**Institution:** University of Westminster

**Unit of Assessment:** 4 Psychology, Psychiatry and Neuroscience

## a. Overview

Research described in this submission has been based primarily within the Department of Psychology. Submitted research is concentrated in three main areas: **Psychobiology** (6 people); **Cognitive Psychology and Cognitive Neuroscience** (7 people); and **Social Psychology** (2 people). Within the Psychobiology area, there is one formally recognised distinctive grouping, the **Psychophysiology and Stress Research Group**.

During the main REF assessment period Psychology was organisationally located within the School of Social Sciences, Humanities and Languages (SSHL). Research strategy was defined at University level and through the School's Research and Knowledge Transfer Strategy for 2010-15.

From 1st August 2013 Psychology has moved to the new Faculty of Science and Technology (FST), arising from the merger of the former Schools of Life Sciences and Electronics and Computer Sciences. This change will significantly enhance the research environment and future research strategy in Psychology.

During the REF assessment period there has been significant new investment in infrastructure, with more planned for the future. There have been strategic staff appointments, building on areas of strength. Significant new funding awards have been won. Building on all these factors, and the solid foundations described below, the Department is currently poised to achieve a higher profile in terms of research activity and excellence.

## b. Research strategy

*Strategy during the assessment period*

The University is committed to high-quality, practice informed research with global impact. An eco-system for research provides facilities aligned with National and European funding bodies, support for early career researchers, and pump-priming for early stage research. Schools (which became Faculties in 2013) are supported by Research Development Officers (RDOs) with primary responsibility for horizon scanning and bid preparation. Research has been guided by the University's research strategy, operationalised by a School-wide plan setting out specific aims and objectives, and addressed within the Psychology department by a local research strategy.

Within Psychology, research has been led by the Head of Department (**Dewart,** then **Clow**), with strategy development and monitoring implementation devolved to an elected Research Committee. The Chair (**Clow**, then **Buchanan)** has led the Research Committee since RAE 2008.

Following RAE 2008 an analysis of the unit's strengths and weaknesses was undertaken and a new five-year research plan was developed with defined high-level aims and objectives. The primary aim was to grow the volume and quality of research, whilst securing sustainability through inclusive support structures.

Of the fifteen individuals submitted here, all but five were in post at the time of RAE 2008. Seven members of the current group were submitted to that exercise. This indicates both stability, and the Department's success in developing promising researchers (e.g. **Gardner, Loveday, Thorn, Potts)**. Others (e.g. **Jones**, **Forrester**, **Silvanto**) were appointed at different times to grow capacity in a specific area.

An important unit within the Department is the **Psychophysiology and Stress Research Group** (**PSRG**; **Clow, Evans, Hucklebridge, Thorn** and **Loveday**). The PSRG was founded in 1989 and works in the area of salivary markers of stress and well-being. Through a strategy of sustained support it is now among the world's leading groups for research on the awakening cortisol response.

Beyond the PSRG, there are high levels of internal and external collaborative work. Staff are adept at national and international networking, contributing to and sustaining fruitful collaborations with external centres of excellence (e.g. **Golding, Morgan**). Cross-disciplinary networking within the institution has been successful, and resulted in significant publications and funded projects (e.g. a newly awarded £1M+ ESRC/MRC funded project on which **Clow** is co-investigator).

The University reinvested the bulk of QR funding arising from RAE 2008 in the areas that generated it. Within Psychology this funding, supplemented by further investment from the School, was used to support ongoing research development. Funding was transparently allocated through a rolling program of evidence-based self-assessment and monitoring of research activity against targets. Staff were eligible for individual support proportionate to their productivity over the previous four years. This system rewarded excellence and broadened participation by creating an attainable '*ladder of excellence'*. This open and transparent support system was the primary means by which development and sustainability of research within the Department was achieved.

Additional policies that applied throughout the period included:

- Continuous employment of a Research Technician tasked with supporting staff research;
- Nurturing research culture with regular events and activities (e.g. internal publicity for published outputs, successes and activities; an annual day of staff research presentations; seminars with external speakers; research 'pop-in' discussion sessions);
- Investing in quality of infrastructure and the range of facilities;
- Increased training / development opportunities;
- A research mentoring scheme;
- Support for collaboration, both internally and externally to the Institution;
- A research-focussed staffing strategy (see further information in Section c. below).

Two supplementary schemes were introduced. First, staff identified as being at the threshold of 'internationally excellent' status were targeted with additional teaching relief. Two beneficiaries are submitted to this assessment exercise (**Gardner, Forrester**). Second, during 2011-12 researchers were incentivised to apply for large external grants in return for enhanced internal support. Seven people benefited from this scheme (**Clow, Thorn, Evans, Hucklebridge, Edginton, Loveday,** and **Forrester**), who made nine external funding applications that year, in comparison to five from the same staff group the previous year.

Midway in the assessment period the Chair of the Research Committee undertook an intensive 1-1 interview schedule with all staff to identify research goals and barriers to success. Findings guided development of research strategy and new schemes to provide additional targeted teaching relief.

Investment has also been focused on specific areas of existing and potential strength (notably psychobiology and cognitive neuroscience). This has been operationalised through the staffing strategy (see below); support for recruiting PhD students in those areas; targeted infrastructure and equipment investments; and support for related teaching activity to build momentum in the area (e.g. a new MSc in Cognitive Rehabilitation).

*Evidence of the achievement of strategic aims during the assessment period.*

The primary aim set out in the Department's post-RAE 2008 strategy has been achieved. The REF submission has grown in critical mass as well as the excellence of its outputs, income generation, external impact, research environment and infrastructure.

The number of staff submitted to REF 2014 compared to RAE 2008 has increased (from 9.5 to 12.5 FTE). Beyond the group selected for submission to this assessment exercise, there is a much broader base of research activity which provides a fertile field from which to grow further capacity and critical mass.

The quality of the majority of outputs is judged, by internal and external review, to be much improved over the work available for the 2008 submission.

Funding applications have risen and research income for the assessment period has increased substantially from £12,913 for RAE 2008 to over £770,000, with some of this funding arising from Research Councils and other prestigious sources. Very recent awards from the ESRC/MRC (Award no. ES/L002884/1; **Clow** co-investigator) and ERC (Award no. 336152 - BRAINIMAGES; **Silvanto** as PI) will bring over £1.1M to the Department and create a solid foundation for future growth.

The number of doctoral degrees awarded in the period remained the same as for RAE 2008. The doctoral students submitting in 2012-13 (**Sterkaj**, **Taylor**, **Smyth**) all did so in a timely manner indicating satisfactory completion rates. Although impact was not assessed in the last assessment exercise our impact template and case studies illustrate the breadth and depth of engagement with this agenda. Finally the research infrastructure within the Department has received considerable investment during the period in terms of equipment and space, with two additional labs and new equipment.

*Future strategic aims and goals for research.*

The Department is at a pivotal moment in its development, and now has a real opportunity to move forward in research. The overarching aim is to continue to build a large and sustainable community of researchers including experienced and early career researchers, research fellows and PhD students who can successfully build their careers within the Department. The community will be broad-based but will include specific areas of excellence as noted below.

Joining the Faculty of Science and Technology significantly increases the critical mass of researchers available for internal inter-disciplinary collaboration. A number of collaborative projects addressing RCUK priority areas are already in development, and will be a strategic priority in the new Faculty (of which **Buchanan** is Research Director). A theme where there is considerable expertise and experience across the Faculty is lifelong health and wellbeing, and this is expected to be a focus. Members of the Psychology Department (notably **Clow**) have substantive track records in this and related areas, so are expected to play key roles. The newly awarded £1M+ ESRC/MRC grant for research on Extending Working Lives on which Clow is co-investigator represents a solid foundation for such work.

A significant development is the appointment of **Silvanto** as Reader from October 2013. This represents a strategic investment in the area of cognitive neuroscience, where he will provide leadership for a group of established and developing researchers. Associated with this, the Faculty has invested in new EEG and Transcranial Magnetic Stimulation (TMS) equipment and laboratory facilities for use by the group. Silvanto brings with him a €1.25M European Research Council 'Starting Grant' that he will use to employ two post-doctoral researchers and run his research group. The University's policy on formation and monitoring of research centres is designed to develop areas of significant strength, focus resource via the University research development fund, promote longevity of activity and support multi-disciplinary research with high impact wherever it is found. It is likely that a formally-recognised centre for cognitive neuroscience will form a significant focus of future activity and excellent research within the Department.

Faculty initiatives to boost collaborative work will include pump-priming funding for inter-disciplinary projects, and development of large bids for specific funding schemes and themes. A number of other complementary initiatives will be used:

- staff will have access to a Faculty-wide competitive one-semester research sabbatical scheme;
- active (and aspiring) researchers will agree yearly objectives for publications and grant applications with the Head of Department. Time will be allocated for this through individuals' workloads. Targets for grant applications by the staff group as a whole will be driven by the Department's operating plan, which specifies year-on-year increases;
- similarly, to support research impact staff time will be allocated for outreach and engagement activities;
- the Department's research culture will be further enhanced through additional Faculty-wide seminar series; through one-off talks, research days and research-led internal events; and researcher development events led by the University's Graduate School;
- new appointees will have access to significant start-up funding for their research programmes, derived from the Faculty research budget;
- the Department will capitalise on institutional initiatives, including (a) an Open Access publishing fund as a top-up to RCUK funds with selection rules designed to encourage critical mass, target and grow early career research, and (b) introduction of a new research data management system;
- suitable candidates will be supported to apply for internal Readerships and Professorships, which bring advantages in terms of allocating additional time for research.

These general strategies will support the overall aim, and also specific goals. Specific goals for the next five years are as follows:

- By the next assessment exercise the volume and proportion of internationally excellent research produced by the Department will increase.
- The proportion of research supported by external funding will be substantially increased. We aim to increase our research income compared to the current REF assessment period**,** targeting a range of sources including Research Councils. This income will enable appointment of research assistants and post-doctoral research fellows to help drive forward our research agenda as well as resource the research infrastructure. Over £1M of this target has already been met by awards made since 31st July 2013.
- All research active staff will be involved in PhD student supervision**.** Some new PhD students will be funded through internal scholarships (full and partial, derived from University / Faculty research budgets and University of Westminster Scholarships Funds). We will seek other funding for studentships through external funding applications and relationships with industry. Through work with the Graduate School (e.g. increased visibility through a re-developed University website) we expect to increase recruitment of self-funded research students. In parallel, supervisory capacity and expertise will be improved through a series of development events.
- The impact of research generated from within the Department will continue to be supported as described in the associated Impact Template, with a target for all research active staff to be able to demonstrate a degree of impact via a draft impact case study.

**c. People, including:**

**i. Staffing strategy and staff development**

The Departmental staff development and research strategies have worked synergistically to support staff research. The Head of Department manages overall workloads and the staff development budget which is used to support staff training, workshops, and attendance at research conferences. Key staff have also been supported through staff development in periods of extended research leave, to facilitate the development of new research links (e.g. **Evans** at the University of Hong Kong and **Clow** at the University of Adelaide). An important element in the staffing strategy is to prioritise research activity, and particular research areas, as appointment criteria for new staff. This is demonstrated best by the area of cognitive neuroscience, where there has been a sequence of strategic appointments as described below.

During the assessment period there have been two promotions to Professor (**Buchanan** and **Golding**) and one promotion to Reader (**Swami**). There are three further Professors amongst the submitted staff (**Clow**, **Evans**, **Hucklebridge**) indicating excellent career progression prospects in the Department and the high regard that Psychology research is held within the University. Whilst the Department boasts a number of Professors the staff structure is well balanced with early career researchers (e.g. **Potts, Jones, Ballieux**) and promising mid-career researchers (e.g. **Forrester, Morgan, Gardner, Loveday**).

Staff are encouraged and supported in building their research in the most appropriate way. In some cases this is by establishment of a research group composed of colleagues from the Department and across the University. An excellent example of this is the interdisciplinary PSRG. The PSRG was provided with laboratory space within the former School of Life Sciences (where **Hucklebridge** was based) to enable development of their laboratory- based work. The sustainability of the work of the PSRG is assured by the contributions of early and mid career researchers **Thorn** and **Loveday**. Thorn was a PhD student and post-doctoral research assistant with the group and following open competition there was a strategic decision to support her appointment to an academic post when a position became available. **Smyth** has a similar trajectory, having just submitted her PhD and been appointed to an externally funded post-doctoral fellowship within the PSRG.

In other cases staff build strong relationships with external researchers and research groups. **Morgan** undertook his PhD at the Institute of Psychiatry (IoP) and has sustained a flourishing relationship there since joining the University of Westminster in 2007 as an early career

researcher. Morgan was supported to spend at least one day each week at the IoP for research meetings and paper writing arising from the MRC-funded AESOP study of schizophrenia. In addition he was provided with space and facilities to develop a laboratory within the Department at Westminster to enable analysis of MRI brain images streamed direct from the IoP AESOP database. In these ways Morgan continues to make substantial contributions to the collaboration and its ground-breaking outputs. In parallel, Morgan has developed associated but independent research within the Department. He won Departmental funding for a PhD student to work under his supervision on a cross cultural study of schizotypy both in the UK and Trinidad.

In another example **Golding** (who has provided one of our impact case studies) has undertaken independent research into spatial disorientation over many years. This has been facilitated by provision of space and facilities (a rotating chair) within the Department. At the same time Golding has sustained a successful collaboration with Imperial College, which has enabled access to clinical populations, otherwise unavailable to him.

Another example of how the Department helps develop the careers of promising early career researchers is provided by **Potts**. Potts was originally appointed as maternity cover to help with teaching. However her ambition to engage in research was recognised and she began a fruitful collaboration with **Gardner**. She has sustained her relationship with Psychology at Westminster, gaining a permanent fractional appointment in 2010 alongside work towards a PhD at UCL.

The work of **Gardner** and **Potts** in the area of cognitive psychology and cognitive neuroscience was supplemented by the arrival of cognitive scientists including **Loveday** from the School of Computer Sciences in 2008. This was part of a strategic restructuring to consolidate all Psychology within one Department. The grouping was further enhanced by the appointment of **Forrester** in 2010 and **Jones** in 2012. The research of these talented early and mid career researchers has received a boost from a range of targeted staff development and research support initiatives and facilities. The appointment of **Silvanto** as Reader in Cognitive Neuroscience in 2013 was purposely designed to galvanise and lead the development of this grouping within the Department.

The staff development and research strategies ensure equality of opportunity and diversity amongst the staff by implementation of a range of transparent and inclusive policies. All staff are equally encouraged and supported in their research aspirations with opportunities for peer mentoring and advancement in career progression, which lies at the heart of our strategy for a sustainable research future.

### ii. Research students

There are currently 13 research students, located in a dedicated research room in the heart of the Department. They are a mixture of full and part time, supported by full or partial bursaries and fee waivers arising from external funding or internal investment. Most are at least partly self-funded. A ring-fenced portion of the Departmental research budget has supported students' research expenses (e.g. conference attendance, training and specialist equipment).

Proactive and responsive support of the research degrees program has been orchestrated by the Departmental Research Student Coordinator (**Cartwright**) and aligned with the wider University research degree program. Since June 2012 this process has been overseen by the University Graduate School which provides a focal point for all research-active staff, research students, and post-doctoral researchers. Offering a range of developmental activities, including seminars and networking events to facilitate sharing of best practice, it supports the personal and professional development of doctoral and early career researchers.

Postgraduate research students undertake the University's Doctoral Research Development Programme (DRDP), the local implementation of the Vitae Researcher Development Framework (RDF) which replaced the RCUK Joint Skills Statement. Westminster is one of the institutions in the forefront of implementing the RDF, and the Graduate School director chairs the Vitae Researcher Development Advisory Group. The DRDP includes academic, research and transferable skills delivered through University-wide and discipline specific sessions. These are specifically geared towards the student's needs at each stage of their PhD. Research students are also able to enrol on relevant modules/sessions from MSc courses. Student progress with the training programme and key stages of the research degree programme (registration, transfer, completion) is monitored annually at Department and School / Faculty level.

**d. Income, infrastructure and facilities**

Since 2008 the Department has won funding awards worth a total of over £770,000. Success has come from a variety of sources including the ESRC, the Joint Research Councils, the Wellcome Trust, the British Academy, the Nuffield Foundation, the Ministry of Justice, the Ministry of Defence (two grants), the Department of Work and Pensions, the Department for Business, Enterprise and Regulatory Reform, the Bial Foundation and private businesses in the UK and Malaysia.

The Department is well-resourced in terms of technical support with 3.5 technicians who are based in a workshop where a range of resources are available, including a selection of research equipment and a psychometric test library. A range of software is available including 25 licenses for the Superlab experimental generator programme; decision analysis software packages HiView and Equity; and access to the Qualtrics online survey platform.

Laboratory space and facilities are based at Regent Street, with two labs at New Cavendish Street a few minutes walk away. In 2014-15, Regent Street laboratories will move to improved spaces at New Cavendish Street where the Faculty of Science and Technology is based.

The *cognitive neuroscience laboratory* houses a 64 channel Neuroscan system for the measurement of EEG data. This equipment is used in conjunction with STIM 2 and E-Prime software. A T-Bar vibrotactile stimulator is used for somatosensory studies. Specialist software allows co-location of EEG data with MRI data (which we have access to from external collaborators). The Unit owns six CANTAB touch screen cognitive assessment systems each with a full battery of cognitive tests. Experiment generator software (E-Prime) is available in addition to a bespoke program that investigates retrieval induced forgetting. Also housed here is equipment used in motion sickness / balance research: software and projection equipment to present wide field-of-view moving images capable of eliciting the vection illusion and inducing spatial disorientation. A rotating cabin chair, used to explore threshold to motion sickness, is also housed in this laboratory, as is a ForcePlate balance testing system.

A further *new cognitive neuroscience laboratory* has been established at New Cavendish Street from September 2013. This will be used by **Silvanto** and others, and houses a further EEG system (BioSemi ActiveTwo system) and a Magstim RAPID2 Transcranial Magnetic Stimulation (TMS) system.

The *psychobiology and psychophysiology laboratory* houses ADI Instruments Powerlab equipment for measuring electrodermal activity, heart and respiration rate, and heart rate variability (15 further units area available in one of the teaching labs). The laboratory also houses ambulatory recording equipment: seven wrist-worn Philips Actiwatch Score units which record physical activity and self-reported scores on any potential variable; six Philips Actiwatch 2 devices; five sets of CamNTech Actiheart ambulatory heart rate variability recorders. There are six sets of MEMS caps for monitoring timing of salivary sampling.

The *psychophysiology and stress research group salivary assay laboratory* at New Cavendish Street is dedicated to the analysis of human salivary biomarkers (cortisol, DHEA and secretory IgA). The laboratory houses all the equipment required to perform these assays including calibrated pipettes, Bio-Tek automated plate washer and Bio-Tek Elx808 microplate reader with Gen5ELISA software for data reduction and analysis.

The *neuroimaging laboratory* contains computer equipment and specialist software used for the processing and analysis of MRI brain scan images originally acquired through collaborations with the Institute of Psychiatry. The *eye tracker laboratory* houses computer hardware and a SR Research EyeLink 1000 eye tracker system with associated experiment generator software.

The *qualitative research laboratory* contains video, DVD recording and state-of-the-art audio digital-recording facilities. The room is also fitted with a 2-way mirror. ATLAS, NVIVO and DRAGON software is used for analysis. A *soundproofed laboratory* provides space for experiments designed to monitor sound localisation in space. It is equipped with a range of speakers and auditory stimulus presentation equipment, a wall-mounted camera, and computers for experiment control. *6 research cubicles* can be booked for use by staff and students. The cubicles have PCs equipped with SPSS, E-Prime, Powerlab, ATLAS and Superlab.

**e. Collaboration and contribution to the discipline or research base**

A broad range of staff from the Department have participated in national and international psychology networks or advisory bodies over the assessment period, as well as contributing to public communication of science.

Contributions include to British Psychological Society committees e.g. the Research Board (**Loveday**), Standing Conference Committee (**Loveday**), Undergraduate Education Committee (**Gardner**) and working parties (**Buchanan)**; the committee of the Association of Heads of Psychology Departments (**Dewart**); the former Higher Education Academy Psychology Network Advisory Board (**Buchanan**); the board of the Association of Business Psychologists (**Benton**); the Self-Harm Expert Reference Group (Department of Health / National Offender Management Service) (**Borrill**); the Syrian Development Research Centre Youth Attitudes Survey (**Borrill**); Central YMCA Health Advisory Board (**Clow**).

Contributions to the discipline have been recognised by awards and prizes during the assessment period. For example **Hixenbaugh** was awarded an HEA National Teaching Fellowship recognising her research on student support (2008); **Swami** received the International Society for the Study of Individual Differences Early Career Development Award (2011).

Staff participate in a wide range of reviewing and related activity including the REF2014 Sub Panel 4 (**Clow**; who was also an RAE2008 panellist and advisor to the City University of Hong Kong in their Research Assessment Exercise); the Google Science Fair (**Williams; Clow**); the Women in Science scheme (**Clow**). Two staff (**Buchanan; Loveday)** are ESRC Peer Review College members, and most staff do a wide range of research funding reviewing activity (e.g. for the ESRC, MRC, BBSRC, Welcome Trust, European Science Foundation, the European Space Agency).

Staff contribute extensively to journal peer reviewing, and a number are members of journal editorial boards. These include Psychoneuroendocrinology (**Clow**); International Journal of Internet Science (**Buchanan**); International Journal of Psychophysiology (**Evans**); Evolutionary Psychology (**Swami**); World Journal of Psychiatry (**Morgan**); Simulation and Gaming (**Colwell**).

The Department has a strong track record in public engagement. Several members are regular contributors to television, radio and print media (**Clow, Buchanan, Swami, Loveday**). Members of the Department also contribute to public events such as those organised by the Science Museum (**Swami, Loveday**), Wellcome Trust (e.g. Packed Lunch: **Clow, Swami**), research user groups (e.g. Well London: **Clow**) and other charity events for groups such as YMCA (**Clow, Swami**) and Age Concern (**Clow, Hucklebridge**).

The Department has strong collaborative research links with a range of high profile national and international research groups. For example; the MRC-funded AESOP study at the Institute of Psychiatry (**Morgan**); the Lottery and Wellcome funded 'Well London' project in collaboration with UEL and the London School of Hygiene and Tropical Medicine (**Clow**); work with the Naval Aerospace Medical Research Laboratory, Pensacola, Florida, USA (**Golding**); on the Neuromotor Plasticity & Development (NeuroPAD) project at the School of Paediatrics and Reproductive Health, The University of Adelaide, Australia (**Clow**); work with the OPENspace Research Centre, University of Edinburgh (**Clow**); a New Dynamic of Aging collaboration with the University of Wales and the University of Manchester (**Benton**).

Visiting Professorships are held at: Imperial College London (**Golding**); University of Adelaide, Australia (**Clow**); the City University of Hong Kong (**Clow**), University Atma Jaya, Jakarta, Indonesia (**Benton**); Universitat de les Illes Balears, Palma, Spain (**Evans**).