GA, Pernet CR, Bennett PJ, Sekuler AB (2008) Parametric study of EEG sensitivity to phase noise during face processing. BMC Neuroscience 9:98.

### Likely background of suitable student (eg. Neuroscience, MR Physics, Chemistry, Psychology) and essential skills required prior to starting this PhD:

**Likely background:** Candidates from neuro-informatics or cognitive sciences with computational experience.

**Essential skills:** Good mathematical or statistical skills. Ability to program in Matlab.

**Additional skills:** A background in Cognitive Neuroscience or Psychology

No prior knowledge in EEG and/or fMRI is requested – training will be provided.

## PROSPECTIVE PhD STUDENT INFORMATION AND CHECK LIST

1. You must contact your proposed PHD supervisor to discuss their project that you are interested in.
2. You must provide them with a completed application form, a CV and 2 referees/references well in advance of the closing date.
3. The proposed supervisors will decide if you are suitable for the PhD. They must support your application for the process to continue.

Please note there is no central SINAPSE funding available for students if they wish to visit the site. Please ask locally for any possible funds from the university to support any potential visit.

4. If the supervisor supports your application they will write a supporting statement for you and put you forward to the SINAPSE Executive for consideration for funding.
5. The supervisor has to send all your documentation to the SINAPSE office by the closing date. If your supervisor does not meet this deadline it will result in your application not being considered.
6. You **MUST** declare any conflict of interest regarding any applicant be it personal, financial etc.
7. If in doubt about the process please discuss with your proposed supervisor.
8. Check list for Submission, you must give your supervisor(s).
  - Completed Application form (one for each project you are interested in)
  - CV
  - 2 References
9. If you have applied for more than one project please give your preferred order of allocation of project.
10. Please note that a SINAPSE studentship **DOES NOT** cover overseas fees. If you are an overseas student you must make a statement on the application form for how you are going to cover the extra fees.

Official Use Only  
Date application received:  
PhD applicant number:

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**SINAPSE**  
**APPLICATION FORM for PhD studentship starting October 2009**

**Name of PhD Student:**

**Project Title:**

**First Supervisor:**

**Name:**

**Department:**

**Address:**

**Email:**

**phone:**

**SINAPSE Centre (university to which this studentship is attached):**

**Name of Second Supervisor and their University :**

**Planned start date (if unable to start 1<sup>st</sup> October 2009):**

**Conflict of Interests** Please declare any "conflict of interest" relating to either Supervisor or any other conflict of interest that may be related to SINAPSE. The term "conflict of interest" refers to situations in which financial or personal considerations may be relevant to the undertaking of this PhD.

**Signature** (please sign that the information you have provided is accurate):

**NB Please note that SINAPSE Executive Committee has the final decision in any application and reserves the right to not to appoint an applicant.**

Official Use Only  
Date application received:  
PhD applicant number:

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**Personal Statement:** Include a statement saying why you want to apply for this PhD, why you think you should be chosen and further career ambitions. If you are applying for more than one PhD project please state your preferred order for the PhD projects.

**NOTE: Overseas applicants MUST state how they will cover the extra fees as a SINAPSE studentship only covers the UK and EU (Home Student) fees.**

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Once completed please send with other relevant documents (CV and References) to  
Your proposed Supervisor