Environment template (REF5)

Institution: Bangor University

Unit of assessment: Panel A, UoA04, Psychology, Psychiatry and Neuroscience

a. Overview

This submission is based on research and impact activity from staff in the School of Psychology, Bangor University. Founded in 1963 -- celebrating our 50th anniversary this year -- we are one of the oldest research-led psychology departments in the UK. We are also one of the largest, with ~1050 undergraduate and postgraduate students. Over the past two decades the School has developed an outstanding international research profile. In previous research assessment exercises, the School ranked: 4A in 1992; 5A in 1996; 5*A in 2001; and had an overall profile of 65% in the 3* and 4* categories in RAE 2008. The School placed joint 3/59 across Europe (2nd in the UK) in the CHE European Excellence ranking (2010), and was ranked joint 8th for research quality in the UK in the latest Times Good University Guide. Over the current REF period, total School research income was approximately £20m, derived from research grants and QR funding.

Our research is organised around four key areas: (1) **Perception, Action and Memory:** This group investigates how we extract information from the environment and use this information to guide our actions. Studies include investigations of: the flow of information from perception; how attention and eye-movements guide the selection of action; how memory systems interact; and how actions are directed through 3D space. (2) **Language, Bilingualism, and Cognitive Development:** This group examines the interaction of language and cognition in monolingual and bilingual populations across the lifespan. Current topics include phonological and lexical development, semantic processing, literacy, dyslexia, treatment for aphasia in bilinguals, cognitive advantages to bilingualism, and cross-language priming. (3) **Social Neuroscience**: This group considers how the brain makes sense of the social world. Particular foci are on: the perception of other people – their faces, bodies, voices; understanding others' actions; social learning; disorders of social cognition, e.g. in autism and Williams' syndrome; and emotion and memory. (4) **Clinical, Health, and Behavioural Psychology**: This group seeks to impact upon behavioural, psychological, and quality of life domains. We work on: ageing well and living with dementia; interventions to improve emotional, behavioural, and quality of life outcomes amongst those affected by chronic disease or disability; developing and implementing novel interventions including mindfulness and cognitive stimulation; understanding preventative health behaviour; and promoting mental health and wellbeing in the general population.

These four groups work collaboratively and are linked by over-arching methodological expertise in cognitive neuroscience, experimental psychology, neuropsychology, clinical-behavioural interventions and behaviour change. This interdisciplinary working is reflected in our leadership role in major centres such as the **Wales Institute for Cognitive Neuroscience** and the **ESRC Centre for Research on Bilingualism**.

We have long had a focus on fostering high-quality research with practical impact. This is reflected in the activity of several associated units that are closely integrated with the School. These centres are an important part of our activity, operating with over £1M in annual turnover. The **Centre for Mindfulness-based Research and Practice** promotes psychological wellbeing through mindfulness-based approaches to mental health and social care. The **Centre for Evidence-based Early Intervention** is dedicated to evidence-based interventions for children with conduct disorders and their families, across the UK and in developing countries overseas. The recently-founded **Wales Centre for Behaviour Change** seeks to support sustainable lifestyles and economic prosperity through research in areas such as energy awareness, work-based safety, productivity, and healthy eating in children. And the **Miles Dyslexia Centre** provides a research base, and an assessment and support service to the University and local education authorities, on dyslexia and associated learning difficulties.

b. Research strategy

Achievement of Strategic Aims. For RAE 2008, we identified several strategic drivers for the current REF period. Our goals were to further enhance the quality of research activity in cognitive and clinical neuroscience, and in psychological intervention and applied psychological research. (A further important aim was to support knowledge transfer through the exploitation of 'real world'

impact opportunities arising from this research -- this is reviewed in REF3a). We have been successful in meeting these objectives, as shown by some overall indicators: outputs are high, with over 740 refereed journal articles from Psychology staff in this assessment period; and our team of research students and grant-supported personnel (research officers, fellows) has grown by 57% from 90.2 FTE to 142 FTE between 2008-2013. More specifically, our continued research success over the REF period in meeting our objectives is attributable to our focus on a number of specific strategic aims:

(1) The recruitment of high-calibre senior and early-career faculty. We have made significant investments in staff recruitment, bringing in 12 new high profile faculty members -- many of them ECRs -- across the four research areas (see Section C). Our strategy is to ensure an appropriate balance of senior and earlier career staff to underpin the vitality and sustainability of the research environment.
(2) Investment in state-of-the art research infrastructure. We have invested heavily in our research infrastructure. Over the current period, we have used core funds to provide laboratory start-ups for new staff, to pay for equipment requests and upgrades for current staff, and to provide support, maintenance, and upgrades for major shared facilities. Equally important, we invest significantly in non-academic research support staff who contribute to many aspects of our research across the entire School, including grant preparation, finance, ethics, support for PhD students, building bespoke equipment, programming, managing shared facilities, etc. Over the REF period the total core School spending for these activities exceeded £1.5M.
(3) Multidisciplinary centres. Our research success has enabled us to take a lead role in two major externally-funded, multi-million pound collaborative interdisciplinary research centres. These in turn have increased our productivity and improved our research environment. (i) The Bangor-led **Wales Institute for Cognitive Neuroscience** was funded by a £5.2m grant from the Welsh Government to support the development of world-leading expertise in cognitive and clinical neuroscience within Wales at Bangor, Cardiff, and Swansea Universities. The Institute draws together the three psychology departments, with investment in a shared management structure, administrative support, academic appointments, and visiting fellows. This injection of resources increased the already high volume of cognitive neuroscience research in Bangor and Wales more widely. Submitted collaborative research grant applications involving Institute staff at two or more of the three universities between 2007 and 2011 exceeded £17m. Over the same period the Institute generated some 648 research publications and more than 200 national and international conference presentations. (ii) The **Centre for Research in Bilingualism** was established in Bangor University across the Schools of Psychology, Linguistics and Education with a £5m award from ESRC, HEFCW, and the Welsh Government. It has to date produced over 169 peer-reviewed journal articles, 57 book chapters and 417 conference presentations, 3 international conferences, 6 workshops, and a summer school. Over the REF period, the Centre attracted over £4.5m in external research grant funding from RCUK, EU and other private and public bodies.

Looking Forward. Our strategy post-REF remains focused on the three aims described above: in short, to appoint the best researchers, to support them with outstanding staff and facilities, and to bring together our areas of strength in multidisciplinary centres of excellence.

(1) Faculty appointments in strategic areas. We will build on our existing strengths in cognitive and clinical neuroscience, and in psychological interventions, by investing in specific thematic areas spanning both basic and applied research domains. In doing so we will maximise the potential for grant capture, inter-disciplinary collaboration, and impact. We have selected these themes to build on our current strengths and to improve our capacity to respond to the initiatives and goals outlined by Research Councils and charities. Specifically, we intend to focus over the coming years on making new appointments in the following thematic areas:

Cognitive Health and Ageing: behavioural interventions and neuropsychological substrates underpinning resilience to age-related cognitive decline, and neurodegenerative illness (linked to MRC goals for lifelong health and wellbeing, neurodegeneration).

Cognitive Neuro-rehabilitation: treatment generalisation in bilingual aphasia, motor rehabilitation in Parkinson's disease, neglect, cognitive control, addiction, gambling and dementia (linked to MRC goals for neurodegeneration, addiction research, neuroimaging).

Bilingualism and Cognitive Development: language, health and cognitive development in mono- and bilingual populations through the lifespan (linked to ESRC goals in vibrant and fair society, children and family, informing interventions; MRC goals in translational research, autism).

Computational Modelling: interdisciplinary study of the computational systems underlying the organisation and structure of the cognitive architecture and its implementation in the brain (this methodological approach cuts across several initiatives, e.g. MRC translational research).

Behaviour Change: the application of psychological principles of behaviour change to foster health and wellbeing in children and adults, and to promote sustainable lifestyles and economic prosperity in areas such as work-based safety, productivity, and energy awareness (linked to ESRC priorities in economic performance and sustainable growth, influencing behaviour; MRC obesity research).

(2) Investment in research infrastructure and support: We will continue to invest across the board in our large and significant research infrastructure (see Section D). Major foci for investment in the immediate future will be to: 1) continue to upgrade our **neuroimaging** centre; 2) extend our capacity for **developmental research**; and 3) develop new capacities for research in **psychopharmacology**. By increasing our capacity and capability in these three areas, we will support excellent research activity across all four research groups. In 2013, we have already secured a total of more than £1M in support of this mission.

(3) Multidisciplinary research: We envision a shift of focus in our efforts on major interdisciplinary centres and projects, towards research that has the creation of **extra-academic impact** as a core aim. In this, we are supported by our position in the College of Health and Behavioural Sciences, where our researchers benefit from the recently reconfigured Schools of Medical and Healthcare Sciences. These colleagues provide continuing routes for research collaboration, as well as access to medical expertise, clinical populations, and other healthcare research services. This includes the North Wales Organisation for Randomised Trials in Health, a fully-registered Clinical Trials Unit. Our ambitions in research-with-impact will be further boosted by the 2014 completion of the £46m University innovation centre "Pontio" - a major infrastructure investment for the University and the wider community. Pontio will provide a base for theatre and arts as well as an innovation facility for interdisciplinary research and support for community engagement activities.

Our emphasis on research with impact is demonstrated by two significant recent developments. One is the establishment in 2013 of the **Wales Centre for Behaviour Change** in Bangor University. Led by the School of Psychology, the Centre (funded by a £1.8m grant from the Wales European Funding Office) will play an important role both in research and impact for the School over the coming REF period by addressing key Governmental priorities related to sustainable lifestyles, health, wellbeing and the promotion of economic prosperity. Second is a major new research programme, funded by ESRC and the National Institute for Health Research (£4.2m). Led by Psychology in partnership with colleagues from across the College, it focuses on "**Living Well with Dementia**" - a major translational challenge for our field.

c. People

i. **Staffing strategy and staff development** We seek to ensure the vitality and sustainability of our research through the recruitment of high-calibre academic staff. Recruitment is guided by our academic research priorities so that we can appoint into targeted thematic research areas. We aim to ensure that there is an appropriate balance of academic staff across seniority levels. A number of senior academic staff moved on, or retired, during the current REF cycle (e.g. Linden, Tipper, Raymond, Shapiro, Gathercole, Hastings) providing us with an opportunity to invest strategically in new academic directions. Accordingly we have made **twelve new appointments** of high-calibre staff, drawn from some of the world's top research institutions and spanning career levels from junior to senior. In the Perception, Action and Memory group, we have appointed **Carey** (neuropsychology, laterality) and **Bestelmeyer** (accent and vocal emotion perception, auditory perception). In Language, Bilingualism, and Cognitive Development, we have been joined by **Caravolas** (bilingualism, literacy, dyslexia), **Oppenheim** (computational modelling, language production, bilingualism), **Jones** (language, dyslexia, bilingualism), and **Mills** (brain and language development, Williams Syndrome). In Social Neuroscience, we have appointed **Rogers** (cognitive control, gambling), **Koldewyn** (cognitive and social development), **Ramsey** (person perception, action understanding), and **Cross** (learning and expertise, action understanding). Finally, in Clinical, Health, and Behavioural Psychology, we have appointed **Henningham** (psychological

interventions, child behaviour) and **Dorjee** (mindfulness).

At the institutional level, Bangor University achieved the HR Excellence in Research Award from the European Commission (2012), acknowledging our alignment with the principles of the Concordat to Support the Career Development of Researchers. This ethos pervades the School's staff support strategy. Perhaps most significant is our commitment to keeping researchers' teaching loads low, and aligned with their research expertise -- to the advantage of both staff and students. Staff on teaching and research contracts typically lecture 36 hours per year, in addition to thesis project supervision. Many of these staff offer final-year or Master's level modules in their area of specialisation. A second important element is our commitment to providing researchers with the flexibility to make decisions about funding research activities themselves. School funds are used to support staff projects through research "overhead" accounts. These funds can be used by individual researchers to purchase equipment, fund pilot projects, provide bridge funding for research staff, and attend conferences, meetings and workshops. Circa £1m of internal funds have been spent over the REF period through this mechanism.

Staff are further supported through specific means: (1) Academic staff are assigned a senior mentor, who undertakes a formal yearly review (covering research, teaching and administration), and provides on-going support and advice, helping staff to maximise their research excellence and highlighting areas relevant to promotion. (2) New academic staff are provided with generous start-up funding, equipment and lab space allocations, as well as the guaranteed allocation of a School-funded PhD studentship in their first year. (3) The School actively supports academic career advancement. In the REF period we have seen many successful promotions, including: Personal Chairs for **Downing**, **Horne**, **Leek**, **Mills**, **Thierry**, **Turnbull**, and **Ward**, and Senior Lectureships for **Bestelmeyer**, **Cross**, **Heerey**, **Hughes**, **Parkinson**, **Ramsey**, and **Watt**. (4) Specialist methodology groups (MRI, EEG, TMS, and patient research) meet regularly to provide feedback on developing projects and to cross-fertilise collaborations. We also support a colloquium series with UK and international speakers in each of the four main research sub-themes (annual spend ~£6k). (5) To support professional development, grant applications are subject to internal peer review. PIs work with an experienced member of staff from the beginning of the grant writing process through submission. (6) Staff with clinical responsibilities and/or joint NHS appointments are integrated into our academic environment with full access to our research infrastructure.

ii. **Research students** We have consistently exceeded Research Council standards for students submitting their theses within 4 years of registration: for intakes starting in 2006, 2007, 2008, and 2009, submission rates were all greater than 85% (later intakes are still in progress). We have achieved substantial PhD funding from external sources: More than 40 PhD students who registered within the REF period were partially or fully funded by outside bodies. Further, the School currently spends approximately £450k p.a. of internal funds to support PhD studentships. A proportion of these funds are used strategically to support new staff and early career hires. Each student's PhD committee meets with the student to formally review progress twice in the first year, and then annually until thesis submission. Students are actively encouraged to attend national and international conferences to expand their range of experience and develop networks of professional contacts – and bench fees (£750 per student per year) are provided for this purpose. Students attend and participate in weekly technical workshops, journal clubs and seminars, and we support a "students-only" weekly research colloquium as well. Finally, we are introducing a competitive School-funded scheme that will allow students to participate in study visits to overseas labs to help prepare them for post-doctoral academic careers.

The high quality of our graduate student environment has enabled us to attract significant external recognition and funding support for our training. For example, we hold an independent 1+3 pathway in the Wales-wide ESRC Doctoral Training Centre (DTC). Psychology faculty also supervise or co-supervise PhD students on the interdisciplinary ESRC DTC Bilingualism pathway. Furthermore, the School runs a Doctoral Programme in Clinical Psychology (DClinPsy) -- the first such programme of its kind in the UK. Forty-four students graduated from the Programme over the current REF period. Finally, we have been an active participant in the Knowledge Economy Skills Scholarship scheme (11 PhD students and 8 research Master's students, £850k+ over the REF

period). The scheme is a major European Convergence programme led by Bangor University on behalf of the higher education sector in Wales. Benefiting from European Social Funds, the scheme supports collaborative research projects (MSc and PhD) with external partners, in order to increase the research capacity of SMEs.

d. Income, infrastructure and facilities

Income. Over the REF period, the School's total research income was circa £20m, derived from research grant capture and QR. Going forward, we have secured several significant awards in 2013 that will help drive our research post REF, and the implementation of our academic strategy. These include a £4.2m ESRC/NIHR award (led by **Clare**) for work on living well with dementia, **Mullins'** EU-funded collaboration on neuroimaging and dementia (Bangor arm: ~£400k; 2012-14), and a £1.8m Wales European Funding Office award to establish the Wales Centre for Behaviour Change (**Parkinson**, **Hughes**). Also noteworthy during the REF period were the capture by both **Cross** and **Ramsey** of ESRC Future Leader awards (2012-15), and the award to **Thierry** of an ERC "Starting Grant" (2007-12), reflecting our ability to recruit young scientists of the highest profile.

Infrastructure. We provide researchers with a high quality modern working environment. As a large School, we occupy eight buildings across the campus with a total estate footprint over 7500m^2. Faculty offices are mainly located in two adjacent buildings that also house the Wolfson Centre for Clinical and Cognitive Neuroscience (along with our onsite 3T MRI scanner, EEG, brain stimulation, and patient testing facilities), and the ESRC Centre for Bilingualism Research. Academic staff offices are co-located nearby their research groups to foster collaboration and interaction. We also have several dedicated, and recently refurbished, research buildings housing a variety of facilities. Two of these buildings contain faculty research labs, an open-access eye tracking and high-density EEG suite, as well as office and meeting space for PhD students and other research staff. The Associated Units occupy their own dedicated space across the campus.

Research facilities and support. In the previous RAE period, funding from the Wolfson Foundation and other sources allowed us to create a facility in which multiple laboratories for clinical and cognitive neurosciences are co-housed along with researchers and their lab groups. We continue to benefit from this facility, which has been significantly expanded and upgraded over the REF period. It includes an onsite, research-dedicated 3T whole-body MRI scanner, and laboratories for brain stimulation (e.g., TMS, tDCS), motion tracking, sound recording and acoustic analysis, psychophysics, virtual reality, eye tracking (both head mounted and remote) and multiple EEG systems including an open-access 128 channel high-density EEG system with an integrated 2000 Hz eye tracking capability.

Researchers in clinical and cognitive neuropsychology have access to a neurology patient recruitment panel. Recruitment is overseen by our three staff neurologists, and a dedicated patient database coordinator. Between 2008 and 2013, 171 new patients were identified for inclusion and agreed to contribute. Of these, at present 78 have participated in research with 41 having research MRI scans in the Bangor Imaging Unit, under a systematic protocol including a variety of anatomical and functional measures. The School also maintains other participant panels, including a student participant panel, a community database (with 885 individuals currently registered), an infant and child database (with over 400 children between birth and 6 years currently registered), and a new genetics database, with individual mapping of key alleles (with over 100 individuals currently registered).

Rigorous research ethical review and governance procedures are maintained by the School's Research Ethics and Governance Committee. Projects involving clinical populations require approval from the NHS/BCUHB Research Ethics Committee. Use of the MRI scanner, EEG, brain stimulation techniques, or testing of neurological populations, requires successful completion of an extensive training and safety protocol including first aid/CPR.

For **equipment** needs, we maintain a fully-equipped technical workshop for the construction, maintenance and repair of bespoke electrical, mechanical and computing equipment. It is staffed by a team of research-dedicated audio-visual, electronic and computer technicians (3+ FTE). Also,

the School Research Committee makes regular open calls for bids to fund larger items of equipment, i.e. that will be of benefit to groups of researchers.

For support of **grant applications**, staff benefit from a team of dedicated research and grant support staff (3+ FTE). This office provides information about funding opportunities, grant deadlines, funding priorities and subject-specific calls. They assist staff in both pre-award and post-award grant management (costings, grant submission, staff recruitment, spend monitoring). Outside the School, staff access a range of other research support services organised centrally through the University Research and Enterprise Office. This provides specialist support services for large (e.g., EU) multi-centre projects, and specialist services to promote translational and impact-related activity (including the establishment of spin-out companies). Additional incentives are also provided by direct allocations of grant overhead income to research support overhead accounts. The School also operates a £1k allocation incentive scheme for the submission of grants of £40k+ to researchers without current grant support. The School's Research Committee holds workshops on funding schemes, grant and paper writing, as well as collaborative research events.

In recent developments, during 2013/2014 we are making significant investments in facilities for **neuroimaging**, for **developmental** studies, and for **psychopharmacological** methods. For neuroimaging, we have secured University approval for the investment of over £200k in software and hardware upgrades to the MRI scanner (including a 32 channel digital head coil and a state-of-the-art stimulus display system). Further, we have committed additional funds (circa £25k) to the establishment of a new developmental MRI scanning suite led by our new appointment **Koldewyn**. This will incorporate a child-friendly waiting area and dummy scanner bore. In further support of developmental research, we have secured capital funding of £850k from Bangor University to relocate our School-run nursery, which will have 50 full time places for children 0-5 and an associated afterschool club for 40 children up to 12 years of age. The new 550m^2 facility will house purpose-built child research facilities including observation rooms, and a dedicated space for onsite EEG. Finally, we have committed £100k to the establishment (led by **Rogers**) of a psychopharmacology research laboratory allowing us to extend our work in both cognitive neuroscience and clinical interventions. The investment includes estates costs, equipment, and the appointment of a clinical fellow to oversee testing.

e. Collaboration and contribution to the discipline or research base

Academic collaborations. A representative sample of collaborations occurring at local, national, and international levels are highlighted below. Two of our most visible and active large-scale collaborative contributions over the REF period were achieved through the Bangor-led **Wales Institute for Cognitive Neuroscience (WICN)** and the **Centre for Research in Bilingualism (CRB).** In addition to outcomes and grant capture highlighted in Section B, these networks stimulated international collaborations through international conferences, public lectures, and summer schools (see below). Both centres had visiting scientist programmes bringing high-profile scientists to Bangor such as Reuter-Lorenz, Sereno, Ivry, Hulme, & Maloney (through WICN) and over 80 visiting researchers, 53 of whom were from overseas, came to Bangor via the CRB. Researchers in each of the four thematic groups are involved in major **international collaborations**. For example, in the Language, Cognition, Bilingualism and Development group, **Caravolas** led a seven member (€3.8M; 2008-12) EU-funded Initial Training Network on "Enhancing literacy development in European languages" with a research network extending across the UK, France, Czech Republic, Slovakia, Spain, Norway, and the US. **Mills** has a longstanding collaboration with Bellugi (Salk Institute) and others in the USA supported by NIH funding (Korenberg, Utah; Brown & Halgren, UC San Diego) on Williams Syndrome. In the Perception, Action and Memory group, **Mullins** leads the Bangor arm of the EU-funded NeuroSKILL project (2012-14) with Trinity, and University College, Dublin. **Bracewell** led the Bangor arm of an EU FP7 grant on "Hyper Interaction Viability Experiments" (2008-12; £540k to Bangor) with partners in Spain, Germany, Greece, Portugal and France. In the Social Neuroscience group, **Rogers** has collaborative projects on drug abuse with Potenza (PI, Yale; Rogers Co-I, $23k supplement) and Winstanley (British Columbia) on animal models of gambling behaviour. **Cross** (early career) was awarded a Volkswagen Foundation European Platform grant (2012-14; €90k) to start a large international collaboration between scientists and architects from the UK, USA, UAE, and Germany. Finally, in the Clinical, Health, and Behavioural Psychology

group, **Clare** holds several large multinational RCT studies including a £2.5m NIHR Health Technology Assessment project, and led a collaboration with Bialystok (Canada) and others on a £630k ESRC award (2010-12) on age-related neurodegenerative disorders. **Morrison** was the Psychology lead on the FP7-funded "Ascertaining Barriers for Compliance" project (2009-13; €2.5M total funding) involving partners from Poland, Belgium, and Switzerland. And **Henningham** is a collaborator on four new grants from Grand Challenges Canada: Saving Brains (total Can$5.65m) involving 3 cluster RCTs of early childhood parenting interventions in Bangladesh, Colombia and other low and middle-income countries.
Examples of **collaborations with the UK** are: **Rogers** has several multidisciplinary collaborations at Oxford (with Harrison (PI) on COMT and inhibition (MRC, £1M); with Powell on serotonin (Rogers PI, £93k); with Saunders (PI) on bipolar or borderline personality disorder (£61k)), and at Cambridge, with Clark (PI) on the neural basis of gambling cognitions (MRC, £783k). **Rafal** works with Bell (Oxford) using DTI tractography to study a putative subcortical threat detection pathway between the colliculus and the amygdala. Examples of ongoing collaborations as a direct result of WICN include **Downing** (Co-I) with Graham (Cardiff; PI) on a BBSRC project on the medial temporal lobes (Bangor arm: ~£300k; 2012-14); and Linden (PI, now at Cardiff) with **Cox** (Bangor) in a new project (BRAINTRAIN), which will develop "neurofeedback" techniques and their use in several mental and behavioural disorders, including alcohol dependence. **Mills** collaborates with Floccia (PI, Plymouth) and others at Oxford, Birmingham, Kent, Lincoln, Liverpool, and Lancaster on a new ESRC-funded project (2013-16) to study bilingual language development across the UK.

Collaborations with the NHS are an integral part of Bangor's research programme as well as providing direct responses to national RCUK priorities. For example, **Clare** has several large collaborative grants in collaboration with the NHS, including the above-mentioned "Living Well with Dementia" project. This is a UK-wide cohort study in response to the UK Government's dementia challenge. The grant was awarded alongside the University's commitment to provide a full-time faculty position in Cognitive Health and Ageing. Clare is also PI of a large NHS collaborative project: Goal-oriented rehabilitation in early-stage dementia: multi-centre single-blind randomised controlled trial (NIHR HTA, £2.5M, 2012–2016). **Cox** is co-director (with Linden, Cardiff) of the MRC Addiction Research Cluster in Applied Cognitive Neuroscience, developing innovative cognitive-motivational and neuroscientific interventions for alcohol abuse. The cluster fosters and coordinates collaborations among addiction researchers across several UK and European institutions including Amsterdam, Birmingham, Bristol, Cardiff, City (London), Imperial, Liverpool, Oxford and Nottingham. **Mullins** collaborates with N. John (PI; Bangor CompSci) on the NISCHR-funded (£1.2M) Advanced Medical Image Analysis and Visualization Biomedical Research Unit.

UK research council panels, government bodies, advisory board memberships. Many of our staff serve on the ESRC Peer Review College, including **Clare**, **Ward**, **Leek**, **Cox**, **Tainturier** and ECRs **Cross**, **Ramsey**, and **Jones**. Membership of international review committees includes the Research Evaluation Panel for the Spanish Research Council (**Mari-Beffa**, 2009-present), and the Review Committee of the Ministry of Education, Kingston, Jamaica (**Henningham**, 2011-2012). School staff serving on government boards and councils include **Bracewell**, who is the only academic member (2008-present) of the Welsh Council of the British Medical Association. **Caravolas** has since 2010 advised the Welsh Government on literacy and the provision for children with dyslexia in Wales. Additionally, our faculty hold membership on a diverse set of advisory boards at the international (e.g. **Rafal**: James S. McDonnell Foundation, Understanding Human Cognition Program), national (e.g. **Rogers**: Research Expert Panel that advises the Responsible Gambling Strategy Board, Gambling Commission on Gambling Research and Regulation; **Bracewell**: National Institute for Health and Clinical Excellence, UK Foundation Programme Office Academic task and finish group, and the Wales Vision Advisory Group), and local levels (e.g. **Thierry**: advisory board of the Centre for Literacy and Multilingualism at Reading University).

Editorial boards. Our staff are active in senior editorial roles for journals such as: *Addiction* (**Cox:** Assistant Editor*), Ageing & Mental Health (***Woods**: Associate Editor), *British Journal of Health Psychology* (**Morrison**: Associate Editor), *Cortex (***Tainturier**: Associate Editor*), Dementia (***Clare**: Associate Editor*), Frontiers* (**Thierry**: Associate Editor), *International Journal of Social Research*

and Practice (**Clare**: Associate Editor), *Journal of Neuropsychology* (**Turnbull**: Associate Editor)*, Neuropsychological Rehabilitation* (**Clare**: Executive Editor), *Neuropsychoanalysis* (**Turnbull**, former Editor), *Neuroreport (***Thierry**: Section Editor*), Quarterly Journal of Experimental Psychology* (**Leek**: Associate Editor; **Parkinson**: Assistant Editor*),* and the *Cochrane Dementia and Cognitive Improvement Group* (**Clare**, Editor). Furthermore, our staff are well-represented on journal editorial boards including, but not limited to, *Behaviour Analysis in Practice, Cortex, Cognitive Neuropsychology, Developmental Neuropsychology, Experimental Brain Research, Frontiers, Gerontology, Infancy, Journal of Gambling Studies, International Journal of Geriatric Psychiatry, Journal of Children's Services, Journal of Dementia Care*, *Laterality, Mindfulness, Neuropsychologia, Non-Pharmacological Therapies in Dementia, The Behavior Analyst, The European Journal of Behavior Analysis,* and *The Journal of Precision Teaching*.

Conference and workshop participation and organization. Coincident with our 50th Anniversary, the School hosted the Experimental Psychology Society (EPS) conference in June 2013 with 100+ delegates (**Leek**: conference organiser). The EPS draws international membership from the UK, EU, and USA. The **Centre for Research in Bilingualism** held three highly successful international conferences, six international workshops, and a summer school, attracting high-profile speakers from national and international institutions. The Centre also organised a series of six workshops for academics and practitioners including "One brain, two languages: bridging neuroscience and linguistics", funded by the Art and Humanities Research Council (2008-2011; £25,000) to **Thierry** (with Deuchar, Bangor Linguistics). Conferences organised by Bangor faculty in other locations include: the International Conference of Reading, Spelling, and Writing Development in Prague, Czech Republic (**Caravolas**, 2011); the International MR Spectroscopy of GABA conference (**Mullins**); and TEDx Holyhead (**Parkinson** co-organiser, 2013).
The School has also been active in international training and education, particularly in cognitive neuroscience. For example, **Rafal** annually runs a summer school course (2010-present), funded by the James S. McDonnell Foundation: "The Visceral Mind: A Hands on Course in the Anatomy of Human Cognition". The summer school, which takes 40 students each year, attracts large numbers of applications from students around the world. **Rafal** is also a permanent faculty member, and on the executive board, of the Summer Institute for Cognitive Neuroscience, University of California. In 2013, our staff (**Boehm**, **Mills**, **Klein**) conducted a highly successful summer school on "Event-Related Potentials (ERPs): Exploring the human mind with brain waves". In its first year, the summer school trained 40 students; roughly three times this number of UK and international applicants applied. **Klein** was also co-organiser of the European Summer School on Eye Movements in Bonn (2013). Five Wales Institute of Cognitive Neuroscience summer schools (hosted by Bangor, Cardiff & Swansea) were held in the REF period. These regularly attracted around 100 graduate students, research fellows, and staff members.

Fellowships, awards, and keynote addresses. A small subset of the awards given to our faculty include: an OBE for services to children and families to **Hutchings** (2011); multiple awards to **Horne** and **Lowe** including the Scientific Translation Award from the Society for the Advancement of Behavioral Analysis (2012); and the Society for the Advancement of Behavior Analysis Distinguished Service Award to **Hughes** (2013). **Watt** received an award from the Society of Motion Picture and Television Engineers for work on stereoscopy in vision. Two of our new early-career appointments (**Cross**, **Ramsey**) captured the ESRC Future Leaders Award (2012-15). **Cross** was also awarded the Dutch Science Foundation VENI young Investigator award (2012-2015, €250,000 – with matching funds for a PhD student from Bangor), the Young Talent Award from the Dutch Endo-Neuro-Psycho Society (2012), the Advancing Science "Serving Society Excellence in Science Award" (2008), and was recently chosen as 1 of 12 British women scientists for "Soapbox Science" (2013). Our faculty have also given a large number of invited addresses, of which the following is a small sample: **Caravolas**: British Dyslexia Association 8th International Conference, UK, 2011; **Rafal**: The Helmholtz Lecture, University of Utrecht, 2011 and The Whitehead Lectures in "Cognition, Computation and Culture", Goldsmiths, 2010. Public engagement contributions have come from **Mills**: public keynote on research behind bilingualism, Bogotá, Columbia, 2012; **Downing**: speaker at Wellcome Trust public engagement event "Master of Manipulation", 2012; **Thierry**: public keynote lecture, Wits University, South-Africa, 2010.